Big Tujunga Dam
Low-Effect Habitat Conservation Plan

Big Tujunga Creek, Los Angeles County, California

Prepared for

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Executive Summary

Big Tujunga Dam (Dam) is located in Big Tujunga Canyon in the San Gabriel Mountains of the Angeles National Forest, Los Angeles County, California. Big Tujunga Dam was constructed in 1931 to provide flood protection through storm attenuation and debris capture in addition to water conservation for the region. Los Angeles County Public Works (Public Works) and the Los Angeles Department of Water and Power (LADWP) have prepared the Big Tujunga Dam Low-Effect Habitat Conservation Plan (HCP) pursuant to Section 10 of the Federal Endangered Species Act to support consultation with the U.S. Fish and Wildlife Service (USFWS) for ongoing operation and maintenance of the Dam. The permit duration would be 30 years from the date of permit issuance, anticipated in spring 2022.

Covered Species for the HCP include the following: (1) Santa Ana sucker (*Catostomus santaanae*); (2) arroyo chub (*Gila orcuttii*); (3) Santa Ana speckled dace (*Rhinichthys osculus*); (4) arroyo toad (*Anaxyrus californicus*); (5) western pond turtle (*Actinemys marmorata pallida*); (6) least Bell's vireo (*Vireo bellii pusillus*); (7) southwestern willow flycatcher (*Empidonax traillii extimus*); and (8) western yellow-billed cuckoo (*Coccyzus americanus occidentalis)*. It should be noted that the southwestern willow flycatcher and western yellow-billed cuckoo do not currently occur in the HCP study area but are included because they could occur in the future.

The HCP study area includes Big Tujunga Creek from Fall Creek (upstream of Big Tujunga Reservoir), Big Tujunga Reservoir, Big Tujunga Creek from Big Tujunga Dam downstream to Hansen Dam, and upland habitat in Maple Canyon Sediment Placement Site, which would be the receptor site for sediment removed from Big Tujunga Reservoir by the Reservoir Restoration Project. The HCP study area is approximately 14 miles long and includes approximately 2,334 acres of habitat. Vegetation types and other land cover present within the study area have been grouped into generalized types as follows: sage scrub, alluvial scrub, chaparral, grassland, riparian forest, riparian scrub, riparian herb, marsh, seep, forest/woodland, riparian invasive, ornamental plantings, cliff/rock, open water, alluvium, and other landcover.

Covered Activities that the HCP addresses include the following: (1) ongoing Dam operations including flood control releases, water conservation releases, and supplemental releases for the benefit of downstream habitat; (2) periodic Dam maintenance including inspections/testing, regular short-term small-scale maintenance, infrequent short-term small-scale maintenance, and infrequent long-term large-scale maintenance (including the upcoming Reservoir Restoration Project to remove sediment from the Big Tujunga Reservoir); and (3) Spillway Improvement Project, which would raise the height of the Dam's right abutment spillway by 8 feet. Because the USFWS is anticipated to translocate Santa Ana sucker upstream of Big Tujunga Reservoir as part of the species' Recovery Plan, the HCP also covers potential take of translocated Covered Fish species that may occur due to operation and maintenance of the Dam. Covered Activities also include Avoidance and Minimization Measures (numbered OPER-X and MAIN-X) that would be implemented for operation and maintenance activities. The HCP Action Area includes areas that would be directly or indirectly impacted by Covered Activities. Direct and indirect impacts on Covered Species are summarized in Table ES-1.

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TABLE ES-1
SUMMARY OF POTENTIAL EFFECTS ON COVERED SPECIES AND CRITICAL HABITAT

Covered Species	Potential Direct Take	Possible Indirect Take	Direct Loss of Habitat	Indirect Effects on Habitat
Santa Ana sucker, arroyo chub, Santa Ana speckled dace	No direct take of Covered Fish expected as a result of operation and maintenance assuming implementation of OPER-2, and MAIN-1. Handling individuals for relocation out of work areas per MAIN-1 could inadvertently kill/injure the juveniles/adults (minimized through use of proper methods reviewed in the SSFRP per MAIN-1).	1. Releases could wash eggs/fry downstream into non-suitable habitat (minimized by implementation of OPER-2). 2. Abrupt change in release rate could cause stranding of eggs/fry/juveniles in drying pools (not expected with implementation of OPER-2). 3. Supplemental releases beneficially affect water quality by lowering water temperature and increasing dissolved oxygen levels during the warm summer months, which would increase survival (per OPER-3). 4. Maintenance projects could have indirect effects on water quality (not expected with implementation of MAIN-1 and MAIN-6). 5. Maintenance projects within the plunge pool or stream downstream could inadvertently kill/injure individuals during installation of exclusion measures or BMPs (not expected with implementation of MAIN-1). 6. Replacement of the downstream access road could disrupt movement of aquatic species (not expected with implementation of MAIN-1). 7. Supplemental releases would not be available during infrequent long-term, large-scale maintenance projects; stream would be on a bypass line and subject to natural flows (minimized by biological monitoring under MAIN-1). 8. Following translocation upstream, stream habitat in the upper Reservoir footprint would be subject to inundation based on fluctuation in the Reservoir pool (not expected to adversely affect Covered Fish).	**Infrequent short-term, small-scale maintenance (downstream maintenance):** up to 2.69 acres of white alder grove–willow thicket; *temporary impact* **Infrequent long-term, large-scale maintenance:** 1.45 acres open water in the plunge pool (occupied by only arroyo chub); *temporary impact* **Spillway Improvement Project:** 1.45 acres open water in the plunge pool (occupied by only arroyo chub); *temporary impact*	1. Dampening of the flood cycle downstream of the Dam to Stone Canyon: 111.20 acres of riparian habitat along 4.8 stream miles (see habitat enhancement in Section 5.5). 2. Non-native wildlife species could spread from the Reservoir (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 3. Supplemental releases provide continuous water that could contribute to expansion of non-native wildlife downstream (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 4. Supplemental releases could contribute to densification of riparian vegetation that would encroach upon the stream habitat (see in-stream vegetation removal as a potential habitat enhancement measure in Section 5.5).
arroyo toad	No direct take expected as a result of operation and maintenance assuming implementation of MAIN-2. Handling individuals for relocation out of work areas per MAIN-2 could inadvertently kill/injure the eggs/tadpoles/juveniles/adults (minimized through use of proper methods reviewed in the ATRP per MAIN-2).	1. Up to 1.12 stream miles of stream-like habitat could be inundated by fluctuation in the Reservoir pool; however, typically 0.76 stream mile is available during the non-storm season. 2. Eggs/tadpoles could be inundated or stranded due to fluctuation in the Reservoir pool (extremely limited potential; further minimized with implementation of OPER-2). 3. Storage of water for the supplemental releases would inundate up to 0.73 stream mile, leaving 0.39 mile of suitable stream-like habitat in the upper Reservoir; the amount of available habitat would increase over the non-storm season as water is released. 4. Maintenance projects that require a bypass line inlet at the upper end of the Reservoir could inadvertently kill/injure individuals during installation of exclusion measures, bypass line, or BMPs (not expected with implementation of MAIN-2). 5. Following the Spillway Improvement Project, an additional 0.08 mile of stream-like habitat would be inundated following large storms (approximately once every ten years during the storm season). 6. Following future translocation of Covered Fish upstream of the Reservoir, pre-construction surveys for Covered Fish could kill/injure arroyo toads in the area being surveyed (minimized through conducting surveys for MAIN-2 prior to surveys for MAIN-1).	**Reservoir fluctuation (flood control/water conservation/supplemental releases):** Inundation of 1.12 stream miles of stream-like habitat at upper end of Reservoir; 14.60 acres riparian/alluvial habitats (0.07 acre scale broom scrub, 0.82 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 4.74 acres arroyo willow thicket, 0.03 acre sandbar willow thicket, 0.60 acre mulefat thicket, 2.67 acres smartweed–cocklebur patch, and 5.50 acres dry wash; *temporary impact* **Infrequent long-term, large-scale maintenance (sediment removal only):** 6.29 acres of habitat (0.06 acre of white alder grove—willow thicket, 0.17 acre of black willow thicket, 0.23 acre of arroyo willow thicket, 0.46 acre of mulefat thicket, 2.29 acres of smartweed—cocklebur patch, and 3.08 acres of dry wash); *temporary impact* **Spillway Improvement Project:** infrequent inundation of 0.08 additional stream mile of stream-like habitat at the upper end of Reservoir, which includes 1.60 acres riparian/alluvial habitats (0.07 acre scale broom scrub, 0.28 acre white alder grove–willow thicket, 0.95 acre arroyo willow thicket, 0.13 acre sandbar willow thicket, 0.03 acre smartweed–cocklebur patch, and 0.14 acre dry wash); *temporary impact*	1. Non-native wildlife species could spread from the Reservoir (see non-native species removal as a potential habitat enhancement measure in Section 5.5).

TABLE ES-1
SUMMARY OF POTENTIAL EFFECTS ON COVERED SPECIES AND CRITICAL HABITAT

Covered Species	Potential Direct Take	Possible Indirect Take	Direct Loss of Habitat	Indirect Effects on Habitat
western pond turtle	No direct take is expected as a result of operation and maintenance assuming implementation of MAIN-3. Handling individuals for relocation out of work areas per MAIN-3 could inadvertently kill/injure the juveniles/adults (minimized through use of proper methods reviewed in the WPTRP per MAIN-3).	1. Releases could displace individuals downstream, but they would be expected to move upstream/downstream to suitable habitat. 2. Supplemental releases beneficially add suitable habitat during the non-storm season. 3. Supplemental releases beneficially affect water quality by lowering water temperature and increasing dissolved oxygen levels during the warm summer months. 4. Maintenance projects could have indirect effects on water quality (not expected with implementation of MAIN-3 and MAIN-6). 5. Maintenance projects within the plunge pool or downstream areas could inadvertently kill/injure individuals during installation of exclusion measures or BMPs (not expected with implementation of MAIN-3). 6. Replacement of the downstream access road could disrupt movement of aquatic species (not expected with implementation of MAIN-3). 7. Supplemental releases would not be available during infrequent long-term, large-scale maintenance projects; stream would be on a bypass line and subject to natural flows. Western pond turtles would be expected to move to suitable habitat.	**Infrequent short-term, small-scale maintenance (downstream maintenance):** 2.69 acres of white alder grove–willow thicket; *temporary impact* **Infrequent long-term, large-scale maintenance (sediment removal):** 49.64 acres (0.06 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 0.23 acre arroyo willow thicket, 0.46 acre mulefat thicket, 2.29 acres smartweed–cocklebur patch, 43.35 acres open water, 3.08 acres dry wash); *temporary impact* **Infrequent long-term, large-scale maintenance (subsurface grouting/ concrete repair):** 19.13 acres (0.04 acre disturbed freshwater seep, 19.09 acres open water); *temporary impact* **Spillway Improvement Project:** 1.45 acres open water in the plunge pool; *temporary impact*	1. Dampening of the flood cycle downstream of the Dam to Stone Canyon: 111.20 acres of riparian habitat along 4.8 stream miles (see habitat enhancement in Section 5.5). 2. Non-native wildlife species could spread from the Reservoir (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 3. Supplemental releases provide continuous water that could contribute to expansion of non-native wildlife downstream (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 4. Supplemental releases could contribute to densification of riparian vegetation that would encroach upon the stream habitat (see in-stream vegetation removal as a potential habitat enhancement measure in Section 5.5).
least Bell's vireo, southwestern willow flycatcher, western yellow-billed cuckoo	No direct take is expected as a result of operation and maintenance assuming implementation of MAIN-4 and MAIN-5.	1. Releases during the breeding season could inundate nests that are built close to the water level downstream of the Dam; minimal potential to affect least Bell's vireo nests; not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests (minimized with implementation of OPER-2 and MAIN-1). 2. Reservoir fluctuation during the breeding season could inundate nests that are built close to the water level in riparian habitat in the upper Reservoir; minimal potential to affect least Bell's vireo nests; not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests. 3. Maintenance projects could have indirect effects on water quality, which could affect invertebrate prey of riparian bird species (not expected with implementation of MAIN-1 and MAIN-6). 4. Noise and human activity during the breeding season could cause Covered Riparian Birds to abandon a nest or avoid establishing a territory within 500 feet of the work area. Noise could interfere with communication between a pair and could affect nest success (not expected with implementation of MAIN-4). 5. Maintenance projects that remove riparian habitat during the breeding season could impact riparian bird nests during vegetation removal or installation of BMPs (not expected with implementation of MAIN-4 and MAIN-5). 6. Following the Spillway Improvement Project, an additional 0.08 mile of stream-like habitat would be temporarily inundated following large storms (approximately once every ten years during the storm season); minimal potential to affect least Bell's vireo nests; not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests. 7. Following future translocation of Covered Fish upstream of the Reservoir, pre-construction surveys for Covered Fish could impact riparian bird nests in the area being surveyed.	**Reservoir fluctuation (flood control/water conservation):** Inundation of 6.36 acres riparian habitat (0.82 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 4.74 acre arroyo willow thicket, 0.03 acre sandbar willow thicket, 0.60 acre mulefat thicket); *temporary impact* **Infrequent short-term, small-scale, maintenance (downstream maintenance):** Removal of 2.69 acres of white alder grove–willow thicket; *temporary impact* **Infrequent long-term, large-scale maintenance (sediment removal only):** Removal of 0.92 acre of riparian habitat (0.06 acre of white alder grove—willow thicket, 0.17 acre of black willow thicket, 0.23 acre of arroyo willow thicket, 0.46 acre of mulefat thicket); *temporary impact* **Spillway Improvement Project (additional inundation):** Inundation of 1.36 acres riparian habitats (0.28 acre white alder grove–willow thicket, 0.95 acre arroyo willow thicket, 0.13 acre sandbar willow thicket); *temporary impact*	1. Dampening of the flood cycle downstream of the Dam to Stone Canyon: 85.85 acres of riparian scrub/forest habitat along 4.8 stream miles (see habitat enhancement in Section 5.5). 2. Supplemental releases could contribute to densification of riparian vegetation that would encroach upon the stream habitat. Initially beneficial for increasing the amount of riparian habitat; but, over time, the lack of flooding would reduce the amount of young understory growth preferred for nesting (see in-stream vegetation removal as a potential habitat enhancement measure in Section 5.5).

TABLE ES-1
SUMMARY OF POTENTIAL EFFECTS ON COVERED SPECIES AND CRITICAL HABITAT

Covered Species	Potential Direct Take	Possible Indirect Take	Direct Loss of Habitat	Indirect Effects on Habitat
Critical Habitat				
Santa Ana sucker	Not applicable	See above	**Infrequent short-term, small-scale maintenance (downstream maintenance):** up to 2.69 acres; *temporary impact* **Infrequent long-term. large-scale maintenance:** 1.45 acres (not occupied by Santa Ana sucker); *temporary impact* **Spillway Improvement Project:** 1.45 acres (not occupied by Santa Ana sucker); *temporary impact*	Disruption of the flood cycle downstream of the Dam to Stone Canyon: 111.20 acres of riparian habitat along 4.8 stream miles
arroyo toad	Not applicable	See above	**Reservoir fluctuation (flood control/water conservation):** Inundation of 5.39 acres over 0.24 stream mile typically during the storm season; *temporary impact* **Spillway Improvement Project:** Inundation of an additional 1.59 acres over 0.08 stream mile typically during the storm season; *temporary impact*	None
southwestern willow flycatcher	Not applicable	None	None	None
SSFRP: Special Status Fish Relocation Plan; ATRP: Arroyo Toad Relocation Plan; WPTRP: Western Pond Turtle Relocation Plan; BMPs: Best Management Practices; OPER-X: Avoidance and Minimization Measure for Operations; MAIN-X: Avoidance and Minimization Measure for Maintenance				

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The following biological goals were established for the HCP:

Biological Goal 1 Facilitate water releases that are not detrimental to conserving existing Covered Species occurrences in the Action Area and that would support an increase in the number of Covered Species individuals and/or an increase in the distribution of Covered Species in the Action Area.

Biological Goal 2 While providing flood protection and water conservation pursuant to Los Angeles County Flood Control District's mission, maintain natural stream dynamics (hydrological and sediment transport processes) to the extent reasonably possible downstream of Big Tujunga Dam. Natural stream dynamics would support a mosaic of riparian and riverine habitats (i.e., various successional stages) that would provide habitat value for multiple Covered Species.

Biological Goal 3 Avoid and minimize impacts on Covered Species in the Action Area during maintenance projects.

The HCP includes monitoring of Covered Species. Each species group would be monitored once every three years on the following cycle: (1) Covered Fish Species, Benthic Macroinvertebrates, and Aquatic Habitat; (2) Covered Herpetofauna Species and Barrier Mapping (i.e., barriers that may block aquatic wildlife movement); (3) Covered Riparian Bird Species and Riparian Habitat. Additionally, two data loggers would be installed downstream of the Dam to record stream temperature for the purpose of evaluating the effectiveness of the Supplemental Releases.

The HCP Working Group will meet annually to review the results of monitoring and to determine how habitat enhancement funds should be allocated based on stream habitat conditions. Potential habitat enhancement projects may include removal of non-native plants, removal of non-native wildlife, removal of in-stream vegetation, removal of barriers to fish movement, supplementing cobble/gravel substrate, supplementing woody debris, and removal of homeless encampments and trash. The HCP Working Group[3] will be comprised of Public Works, LADWP, USFWS, California Department of Fish and Wildlife (CDFW), U.S. Forest Service (USFS), and species experts.

Each year, Public Works/LADWP will prepare an Annual Report to discuss compliance with the HCP. The Annual Report will include records of inflow/outflow; maintenance projects, associated impacts, and associated avoidance and minimization measures that were implemented; and results of Covered Species surveys and habitat monitoring.

Public Works will provide all funding necessary to implement the HCP. The HCP includes an annual contribution to the habitat enhancement fund of $30,000 per year and would be increased for inflation every 10 years; these funds may be pooled over multiple years to accommodate larger projects. The annual cost of the HCP implementation varies depending on the type of monitoring that would occur. The HCP's annual cost would range from an initial cost of approximately $225,000–$330,000 and would be adjusted for inflation of the 30-year permit term. The total cost of the HCP over the 30-year permit term would be approximately $11.56 M.

The HCP also evaluates changed and unforeseen circumstances that may occur over the permit term. Changed circumstances evaluated include fire, flood, drought, earthquake, hazardous materials spill, illegal dumping, vandalism, and spread of non-native invasive species. The HCP includes funding for changed circumstances if a response was considered necessary. Unforeseen

[3] CDFW, USFS, and species experts will participate in the HCP Working Group in an advisory role but will have no decision-making authority because they are not signatory to the HCP.

circumstances included in the HCP include structural failure of the Dam and disease affecting Covered Species. While unforeseen circumstances are not expected to occur over the permit term, if they do occur, the HCP Working Group will determine how to reallocate HCP funding to respond to the unforeseen circumstance. The HCP describes how modifications can be made to the plan, including administrative changes, minor amendments, and major amendments.

Lastly, the HCP evaluated alternatives to the preparation of the Low-Effect HCP such as the status quo, no take alternative, activity by activity permitting, reduced species alternative, and alternative permit durations.

1.0 Introduction and Background

Big Tujunga Dam (Dam) is located in Big Tujunga Canyon in the San Gabriel Mountains of the Angeles National Forest, Los Angeles County, California. The Los Angeles County Flood Control District (LACFCD), as administered by and through Los Angeles County Public Works (Public Works), and the Los Angeles Department of Water and Power (LADWP) have prepared the Big Tujunga Dam Low-Effect Habitat Conservation Plan (HCP) pursuant to Section 10 of the Federal Endangered Species Act (FESA) to support consultation with the U.S Fish and Wildlife Service (USFWS). Covered Activities that the HCP addresses include: (1) ongoing Dam operation; (2) periodic Dam maintenance, which includes an upcoming project to remove sediment from the Big Tujunga Reservoir (Reservoir Restoration Project); and (3) Spillway Improvement Project, which would raise the height of the Dam's right abutment spillway by 8 feet. The permit duration would be 30 years from the date of permit issuance, anticipated in spring 2022.

The HCP study area includes Big Tujunga Creek from Fall Creek (upstream of Big Tujunga Reservoir), Big Tujunga Reservoir, Big Tujunga Creek from Big Tujunga Dam downstream to Hansen Dam, and upland habitat in Maple Canyon Sediment Placement Site (SPS), which would be the receptor site for sediment removed from Big Tujunga Reservoir by the Reservoir Restoration Project. The HCP study area is approximately 14 miles long and includes approximately 2,334 acres of habitat (Exhibit 1).

Covered Species for the HCP include the following: (1) Santa Ana sucker (*Catostomus santaanae*), (2) arroyo chub (*Gila orcuttii*), (3) Santa Ana speckled dace (*Rhinichthys osculus*), (4) arroyo toad (*Anaxyrus californicus*), (5) western pond turtle (*Actinemys marmorata pallida*); (6) least Bell's vireo (*Vireo bellii pusillus*), (7) southwestern willow flycatcher (*Empidonax traillii extimus*), and (8) western yellow-billed cuckoo (*Coccyzus americanus occidentalis*).

The California Department of Fish and Wildlife (CDFW) has been included in the HCP Steering Committee throughout the preparation of the HCP. Although LACFCD/LADWP have elected not to pursue a Natural Communities Conservation Plan (NCCP) with CDFW, CDFW comments have been incorporated into the HCP. The purpose of including CDFW in the federal HCP process is to encourage project-level Streambed Alteration Agreements and/or Incidental Take Permits (ITP) to rely on the analysis and conservation measures in the HCP, assuming the conditions at the time of project-level permitting remain consistent with the analysis in the HCP. However, without pursuing a formal NCCP/State ITP, future project-level permitting from CDFW would not be bound to the requirements in the HCP.

1.1 REGULATORY FRAMEWORK

1.1.1 FEDERAL

1.1.1.1 NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act (NEPA) establishes a broad national framework for protecting the environment. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment (42 United States Code [USC] 4321-4347). NEPA established the Environmental Protection Agency (EPA) with the following roles and functions: (1) to establish and enforce environmental protection standards consistent with national environmental goals; (2) to conduct research on the adverse effects of pollution and on methods and equipment for controlling it, the gathering of information on pollution, and the use of this information in strengthening environmental protection programs and recommending policy changes; (3) to provide grants, technical assistance, and other means to lessen pollution of the environment; and (4) to assist the Council on Environmental Quality in developing and recommending to the President new policies for the protection of the environment.

1.1.1.2 FEDERAL ENDANGERED SPECIES ACT

The FESA protects plants and animals that the USFWS has listed as “Endangered” or “Threatened.” A federally listed species is protected from unauthorized “take,” which is defined in the FESA as acts to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct” (16 USC Sections 1532[19] and 1538[a]). In this definition, “harm” includes “any act which actually kills or injures fish or wildlife, and emphasizes that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife” (50 Code of Federal Regulations [CFR], Title 50, Section 17.3). Enforcement of the FESA is administered by the USFWS.

Unless performed for scientific or conservation purposes with the permission of the USFWS, take of listed species is permissible only if the USFWS issues an Incidental Take Authorization (ITA) or Incidental Take Permit (ITP) under Section 7 or 10 of the FESA, respectively, or pursuant to Section 4(d) of the FESA for federally listed Threatened species. When issuing an ITP, all federal agencies, including the USFWS, must ensure that their activities are “not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species” (16 USC 1536[a]). To obtain an ITP under Section 10, applicants must develop a conservation plan that meets specific requirements (50 CFR 17.22 and 17.32; 50 CFR 222.25, 222.27, and 222.31); it must specify the impacts that are likely to result in take and measures that the applicant will implement to minimize and mitigate these impacts. Conservation plans prepared to meet the requirements of Section 10 are known as HCPs.

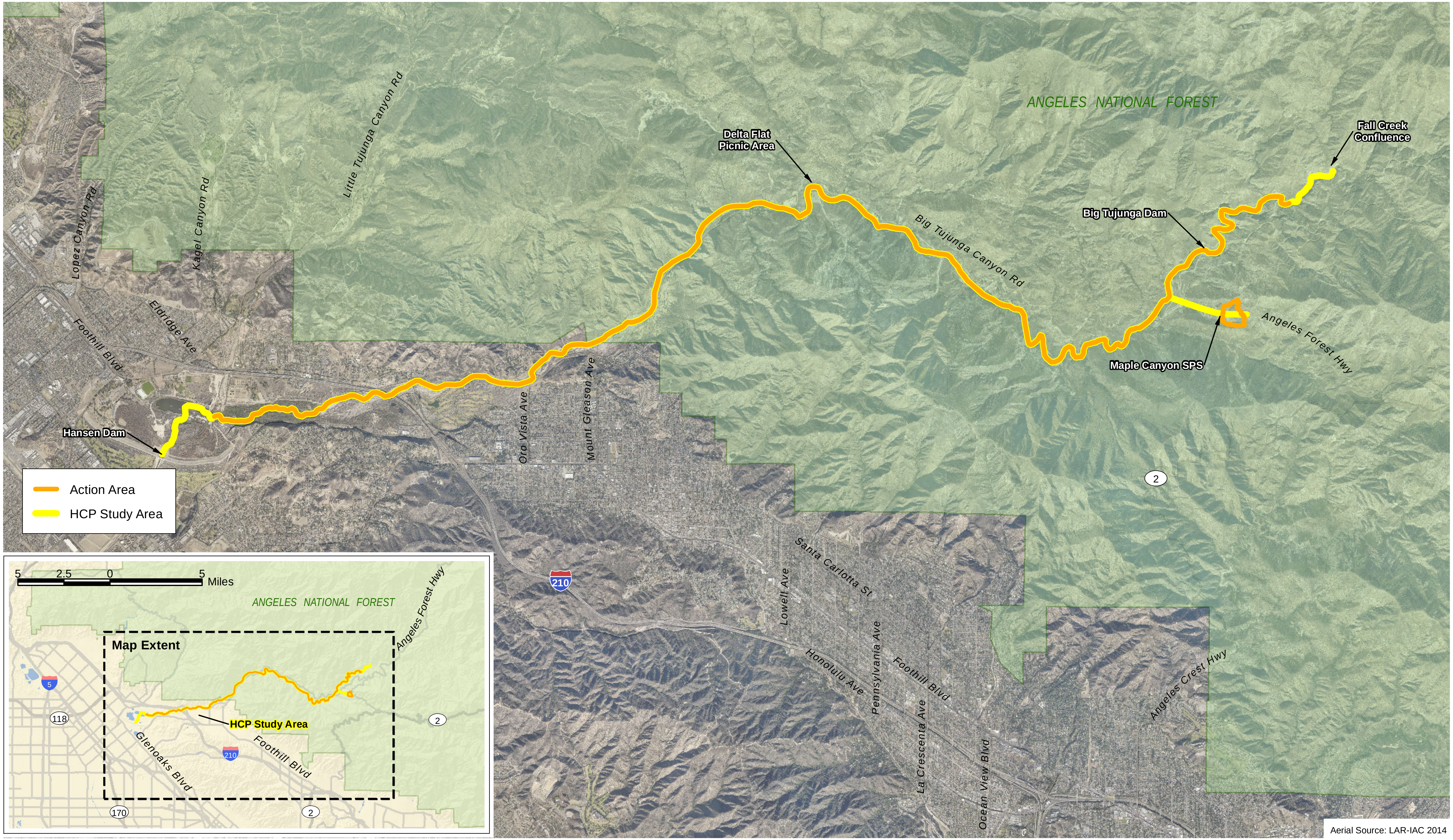
The FESA also provides for designation of Critical Habitat: specific areas within the geographical range occupied by a species where physical or biological features “essential to the conservation of the species” are found and “which may require special management considerations or protection” (16 USC 1538[5][A]). Critical Habitat may also include areas outside the current geographical area occupied by the species that are nonetheless essential for the conservation of the species.

1.1.1.3 FISH AND WILDLIFE COORDINATION ACT

The Fish and Wildlife Coordination Act requires consultation with the USFWS and the fish and wildlife agencies of States where the “waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified” by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of “preventing loss of and damage to wildlife resources.”

1.1.1.4 SECTIONS 404 AND 401 OF THE CLEAN WATER ACT OF 1972

Section 404 of the Clean Water Act (CWA) (33 USC 1251 et seq.) regulates the discharge of dredged or fill material into waters of the United States, including wetlands. The U.S. Army Corps of Engineers (USACE) is the designated regulatory agency responsible for administering the 404 permit program and for making jurisdictional determinations. This permitting authority applies to all waters of the United States where the material has the effect of (1) replacing any portion of waters of the United States with dry land or (2) changing the bottom elevation of any portion of waters of the United States. These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in waters of the United States. Dredge and fill activities are typically associated with development projects; water



HCP Study Area

Big Tujunga Dam HCP

Exhibit 1

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resource-related projects; infrastructure development; and wetland conversion to farming, forestry, or urban development.

Under Section 401 of the CWA, an activity requiring a USACE Section 404 permit must obtain a State Water Quality Certification (or waiver thereof) to ensure that the activity will not violate established State water quality standards. The State Water Resources Control Board (SWRCB), in conjunction with the nine California Regional Water Quality Control Boards (RWQCBs), is responsible for administering the Section 401 water quality certification program.

Under Section 401 of the federal CWA, an activity involving discharge into a federal water must obtain a federal permit and a State Water Quality Certification to ensure that the activity will not violate established water quality standards. The EPA is the federal regulatory agency responsible for implementing the CWA. However, it is the SWRCB, in conjunction with the nine RWQCBs, which essentially has been delegated the responsibility of administering the water quality certification (Section 401) program.

1.1.1.5 RIVERS AND HARBORS APPROPRIATION ACT OF 1899

Section 10 of the Rivers and Harbors Appropriation Act (33 USC 403) requires authorization from the Secretary of the Army, acting through the USACE, for the construction of any structure in or over any navigable water of the United States. Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to any dredging or disposal of dredged materials, excavation, filling, re-channelization, or any other modification of a navigable water of the United States and applies to all structures, from the smallest floating dock to the largest commercial undertaking. It further includes, without limitation, any wharf, dolphin, weir, boom breakwater, jetty, groin, bank protection (e.g., riprap, revetment, bulkhead), mooring structures such as pilings, aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, tunnel, artificial canal, boat ramp, aids to navigation, and any other permanent or semi-permanent obstacle or obstruction.

1.1.1.6 MIGRATORY BIRD TREATY ACT OF 1918

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–711), as amended in 1972, makes it unlawful at any time, by any means or in any manner, unless permitted by regulations, to “pursue; hunt; take; capture; kill; attempt to take, capture, or kill; possess; offer for sale; sell; offer to barter; barter; offer to purchase; purchase; deliver for shipment; ship; export; import; cause to be shipped, exported or imported; deliver for transportation; transport or cause to be transported; carry or cause to be carried; or receive for shipment, transportation, carriage, or export, any migratory bird; any part, nest, or eggs of any such bird; or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. . .” (16 USC 703).

The MBTA covers the taking of any nests or eggs of migratory birds, except as allowed by permit pursuant to 50 CFR, Part 21. This regulation seeks to protect migratory birds and active nests. The MBTA protects over 800 species, including many relatively common species. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds (50 CFR 10.13), as updated by the 1983 American Ornithological Society (AOS) Checklist and published supplements by the USFWS.

In 1972, the MBTA was amended to include protection for migratory birds of prey (e.g., raptors). Six families of raptors occurring in North America were included in the amendment: *Accipitridae* (kites, hawks, and eagles); *Cathartidae* (New World vultures); *Falconidae* (falcons and caracaras); *Pandionidae* (ospreys); *Strigidae* (typical owls); and *Tytonidae* (barn owls). The provisions of the 1972 amendment to the MBTA protect all species and subspecies of these families.

1.1.2 STATE

1.1.2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) (13 Public Resources Code [PRC] Sections 21000 et seq.) is a statute that requires State and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. The CEQA Guidelines (Title 14, Chapter 3, California Code of Regulations) are the regulations that explain and interpret the law for both public agencies and private development required to administer CEQA.

With regard to plants and animals, Section 15380 of the CEQA Guidelines independently defines “Endangered” and “Rare” species separately from the definitions of the California Endangered Species Act (CESA). Under CEQA, a Lead Agency can consider a non-listed species to be treated as if it were Endangered, Rare, or Threatened for the purposes of CEQA if the species can be shown to meet the criteria in the definition of “Rare” or “Endangered” in the project region.

The CEQA Guidelines designates certain “trustee agencies” that have jurisdiction by law over natural resources affected by a project which are held in trust for the people of California. The CDFW is the trustee responsible for fish and wildlife and designated rare or endangered native plants and responsible to game refuges, ecological reserves, and other areas administered by the department. Trustee agencies are generally required to be notified of CEQA documents relevant to their jurisdiction, whether or not these agencies have actual permitting authority or approval power over aspects of the underlying project. The CDFW, as the trustee agency for fish, wildlife, native plant, and habitat resources provides the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities and makes recommendations regarding those resources held in trust for the people of California (California Fish and Game Code Section 1802).

1.1.2.2 CALIFORNIA ENDANGERED SPECIES ACT

The State of California implements the CESA which is enforced by the CDFW. While the provisions of the CESA are similar to the FESA, CDFW maintains a list of California Threatened and Endangered species independent of the FESA. It also lists species that are considered Rare and Candidates for listing, which also receive protection. The California listing of Endangered and Threatened species is contained in Title 14, Sections 670.2 (plants) and 670.5 (animals) of the California Code of Regulations.

State listed Threatened and Endangered species are protected under provisions of the CESA. Activities that may result in take of individuals (defined in CESA as acts to “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill”) are regulated by the CDFW. Habitat degradation or modification is not included in the definition of take under CESA.

If it is determined that the take would not jeopardize the continued existence of the species, an ITP can be issued by CDFW per Section 2081 of the California Code of Regulations. If a State listed species is also federally listed, and the USFWS has issued an ITP that satisfies CDFW’s requirements, CDFW may issue a consistency finding in accordance with Section 2080.1 of the California Fish and Game Code.

1.1.2.3 NATURAL COMMUNITIES CONSERVATION PLANNING ACT

The Natural Community Conservation Planning Act, codified in Sections 2800–2835 of the California Fish and Game Code, authorizes the preparation of Natural Community Conservation Plans (NCCPs). The Act is a State of California effort to protect critical vegetative communities and their dependent wildlife species. The purpose of an NCCP is to sustain and restore those species and their habitat identified by the CDFW that are necessary to maintain the continued viability of those biological communities impacted by human changes to the landscape. The NCCP process provides an alternative to protecting species on a “single species basis” as in the FESA and CESA. Under the Act, the CDFW is responsible for creating process planning and conservation guidelines for NCCP programs. Local governments and landowners may then prepare the NCCPs so that they comply with the CESA.

1.1.2.4 CALIFORNIA FISH AND GAME CODE

The CDFW administers the California Fish and Game Code. Particular sections of the Code are applicable to natural resource management.

1.1.2.4.1 Unlawful Take or Destruction of Nests or Eggs

Section 3503 of the California Fish and Game Code makes it unlawful to take, possess, or destroy any bird’s nest or any bird’s eggs. Further, any birds in the orders *Falconiformes* or *Strigiformes* (birds of prey such as hawks, eagles, and owls) and their nests and eggs are protected under Section 3503.5 of the California Fish and Game Code. Section 3513 of the California Fish and Game Code prohibits the take and possession of any migratory nongame bird, as designated in the MBTA.

1.1.2.4.2 California Fully Protected Species

The State of California created the “Fully Protected” classification in an effort to identify and provide additional protection to those animals that are rare or that face possible extinction. Lists were created for fish, amphibians, reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under the State and/or Federal Endangered Species Acts; however, some have not been formally listed.

Various sections of the California Fish and Game Code provide lists of Fully Protected reptiles and amphibians (Section 5050), bird (Section 3511), and mammal (Section 4700) species that may not be taken or possessed at any time, except as provided in Section 2081.7, 2081.9, or 2835. The CDFW is unable to authorize the issuance of permits or licenses to take these species, except for necessary scientific research.

1.1.2.4.3 Sections 1600 through 1616

California Fish and Game Code Sections 1600 et seq. establish a process to ensure that projects conducted in and around lakes, rivers, or streams do not substantially adversely affect existing fish and wildlife resources or, when adverse impacts cannot be avoided, ensures that measures are provided as necessary to protect fish and wildlife resources.

California Fish and Game Code Section 1602 requires any person, State, or local governmental agency or public utility to notify the CDFW before beginning any activity that will do one or more of the following:

- substantially obstruct or divert the natural flow of a river, stream, or lake

- substantially change or use any material from the bed, channel, or bank of a river, stream, or lake
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake

Section 1602 of the California Fish and Game Code applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. Generally, the CDFW takes jurisdiction to the top bank of the stream or to the outer limit of the adjacent riparian vegetation (outer drip line), whichever is greater. A Section 1602 Lake or Streambed Alteration Agreement would be required if impacts to identified CDFW jurisdictional areas occur.

1.1.2.5 CALIFORNIA PORTER-COLOGNE WATER QUALITY CONTROL ACT

The Porter-Cologne Water Quality Control Act charges the SWRCBs and RWQCBs with protecting water quality throughout California. Typically, the SWRCB and RWQCB act in concert with the USACE under Section 401 of the CWA in relation to permitting fill of federally jurisdictional waters. SWRCBs and the RWQCBs may require permits (known as “Waste Discharge Requirements” [WDRs]) for the fill or alteration of the waters of the State. The term “waters of the State” is defined as “any surface water or groundwater, including saline waters, within the boundaries of the state” (California Water Code, Section 13050[e]). The SWRCBs and RWQCBs have interpreted their authority to require WDRs to extend to any proposal to fill or alter waters of the State, even if those same waters are not under USACE jurisdiction. Pursuant to this authority, the SWRCBs and RWQCBs may require the submission of a “report of waste discharge” under Section 13260, which is treated as an application for WDRs.

1.2 PROJECT BACKGROUND

The Los Angeles County Flood Control Act (FCA) was adopted by the California State Legislature in 1915, after a disastrous regional flood took a heavy toll on lives and property. The FCA established the LACFCD and its mission to provide flood control and water conservation within its boundaries. The LACFCD is governed, as a separate entity, by the County of Los Angeles Board of Supervisors and is administered by the Los Angeles County Public Works (Public Works). The LACFCD currently owns and operates 14 major dams, 172 debris basins, 26 sediment placement sites, 26 groundwater recharge facilities, and approximately 500 miles of open channel.

Big Tujunga Dam was the tenth major dam to be constructed by the LACFCD and was completed in 1931. The purpose of the Dam is to provide flood protection through storm attenuation and debris capture in addition to water conservation for the region. Its watershed contains over 82 square miles within the San Gabriel Mountains. Upon construction of the Dam, an easement was granted to LACFCD, giving them use of the land needed to operate Big Tujunga Dam and Big Tujunga Reservoir (Reservoir). The Dam is authorized under an easement issued by the United States Department of the Interior per the General Right of Way Act of March 3, 1891 (Easement). This Easement provides for the implementation of operation and maintenance activities needed for continuous operation of the Dam, including periodic sediment removal.

As described in the FCA, the Dam is operated “to protect the areas downstream from damage from flood or storm waters and to provide for the control and conservation of flood, storm, and other waste waters and to conserve these waters for beneficial and useful purposes by spreading, storing, retaining or causing to percolate into the soil within the district” (i.e., through groundwater recharge). The majority of flood control operations occur during the storm season (i.e., between October 15 and April 15); however, flood control operations may occur outside this time period if needed due to storm events. Storm operations attenuate flood flows with the Reservoir rising up to the current spillway elevation of 2,290 feet. Flood control releases prior to, during, and following storm events are varied and depend upon weather forecasts, available storage capacity of the Dam, and inflow received in the Reservoir. Flood control releases are made to safely manage downstream capacity of flood control channel systems when possible while preventing uncontrolled flows. Flood threats can occur rapidly during the storm season; therefore, in order to protect public safety, flood control operations are considered nondiscretionary and are charged by the FCA.

The Dam is also operated by Public Works to provide for water conservation, which is the other mission of the LACFCD, as charged by the FCA. LACFCD conveys the water captured at the Dam to downstream spreading grounds. Water delivered to these spreading grounds percolates into the San Fernando Groundwater Basin, which underlies the City of Los Angeles. During the non-storm season, Public Works is typically able to adjust the timing and rate of water conservation releases to recharge local water supplies while not compromising the flood control capability of the facility or downstream channel system. Factors that affect optimal water conservation efforts include availability of storm water captured behind the Dam to successfully reach the downstream spreading grounds, available capacity at the downstream spreading grounds to accept the water, and other flood control system constraints (i.e., channel maintenance, construction permits, etc.). Since the Dam's construction, water conservation releases have varied in response to the factors mentioned above and account for non-storm season flows downstream in Big Tujunga Creek. These non-discretionary flood control and resulting water conservation operations have been in effect since the Dam's construction; however, because the FESA was passed decades after the Dam was already in operation, the LACFCD has never formally consulted with the USFWS on the potential effects that these Dam operations could have on downstream listed species. Thus, the LACFCD, in cooperation with the LADWP, has voluntarily elected to prepare this HCP to gain assurances that the current and future operations do not jeopardize the continued existence of listed species. While the LACFCD owns the Dam, the City of Los Angeles has exclusive ownership and right[2] to all water flowing in and beneath the Los Angeles River from its sources to the southern boundary of the City, which includes flows from Big Tujunga Creek. As a result, the City relies on LACFCD's operation of the Dam for such water conservation activities to assist in maintenance and recharge of the San Fernando Groundwater Basin. In 1979, the Upper Los Angeles River Area (ULARA) Watermaster was court-appointed to administer the judgment entered in *City of Los Angeles v. City of San Fernando* and to enforce the water rights encompassed within that judgement (including within the ULARA watershed, tributaries, and groundwater basins).

Since the completion of Big Tujunga Dam in 1931, Public Works has conducted several sediment removal projects to maintain the capacity and operability of Big Tujunga Reservoir. In order to establish a long-term sediment removal plan and to accommodate sediment generated by a clean-out in 1981, Maple Canyon was approved for use as a Sediment Placement Site (SPS; USFS 1981). A Special Use Permit was granted to LACFCD by the U.S. Forest Service (USFS) in 1981 for use and operation of Maple Canyon SPS. The 1981 clean-out of Big Tujunga Reservoir resulted in the transfer of approximately 2.6 million cubic yards (mcy) of sediment and debris to Maple Canyon SPS. The 1994–1995 clean-out resulted in the removal of approximately 1.5 mcy of sediment from Big Tujunga Reservoir into Maple Canyon SPS. At the time of establishment,

[2] California recognizes water rights granted to pueblos (settlements) under the Spanish and Mexican governments. Under the doctrine, pueblos organized under the laws of Mexico or Spain have a water right to all streams and rivers flowing through the City and to all groundwater aquifers underlying the City. In addition, the pueblo's claim expands with the needs of the City and may be used to supply the needs of areas that are later annexed to the City. Los Angeles and San Diego are the only original pueblos to exercise their pueblo water rights in the courts.

Maple Canyon SPS was expected to accommodate the sediment removed from Big Tujunga Reservoir for a 50-year period. Currently, Maple Canyon SPS is estimated to have approximately 4.4 mcy of remaining capacity for sediment. At least 2.1 mcy of this capacity will be utilized by a clean-out which will commence shortly after this HCP is completed (Reservoir Restoration Project).

Big Tujunga Dam is under the jurisdiction and oversight of the California Department of Water Resources – Division of Safety of Dams (DSOD). In the 1970s, the DSOD determined that the Dam did not meet current seismic standards and restricted the volume of water that could be stored behind the Dam; however, during flood control operations, water was permitted to be impounded up to the spillway elevation of 2,290 feet, to be returned to restricted elevation as soon as practical. Once returned to the restricted elevation, lower recession flows were impounded up to the restricted Reservoir elevation before it was released to the downstream spreading grounds for groundwater recharge; this was an inefficient use of the Reservoir's capacity and resulted in the practice of surge releases downstream. The Big Tujunga Dam Seismic Rehabilitation and Spillway Modification Project (Rehabilitation Project) was completed to restore the Dam to meet current seismic standards and to reinstate the Reservoir's full capacity to impound storm water with acceptable seismic risk. The Rehabilitation Project consisted of rehabilitating the existing Dam through several modifications, which included, but were not limited to the following: creating a thick-arch Dam face, adding a new overtopping spillway, building raised parapet walls, armoring and stabilizing the right and left abutments, installing a new Dam-control system, constructing a new control house, and installing new valves and a valve house chamber. Without this project, the DSOD would have further restricted the ponding of water at the facility, potentially causing less captured water to be available within the canyon. In 2012, the DSOD recertified the Dam, which allowed Public Works unrestricted operational use of the facility. The Rehabilitation Project restored the full available capacity at the Dam, allowing increased opportunities for water conservation and flood risk reduction. In addition, the Dam's restored capacity allows increased opportunities for habitat enhancement through the supplemental water releases specifically for the Santa Ana sucker when captured storm water is available.

The Santa Ana sucker was federally listed as Threatened in 2000 (USFWS 2000). The Santa Ana Sucker Working Group (SASWG) was created shortly thereafter to discuss the potential ongoing impacts that Big Tujunga Dam operation could have on the Santa Ana sucker. Initially, the group addressed ways in which the Rehabilitation Project could benefit the Santa Ana sucker; the SASWG has continued to meet as agreed during the consultation for the Rehabilitation Project. The SASWG is composed of Public Works, the ULARA Watermaster, LADWP, and resource agencies including the USFWS, the CDFW, the USFS, and consulting biologists that specialize in the species. As part of its commitments to the SASWG, Public Works agreed to add a low-flow valve as part of the Rehabilitation Project. Prior to the Rehabilitation Project, due to physical limitations with the valves, the minimum release that could be made from the Dam was approximately 100 cubic feet per second (cfs). As part of the Rehabilitation Project, the Dam was equipped with a new 24-inch jetflow valve (low-flow valve) that allows for releases from the Dam between 1 cfs and 240 cfs. This low-flow valve makes it possible to make small non-storm season releases that could recharge the creek and potentially benefit the Santa Ana sucker downstream of the Dam. Additionally, Public Works funded a Habitat Suitability Study of the entire stream between Big Tujunga Dam and Hansen Dam (EDAW and SMEA 2009) and agreed to fund ten years of long-term monitoring of the Santa Ana sucker and benthic macroinvertebrates at a subset of the reaches as described in the Habitat Suitability Study. Annual monitoring has been conducted each fall from 2009 to 2018 (SMEA 2010a, 2010b; BonTerra 2012c, 2012e; BonTerra Psomas 2014, 2015, 2016a; Psomas 2017a, 2018d, 2019b). CDFW conducted informal monitoring of the Santa Ana sucker population in 2019 (Psomas 2020a). Following each year of monitoring, the results are presented to the SASWG, and the group discusses the proposed approach to supplemental releases based on how much water is available each year. While additional effort is necessary to determine the best flow regime to benefit the Santa Ana sucker, the SASWG has committed to an "Adaptive Management"[3] approach for non-storm season operation of the Dam and has agreed to reserve a portion of the water captured by the Dam for post-storm season releases to supplement stream flow and refill downstream pools. It should be noted that these low-flow releases of 1.0 to 5.0 cfs were not physically possible until the low-flow valve was installed as part of the Rehabilitation Project. In addition, without the Rehabilitation Project, the supplemental water would not have been available to release for habitat enhancement purposes.

On August 26, 2009, the Station Fire began in the Angeles National Forest near the USFS ranger station along State Route (SR-) 2; it burned over 160,000 acres before the fire was completely contained on October 16, 2009. Approximately 87 percent of the watershed tributary to the Big Tujunga Dam was affected by this wildfire. This event changed the watershed, and it is continuing to recover from this catastrophic event. During this recovery time, increased amounts of debris (e.g., scorched vegetation and topsoil) are transported from burned areas during rain events due to the denuded ground surface. The first few years following the Station Fire were high rainfall years. Through a comparison of pre- and post-2009/2010 and 2010/2011 storm season surveys, an estimated 1.2 mcy of sediment accumulated in Big Tujunga Reservoir after the wildfire, increasing the total amount of sediment in the Reservoir to approximately 2.0 mcy. The subsequent years have consisted of multiple consecutive years of below-average rainfall; limited sediment has been deposited in the Reservoir from 2012 to 2018. A watershed generally takes five years to significantly recover from a wildfire burn; however, the watershed recovery has been slowed due to multiple consecutive years of below-average rainfall.

1.3 CONSULTATION TO DATE

The Rehabilitation Project contained a federal discretionary action, which required completion of the NEPA process with the Federal Emergency Management Agency (FEMA) as the lead agency.

In 2003, during the Section 7 Consultation for the Rehabilitation Project, the USFWS stated that, if the Rehabilitation Project is interrelated with the future operation of the Dam, then Dam operation should be addressed as part of the Rehabilitation Project. Although the installation of a low-flow valve as part of the Rehabilitation Project would allow more flexibility in the operation of the Dam, the SASWG agreed that, if necessary, the Dam could still be operated as it was prior to the Rehabilitation Project. Because time was needed to address the many variables and unknowns regarding the best flow regimes and operations of the Dam to benefit the Santa Ana sucker, it was agreed by all agencies involved that combining the operation of the Dam with the Rehabilitation Project could significantly delay the NEPA process. Delays to the Rehabilitation Project had the potential to jeopardize grant funding which, if lost, would prevent the Rehabilitation Project from being built. The Rehabilitation Project's primary purpose was to provide seismic stability to the Dam. Additionally, if it was not completed, there would be no opportunity to store additional water that would benefit downstream species including the Santa Ana sucker. Therefore, the agencies agreed that it was in the best interest of the Santa Ana sucker for the Rehabilitation Project to move forward while minimizing delays.

As part of the final NEPA process for the Rehabilitation Project, an informal Section 7 consultation was conducted. In order to separate the effects of the Rehabilitation Project from interrelated effects of post-project operations due to removal of the seismic restrictions, language was included in the Rehabilitation Project description that flow regimes would not change until formal consultation had occurred. The Rehabilitation Project's Biological Assessment concluded that the

[3] Adaptive Management is a structured approach to decision-making that uses the outcome of one management action to update knowledge and adjust future management actions. The approach is best applied in situations where there is substantial uncertainty regarding the best approach for managing natural resources.

Rehabilitation Project was not likely to adversely affect the Santa Ana sucker (URS 2005). The December 2005 informal consultation letter stated that Dam operations will not change during or after Dam rehabilitation activities until Section 7 consultation with the USFWS occurs (USFWS 2005a).

Multi-agency agreements were reached and reaffirmed at multiple meetings acknowledging that Section 7 Consultation was necessary for Dam operations, with or without the Rehabilitation Project (Lilley 2004, 2013). A Memorandum of Understanding was drafted between FEMA and the USFS to have FEMA be the lead agency for the Rehabilitation Project and USFS be the lead for the operations consultation. It is noted that the original USFS Special Use Permit allowed operation of the Dam up to spillway capacity for flood control and water conservation at elevation 2,290 feet. The Rehabilitation Project strengthened the Dam to allow it to safely impound a reservoir pool to elevation 2,298 feet. Following the Rehabilitation Project, the only change in Dam operations is the ability to provide low-flow releases during the non-storm season (i.e., dry summer months) for the purpose of habitat enhancement for the Santa Ana sucker. At SASWG meetings since completion of the Rehabilitation Project in 2012, the USFWS has recommended that the Section 7 Consultation be initiated to address ongoing existing Dam operations and maintenance in its entirety (including both storm season and non-storm season operations), as recommended since approximately 2003 and agreed to during the Rehabilitation Project.

Public Works submitted a Draft Biological Assessment for the Reservoir Restoration Project[4] to the USFS in May 2013. While reviewing the Draft Biological Assessment, the USFS contacted the USFWS to generally discuss the upcoming Section 7 Consultation for the Reservoir Restoration Project. When providing comments to Public Works on the Draft Biological Assessment for the Reservoir Restoration Project, the USFS relayed concerns from the USFWS that recommended an analysis of the ongoing operation and maintenance of the Dam and its potential impacts on listed species and their habitats because USFWS believed such activities are interrelated with the Reservoir Restoration Project. The possible interrelated nature of the operation and maintenance of the Dam and the Reservoir Restoration Project was also discussed at the 2011, 2012, 2013, and 2014 SASWG meetings. In order to allow Public Works to continue protecting communities downstream and to capture locally generated water as part of their charge under the FCA, a Draft Biological Assessment was prepared to address the operation and maintenance of the Dam, including storm season operations, non-storm season operations, and maintenance activities such as sediment removal. The Draft Biological Assessment was reviewed by both the USFWS and USFS in December 2014; both agencies provided comments.

Prior to the initiation of the formal Section 7 Consultation for the Reservoir Restoration Project and the operation and maintenance of the Dam, the LACFCD identified a Conservation Easement that granted land to the agency for all activities necessary to operate Big Tujunga Dam and Reservoir. Based on this documentation, the USFS no longer had jurisdiction over the Dam and could no longer serve as the lead agency in the Section 7 Consultation for the Reservoir Restoration Project. The USACE became the lead agency for the Reservoir Restoration Project Section 7 Consultation; however, the USACE has no authority over ongoing Dam operations. At this point, the USFWS recommended that LACFCD enter into a voluntary consultation under Section 10 of the FESA, which would include preparation of an HCP to address ongoing operation and maintenance of the Dam (USFWS 2016a). Following the approval of this HCP, the USFWS could carry out the Section 7 Consultation with the USACE for the Reservoir Restoration Project. Until the HCP is in place, the USFWS maintains that they cannot conduct the Section 7 Consultation for the Reservoir Restoration Project without an analysis of the operation and maintenance of the Dam. Therefore, LACFCD voluntarily agreed to prepare this HCP pursuant to

4 At the time of the Draft Biological Assessment, the project was referred to as the Sediment Removal Project.

Section 10 of FESA because they will receive longer-term assurances for more species with a HCP than they would under a traditional Section 7 Consultation.

1.4 PURPOSE OF THE HCP

Congress intended the HCP program to address at-risk species in an ecosystem context, generate long-term commitments to conservation of species, and deliver regulatory assurances to protect project applicants. The purpose of the HCP program was “not merely to issue take permits, but to use the process to integrate non-federal development and land use activities with conservation goals, resolve conflicts between endangered species protection and economic activities on non-federal lands, and to create a climate of partnership and cooperation” (USFWS 2016b).

One of the most important aspects of the HCP program is the “No Surprises Rule,” which provides assurance that as long as the permittee is implementing the HCP according to all its terms and conditions, the USFWS will not impose additional requirements or restrictions with regard to Covered Species. Because of this, including species that may become listed over the permit duration can benefit the permittee by ensuring the terms of the HCP will not change over time if that species subsequently becomes listed. This benefits those species by providing protective measures that may prevent their decline and possibly the need to list those species in the future (USFWS 2016b).

1.4.1 DEVELOPMENT OF THE HCP STUDY AREA AND ACTION AREA

The HCP analysis assesses the extent of the direct and indirect effects of operation and maintenance of Big Tujunga Dam on Covered Species; this area of direct and indirect effects is referred to as the “Action Area.” When HCP preparation began, the Action Area was not yet known. Several analyses, including a hydraulic analysis, needed to be carried out to determine the Action Area. Therefore, the “HCP study area” was developed by estimating the Action Area and extending it both upstream and downstream (described in more detail below). Extending the HCP study area beyond the Action Area also allowed the HCP to consider species that may occur immediately adjacent to Covered Activities and/or species that may reasonably occur within the Action Area in the future.

The HCP study area is focused on aquatic and riparian species and their habitats. Hansen Dam was selected as the downstream end of the HCP study area because water conservation releases from Big Tujunga Dam contribute to the inflow to Hansen Dam. Thus, it is reasonable to assume that water releases from Big Tujunga Dam could potentially affect the entire length of Big Tujunga Creek from Big Tujunga Dam to Hansen Dam. However, it should be noted that several tributaries enter Big Tujunga Creek between Big Tujunga Dam and Hansen Dam. Big Tujunga Creek flows are composed of the Big Tujunga Dam outflow and runoff from these many tributaries downstream of Big Tujunga Dam.

The upstream end of the HCP study area was selected as the confluence of Big Tujunga Creek with Fall Creek, upstream of the Reservoir. This area was selected because it was the upstream extent of several focused surveys that had been conducted for the Reservoir Restoration Project over many years. This area extends beyond the areas that would be affected by the Reservoir Restoration Project and the Spillway Improvement Project, both Covered Activities under the HCP.

Following the analysis, it was determined that the Action Area consists of Big Tujunga Dam and Reservoir; upstream of the Reservoir to where Big Tujunga Creek reaches elevation 2,298 feet (approximately 2,400 feet upstream of the Reservoir); and downstream of the Dam to the inflow to Hansen Reservoir. While the hydraulic influence of the Dam extends to the inflow to Hansen

Reservoir when the downstream tributaries are not flowing, the hydraulic influence of the Dam was determined to extend downstream to Stone Canyon (approximately 4.8 miles downstream of the Dam) during large storms when the tributaries are flowing (see Section 4.1.1).

Although it consists of upland habitat, Maple Canyon SPS has been included in the Action Area because it would be impacted by maintenance activities related to sediment removal; it would receive sediment removed during the Reservoir Restoration Project, a Covered Activity under the HCP.

1.4.2 SELECTION OF COVERED SPECIES

During the initial stages of HCP preparation, a literature review was conducted to determine which species should be included in the HCP. The first step was to generate a list of all special status species incidentally observed during all biological surveys for the Big Tujunga Dam from 2009 through present. The following project reports were reviewed to create this list and are included in the HCP Support Documents (Volume II):

- Results of Focused Plant Surveys for the Big Tujunga Dam Maintenance and Operation Plan Revision Project (BonTerra Consulting 2009a)
- Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher at the Big Tujunga Dam Maintenance and Operation Plan Revision Project (BonTerra Consulting 2010a)
- Results of Focused Presence/Absence Surveys for Special Status Amphibian Species at the Big Tujunga Dam Maintenance and Operation Plan Revision Project (BonTerra Consulting 2010b)
- Biological Constraints Survey for the Big Tujunga Sediment Removal Project[5] (BonTerra Consulting 2011a)
- Results of Focused Presence/Absence Surveys for Arroyo Toad for the Big Tujunga Sediment Removal Project (BonTerra Consulting 2011c; BonTerra Psomas 2016b; Psomas 2017b)
- Results of Presence/Absence Surveys for Sierra Madre Yellow-Legged Frog for the Big Tujunga Sediment Removal Project (BonTerra Consulting 2012a; BonTerra Psomas 2016d)
- Results of Presence/Absence Surveys for Special Status Amphibians for the Big Tujunga Sediment Removal Project (Psomas 2018c)
- Results of Focused Presence/Absence Surveys for Special Status Fish Species Surveys for the Big Tujunga Sediment Removal Project (BonTerra Consulting 2011c; Psomas 2019e)
- Results of Focused Presence/Absence Surveys for Western Pond Turtle for the Big Tujunga Sediment Removal Project (BonTerra Consulting 2012b; Psomas 2018e)
- Results of Focused Plant Surveys for the Big Tujunga Sediment Removal Project (BonTerra Consulting 2011d; BonTerra Psomas 2017)
- Results of Focused Presence/Absence Least Bell's Vireo and Southwestern Willow Flycatcher Surveys for the Big Tujunga Sediment Removal Project (BonTerra Consulting 2012d; BonTerra Psomas 2016c; Psomas 2018a)

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5 The Sediment Removal Project is referred to as the Reservoir Restoration Project.

- Results of Focused Presence/Absence Yellow-billed Cuckoo Surveys for the Big Tujunga Sediment Removal Project (Psomas 2018b)
- Vegetation Mapping for the Big Tujunga Dam Operation and Maintenance HCP (Psomas 2017c)
- Santa Ana Sucker Habitat Suitability Study (EDAW and SMEA 2009)
- Results of the First, Second, Third, Fourth, Fifth, Sixth, Seventh, Eighth, Ninth, and Tenth Annual Long-term Santa Ana Sucker and Benthic Macroinvertebrate Monitoring Project (SMEA 2010a, 2010b; BonTerra Consulting 2012c, 2012e; BonTerra Psomas 2014, 2015, 2016a; Psomas 2017a, 2018d, 2019b)

The HCP literature review included a California Natural Diversity Database (CNDDB) search of species reported from within 25 miles of the HCP study area. These observations were filtered to include only recent observations, defined for these purposes as those observed within the last 15 years. Both sets of observations (i.e., historic and recent observations) were overlaid on an aerial map showing watershed boundaries and the distance was measured from the HCP study area to the nearest recent and historical occurrence. Species that historically or recently occurred within or immediately adjacent to the watershed were most heavily weighted for inclusion in the HCP. The total number of occurrences within the 25-mile search area and the distance from the HCP study area to the nearest observation were considered.

The literature review also included a review of Critical Habitat Designations and Recovery Plans for all listed species under consideration to determine whether the HCP study area was specifically identified in the documents. Species for which the HCP study area was mentioned in the Critical Habitat and/or Recovery Plan were given a higher weight for inclusion in the HCP.

Species were then grouped and prioritized by status into the following groups: (1) listed species that are known to occur in the HCP study area; (2) listed species with potential to occur in the HCP study area; (3) non-listed species that are known to occur and could be listed over the permit duration; (4) non-listed species that have potential to occur and could be listed over the permit duration.

1.4.2.1 SPECIES SELECTED AS COVERED SPECIES

Eight species were selected by the HCP Steering Committee as Covered Species (Table 1).

TABLE 1
SPECIES SELECTED AS HCP COVERED SPECIES

Species Common Name	Species Scientific Name	Federal Status	State Status	Current Occurrence in the HCP Study Area
Fish				
Santa Ana sucker	*Catostomus santaanae*	FT	—	Known to occur from Big Tujunga Dam to Hansen Dam.
arroyo chub	*Gila orcutti*	—	SSC	Known to occur from Big Tujunga Dam to Hansen Dam.
Santa Ana speckled dace	*Rhinichthys osculus* ssp. 3	—	SSC	Known to occur from Big Tujunga Dam to Hansen Dam.
Amphibians				
arroyo toad	*Anaxyrus californicus*	FE	SSC	Known to occur upstream of Big Tujunga Reservoir.
Reptiles				
western pond turtle	*Emys marmorata*	—	SSC	Known to occur throughout the HCP study area.
Birds				
least Bell's vireo	*Vireo bellii pusillus*	FE	SE	Known to occur upstream of Big Tujunga Reservoir, downstream of Big Tujunga Dam, and upstream of Hansen Dam.
southwestern willow flycatcher	*Empidonax traillii extimus*	FE	SE	Not currently known to occur in the HCP study area; potential to occur in the future. Migrant willow flycatchers (of unknown subspecies) have been observed along Big Tujunga Creek and upstream of Hansen Dam.
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT	SE	Not currently known to occur in the HCP study area; potential to occur in the future.
Species Status FE: Federally listed Endangered FT: Federally listed Threatened SE: State listed Endangered ST: State listed Threatened SSC: State Species of Special Concern				

Three listed species are currently known to occur in the HCP study area. Santa Ana sucker is known to occur along the entire length of Big Tujunga Creek downstream of Big Tujunga Dam in the HCP study area; it is considered extirpated from the area upstream of the Reservoir. Arroyo toad is known to occur along Big Tujunga Creek upstream of the Reservoir; it is considered extirpated from the area downstream of Big Tujunga Dam. The least Bell's vireo has been known to occur at Hansen Dam for many years; however, it was recently incidentally observed upstream of Big Tujunga Reservoir during the 2017 surveys for arroyo toad (Psomas 2017a) and incidentally observed elsewhere along Big Tujunga Creek downstream of Big Tujunga Creek (Psomas 2018a). Therefore, it is reasonable to assume that it could occur elsewhere between the upper and lower limits of the HCP study area.

The southwestern willow flycatcher and western yellow-billed cuckoo are not currently known to occur in the HCP study area for breeding; however, migrant willow flycatchers and western yellow-billed cuckoos have been observed in the HCP study area and suitable habitat for these species is present in the HCP study area. Therefore, it is reasonable to assume that these species could occur in the HCP study area for breeding over the duration of the permit. Furthermore, Critical Habitat for the southwestern willow flycatcher has been identified at the downstream end of the HCP study area at Hansen Dam and will need to be considered in the USFWS consultation. Minimization and mitigation measures to protect the least Bell's vireo would also likely benefit the southwestern willow flycatcher and western yellow-billed cuckoo.

The arroyo chub, Santa Ana speckled dace, and western pond turtle are not formally listed under the FESA; however, they are listed as California Species of Special Concern. Given the multiple threats to aquatic/riparian habitats in southern California (e.g., habitat fragmentation by development, impairment of water quality, introduction of non-native predators, etc.), it is reasonable to assume that these species may become Endangered or Threatened over the proposed 30-year duration of the permit. Additionally, minimization and mitigation requirements to protect the Santa Ana sucker would also likely benefit these aquatic species. Therefore, it was determined that these species should be included in the HCP.

1.4.2.2 SPECIES CONSIDERED BUT NOT SELECTED AS COVERED SPECIES

Four species were considered by the HCP Steering Committee but were not selected for inclusion, as discussed below (Table 2).

TABLE 2
SPECIES NOT SELECTED FOR INCLUSION IN HCP

Species Common Name	Species Scientific Name	Federal Status	State Status	California Native Plant Society Rare Plant Rank	Current Occurrence in the HCP Study Area
Plants					
Greata's aster	*Symphyotrichum greatae*	—	—	CRPR 1B.1	Known to occur upstream of Big Tujunga Dam, and in a few locations near the Big Tujunga Dam.
Amphibians					
California red-legged frog	*Rana draytonii*	FE	SSC	—	Determined absent based on 2009 focused surveys of the entire HCP study area and 2018 focused surveys of the Sediment Removal survey area (upstream of the Reservoir to Fall Creek and downstream of the Dam to 0.62 mile downstream of the Big Tujunga Canyon Road Bridge).
southern mountain [Sierra Madre] yellow-legged frog	*Rana muscosa*	FE	SE	—	Determined absent based on 2009 focused surveys of the entire HCP study area and 2011, 2016, and 2018 focused surveys of the Sediment Removal survey area (upstream of the Reservoir to Fall Creek and downstream of the Dam to 0.62 mile downstream of the Big Tujunga Canyon Road Bridge).
Mammals					
Townsend's big-eared bat	*Corynorhinus townsendii*	—	SSC	—	Unknown; bat surveys have not been conducted.

<u>Species Status</u>

California Rare Plant Rank (CRPR) 1B.1: Rare, Threatened, or Endangered throughout its range; within California it is considered seriously Endangered (over 80 percent of occurrences threatened; high degree and immediacy of threat)

FE: Federally listed Endangered
SE: State listed Endangered
SSC: State Species of Special Concern

Greata's aster (*Symphyotrichum greatae*), a plant species with a California Rare Plant Rank of 1B.1,[6] is known to occur along Big Tujunga Creek upstream of the Reservoir and in freshwater seep areas near the Reservoir. While it is known to occur in the study area for the Reservoir Restoration Project, its occurrence throughout the HCP study area is unknown because a focused survey for this species has not been conducted throughout the HCP study area. Previous focused plant surveys of the HCP study area focused on federally and State listed plant species: Braunton's milk-vetch (*Astragalus brauntonii*), Nevin's barberry (*Berberis nevinii*), San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*), and slender-horned spineflower (*Dodecahema leptoceras*); none of these species were observed during surveys (BonTerra Consulting 2009a). In a review of CNDDB occurrences, ten were recent occurrences (since 2002) within 25 miles of the HCP study area (CDFW 2018a). In general, Greata's aster has a higher potential to occur at freshwater seeps and a lower potential to occur along the active creek channel. Freshwater seep habitat is extremely limited in the HCP study area; therefore, Greata's aster is not expected to occur in sizeable numbers in the HCP study area. Therefore, the HCP

6 The California Native Plant Society has ranked this species as Rare, Threatened, or Endangered throughout its range; within California it is considered seriously Endangered (over 80 percent of occurrences threatened; high degree and immediacy of threat).

Committee decided not to include this species in the HCP; impacts to this species can be dealt with in future project-level CEQA documentation.

California red-legged frog (*Rana draytonii,* federally listed Endangered and a California Species of Special Concern) and southern mountain [Sierra Madre] yellow-legged frog (*Rana muscosa,* federally listed Endangered, State listed Endangered) were both considered for inclusion. Habitat in the HCP study area is considered suitable for these species in both the upstream and downstream portions of the HCP study area. However, multiple focused surveys have been conducted for these species, and they have not been observed (BonTerra Consulting 2010b, 2012a; BonTerra Psomas 2016d; Psomas 2018c). In a review of CNDDB occurrences, five were recent occurrences (since 2002) of each species within 25 miles of the HCP study area (CDFW 2018a). The watershed boundaries were then overlayed with the species mapping. No records of California red-legged frog are reported in the Project watershed (i.e., the Los Angeles Watershed); the nearest current record (since 2002) was approximately 9 miles away in the Santa Clara Watershed (Aliso Canyon) (CDFW 2018a). The nearest record of southern mountain [Sierra Madre] yellow-legged frog was in the upper end of the HCP study area, upstream of Big Tujunga Reservoir; however, the record is historic (1968), and the species was not found during more recent surveys conducted by the U.S. Geological Survey (USGS) in 2001 or 2009 (CDFW 2018a). The nearest current record (since 2002) was approximately 12.3 miles away (Upper Devil's Canyon) (CDFW 2018a). These species are both presumed extirpated from the HCP study area, and their recolonization from nearby known occurrences is not expected. Additionally, the presence of rainbow trout (*Oncorhynchus mykiss*), a predator of these species, makes it unlikely that the resource agencies would choose the HCP study area for a reintroduction of the southern mountain [Sierra Madre] yellow-legged frog and/or that the southern mountain [Sierra Madre] yellow-legged frog would be able to establish in the HCP study area. Therefore, the HCP Committee decided not to include these species in the HCP.

Townsend's big-eared bat (*Corynorhinus townsendii*) was proposed for State listing as a Threatened or Endangered species in 2013; the species listing was found not to be warranted (CDFW 2016). This species was considered for inclusion because it could become listed over the permit term. Suitable foraging and roosting habitat is present in the HCP study area, especially in the upper portion of the HCP study area near the Reservoir. Focused bat surveys have never been conducted for the Reservoir Restoration Project study area or in the larger HCP study area. In the review of CNDDB records, only two records are within 25 miles since 2002; the nearest record is 0.9 mile from the HCP study area in 2011 (CDFW 2018a). The HCP Committee decided not to include this species in the HCP because there was not enough information on this species' distribution in the region and its occurrence in the HCP study area to include it.

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2.0 Environmental Setting/Biological Resources

2.1 REGIONAL SETTING

Big Tujunga Canyon is in the San Gabriel Mountains in the Angeles National Forest. The Angeles National Forest includes over 700,000 acres of open space that are managed for flood control, water conservation, and recreation (USFS 2019). Big Tujunga Reservoir is located on the north side of Angeles Crest Highway (within the Los Angeles River Ranger District), approximately 2.75 miles southeast of Condor Peak and approximately 10 miles northwest of the City of Pasadena. Habitat in the Angeles National Forest is composed primarily of chaparral, with pine and fir forests at higher elevations (USFS 2019).

2.1.1 CLIMATE

Southern California experiences a Mediterranean climate characterized by mild, rainy winters and hot, dry summers. The temperature is moderated by the coastal influence of the Pacific Ocean, which creates mild conditions throughout most of the year. The most distinguishing characteristic of a Mediterranean climate is its seasonal precipitation. In Southern California, precipitation is characterized by brief, intense storms between November and March. It is not unusual for a majority of the annual precipitation to fall during a few storms over a short span of time.

Rainfall patterns in the region are subject to extreme variations from year to year and longer-term wet and dry cycles. The average annual rainfall for the Tujunga weather station is approximately 26.05 inches based on 1927–2020 averages; the minimum annual precipitation in this time period was 8.60 inches in the 2001–2002 water year, and the maximum annual precipitation in this time period was 60.68 inches in the 1968–1969 water year (Zargaryan 2020).

From 1961–2010, the annual average temperature at the Tujunga weather station ranged from 50 to 78 degrees Fahrenheit, with a minimum average temperature of 42 degrees Fahrenheit in December/January and a maximum average temperature of approximately 93 degrees Fahrenheit in July/August (WRCC 2019a). Overall, this data was very similar to the data from the Pasadena weather station, which had records from 1893–2012 (WRCC 2019b).

Climate change refers to any significant change in climate, such as the average temperature, precipitation, or wind patterns over a period of time. Significant changes in global climate patterns have been associated with an accumulation of greenhouse gas emissions in the atmosphere. Some greenhouse gases occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities; the majority of global warming is attributed to human activities. In addition to affecting temperature and precipitation patterns, climate change is believed to be contributing to more extreme weather events such as more frequent, larger storms and extended periods of drought (USFS 2018; USEPA 2017).

In the Angeles National Forest, climate change effects are changing fire patterns and disease outbreaks and affecting water supplies (USFS 2018). Fires are a natural part of the forested landscape, but each year the fire season begins earlier and ends later. In addition, the fires themselves are burning hotter and have become more damaging and dangerous. Similarly, insects are a natural part of forested landscapes, but now the insects are spreading more rapidly because the winter is not cold enough to reduce their populations. Also, insect-caused disease epidemics are larger and last longer, killing more trees and increasing fire risk. The warmer winters are affecting water supplies because the snowpacks are thinner and melt earlier in spring, so the water runs out from the forest earlier in summer. Extended droughts also make trees more vulnerable to both fire and insects (USFS 2018).

The 2009 Station Fire was the largest wildfire in the history of Los Angeles County (Kim 2014). It burned 160,557 acres, over 260 square miles of the Angeles National Forest (CAL FIRE 2009). An interagency effort including the USFS, USFWS, CDFW, and USGS was made to salvage Santa Ana sucker, arroyo chub, and Santa Ana speckled dace from Big Tujunga Creek in October 2009 to protect them from flushing flows, increased debris flow, and decreased water quality; they were kept in captivity until it was safe to return them to the creek (USFS 2010). As vegetation in the Angeles National Forest is fire-adapted, much of the vegetation in the HCP study area and adjacent hillsides has generally recovered. The USFS took efforts to control invasive plant species following the fire. Along Big Tujunga Creek, efforts were made to prevent the spread of giant reed (*Arundo donax*) (USFS 2010). The National Forest Foundation removed invasive plant species from 200 stream miles of the Angeles National Forest (Kim 2014). Additionally, the USFS conducted some restoration efforts in portions of the forest, particularly with regard to recovery of bigcone Douglas-fir (*Pseudotsuga macrocarpa*). Volunteers with national and local organizations planted a million bigcone Douglas-fir saplings in the five years following the fire (Kim 2014). The Station Fire burned approximately 870 acres of the HCP study area (Exhibit 2).

The December 2017 Creek Fire burned 15,619 acres, 24 square miles, of Little Tujunga Canyon and the surrounding community of Sunland (NWCG 2018). The Creek Fire was one of six significant fires that were burning concurrently in Southern California during an unusually powerful and long-lasting Santa Ana Wind condition. The Creek Fire occurred after vegetation mapping efforts of the HCP study area (described below). The Creek Fire burned approximately 835 acres of the HCP study area (Exhibit 2).

The September/October 2020 Bobcat Fire recently burned 115, 796 acres, over 180 square miles, of the San Gabriel Mountains in the Angeles National Forest (NWCG 2020). The Bobcat Fire was one of 27 major fires burning concurrently in California during high wind conditions. The Bobcat Fire reached Angeles Crest Highway at Upper Big Tujunga Canyon, approximately 4.6 miles upstream from the HCP study area (NCWG 2020).

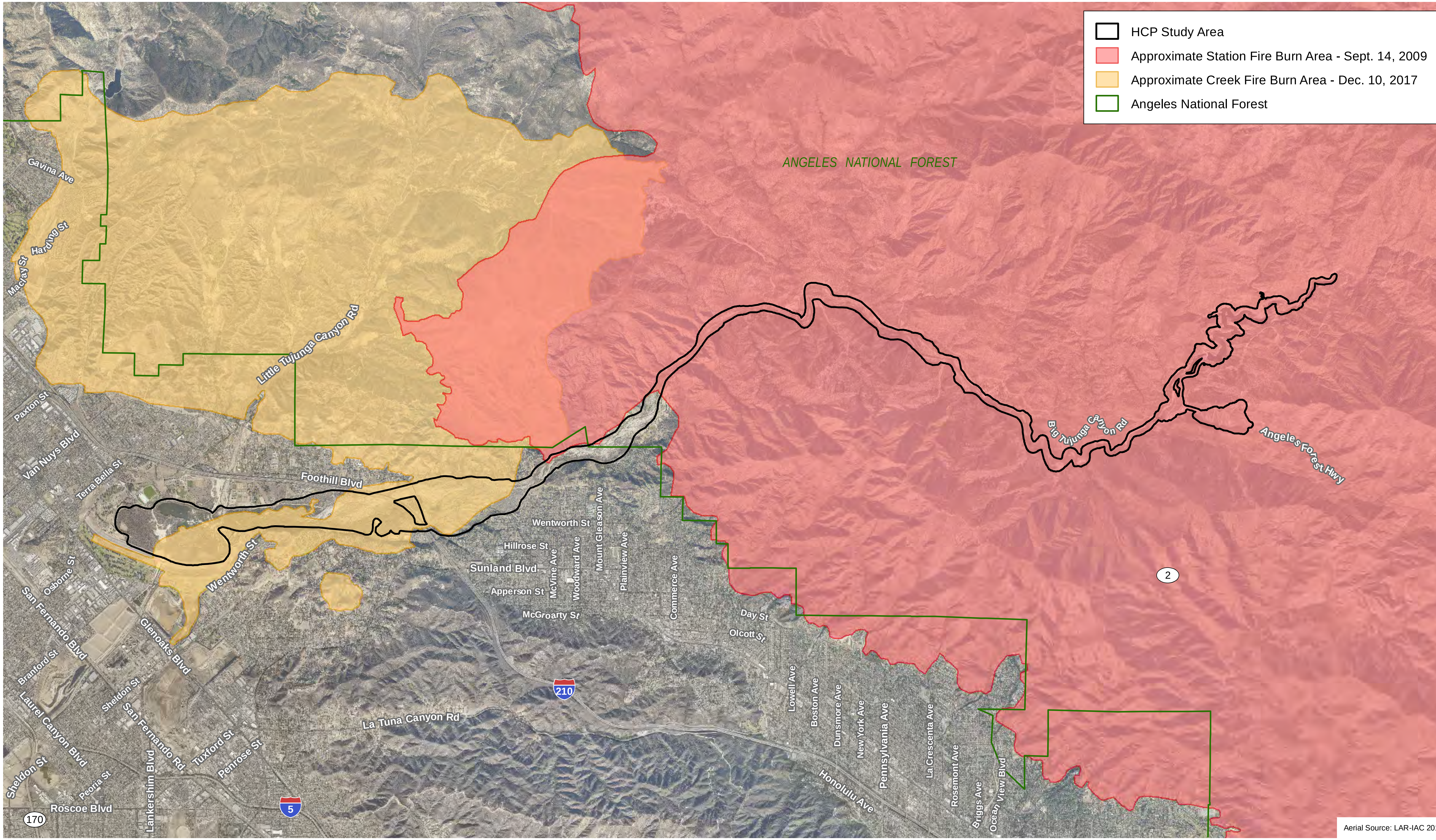
2.1.2 LAND USE

Big Tujunga Reservoir and Maple Canyon SPS are existing public facilities maintained by the LACFCD. These facilities are surrounded by federal land in the Angeles National Forest.

The Forest Plan for the Angeles National Forest includes the vision, strategy, and design criteria for USFS' management activities and practices to ensure the protection of forest resources. The Forest Plan designates the area where Big Tujunga Reservoir is located as "Back Country, Motorized" and Maple Canyon SPS as "Developed Area Interface" (USFS 2005).

No residential land uses occur in the vicinity of Big Tujunga Reservoir, with the exception of the home of the Dam Operator at the Dam site. Rural homes are located approximately 2 miles downstream (west) of Big Tujunga Dam near Vogel Flat Road/Stoneyvale Road; scattered rural residences continue downstream to Oro Vista within the boundaries of the Angeles National Forest. The Angeles National Golf Course is located along the creek between Oro Vista and Interstate 210 (I-210). Hansen Dam is located downstream of I-210.

The Big Tujunga Wash Mitigation Area is a 210-acre mitigation site that was purchased by LACFCD in 1998 to mitigate for their projects (Public Works 2017a). It is located just downstream of I-210 and includes the Haines Canyon Channel confluence with Big Tujunga Creek. The mitigation site consists of native alluvial scrub, aquatic, and willow riparian habitat. LACFCD conducts the following enhancement activities at the mitigation site: (1) removal of invasive plant species, primarily giant reed and tamarisk (*Tamarix* sp.); (2) removal of invasive wildlife species such as red-swamp crayfish (*Procambarus clarkia*), American bullfrog (*Lithobates catesbeianus*), and non-native fish such as largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis*



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Fire Locations

Exhibit 2

Big Tujunga Dam HCP

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cyanellus), and black bullhead (*Ameiurus melas*); (3) trapping of brown-headed cowbirds (*Molothrus ater*); (4) initial native habitat restoration and enhancement; (5) restriction of equestrian use to established trails; and (6) public outreach through meetings and bilingual recreational user program (Chambers Group 2000; ECORP 2016). The mitigation area is known to be occupied by Santa Ana sucker, arroyo chub, and Santa Ana speckled dace.

2.1.2.1 RECREATION

Big Tujunga Reservoir and Maple Canyon SPS do not provide public park or recreational facilities, although the surrounding area within the Angeles National Forest offers opportunities for various recreational activities. While Big Tujunga Dam and Maple Canyon SPS are located within the Angeles National Forest, public access within Big Tujunga Reservoir and Maple Canyon SPS is prohibited. Also, steep slopes along Big Tujunga Reservoir preclude easy access to the Dam and Reservoir. The nearest trailhead is Condor Peak, located approximately 1.2 miles southeast of the entrance road to Big Tujunga Reservoir.

Downstream of Big Tujunga Reservoir are various recreational areas. From the Dam structure, Big Tujunga Creek flows southwesterly for approximately 13.5 miles through the San Gabriel Mountains until it reaches the Hansen Flood Control Basin behind Hansen Dam (owned and operated by the USACE). The City of Los Angeles Department of Parks and Recreation operates several recreational facilities at the Hansen Dam site, including the Golf Course, Recreation Center, Aquatic Center, and Park.

Additionally, informal recreational activities, including swimming, are known to occur along Big Tujunga Creek between Big Tujunga Dam and Hansen Dam. According to the USFS Land Management Plan, the Big Tujunga Canyon area is marked by concentrated public use, mostly family-based, due to its accessibility to water. It is an area that is enjoyed by many people, and that enjoyment leads to chronic overuse. Recreational uses are conflicting with other resource values, and the focus of recreation along low elevation riparian areas is reaching or exceeds capacity. The intensive use is resulting in impacts to vegetation and resources, specifically, soil compaction, loss of vegetation, pollution of riparian environments, and erosion near Big Tujunga Creek. Water-centered recreation in Big Tujunga Canyon is strongly influenced by the low-flow releases from Big Tujunga Reservoir (USFS 2005).

2.1.2.2 SIGNIFICANT ECOLOGICAL AREAS

The County of Los Angeles Department of Regional Planning (LACDRP) established Significant Ecological Areas (SEAs) in 1976 to designate areas with sensitive environmental conditions and/or resources in order to preserve biological diversity. SEA boundaries are general in nature and broadly outline the biological resources of concern. An updated SEA map was finalized by the County in 2015 (LACDRP 2015a). Big Tujunga Dam is not located in an SEA; however, the lower end of the HCP study area is within SEA Number 25: Tujunga Valley/Hansen Dam (LACDRP 2015a) (Exhibit 3). The Tujunga Valley/Hansen Dam SEA (No. 25) supports resources that are limited in Los Angeles County such as alluvial fan sage scrub and riparian habitat. The SEA description specifically mentions that the SEA provides habitat and is occupied by the Santa Ana sucker, arroyo chub, and Santa Ana speckled dace (LACDRP 2015a). In addition, much of the area within the SEA has also been designated an Audubon Important Bird Area (Los Angeles Flood Control Basin) because of its freshwater marsh habitat, which offers foraging and nesting for marsh birds, migratory waterfowl, and shore birds (LACDRP 2015a). This SEA also provides a wildlife corridor between the Verdugo Mountains and the San Gabriel Mountains (LACDRP 2015a).

2.2 PHYSICAL SETTING

2.2.1 TOPOGRAPHY/GEOLOGY

Big Tujunga Canyon is a northeast-to-southwest-trending canyon located on the southern edge of the San Gabriel Mountains in the Angeles National Forest. The HCP study area is located on the USGS' Condor Peak, Sunland, and San Fernando 7.5-minute topographic quadrangles (Exhibit 4). Topography in the upper (eastern) portion of the HCP study area consists of sheer cliffs and steep slopes to the canyon bottom, while topography in the lower (western) end of the HCP study area consists of a wider alluvial floodplain. Elevations in the HCP study area range from approximately 3,400 feet above mean sea level (msl) at the upper (eastern) end of the HCP study area to 1,645 feet above msl at the lower (western) end of the HCP study area (Exhibit 4).

Big Tujunga Canyon is characterized by very steep slopes, shallow soils, and watercourses contained within bedrock channels. Erosion has deposited alluvium (including boulders, cobbles, gravel, and coarse to fine sandy soils) within the stream course. Topography is irregular; and stream grade, width, and flow velocity vary but are generally moderate. The creek channel morphology in the HCP study area includes portions with narrow, incised, fast-moving water; portions with wider, slow-moving water; deep pools; and a relatively broad alluvial wash with multiple meandering channels.

Soil types in and around the HCP study area consist of rock outcrop-Chilao family Haploxerolls warm association; Modesto, moderately deep-Trigo families complex; riverwash; rock outcrop-Chilao family-Haploxerolls warm association; Trigo, granitic substratum Modjeska families association; Tollhouse-Stukel-Wrentham families complex; Winthrop family, very stony-Lithic Xerorthents-rock outcrop association; typic Xerorthents, warm association; Olete-Kilburn-Etsel families complex; and rock outcrop-Chilao family-Haploxerolls warm association (USDA 2006).

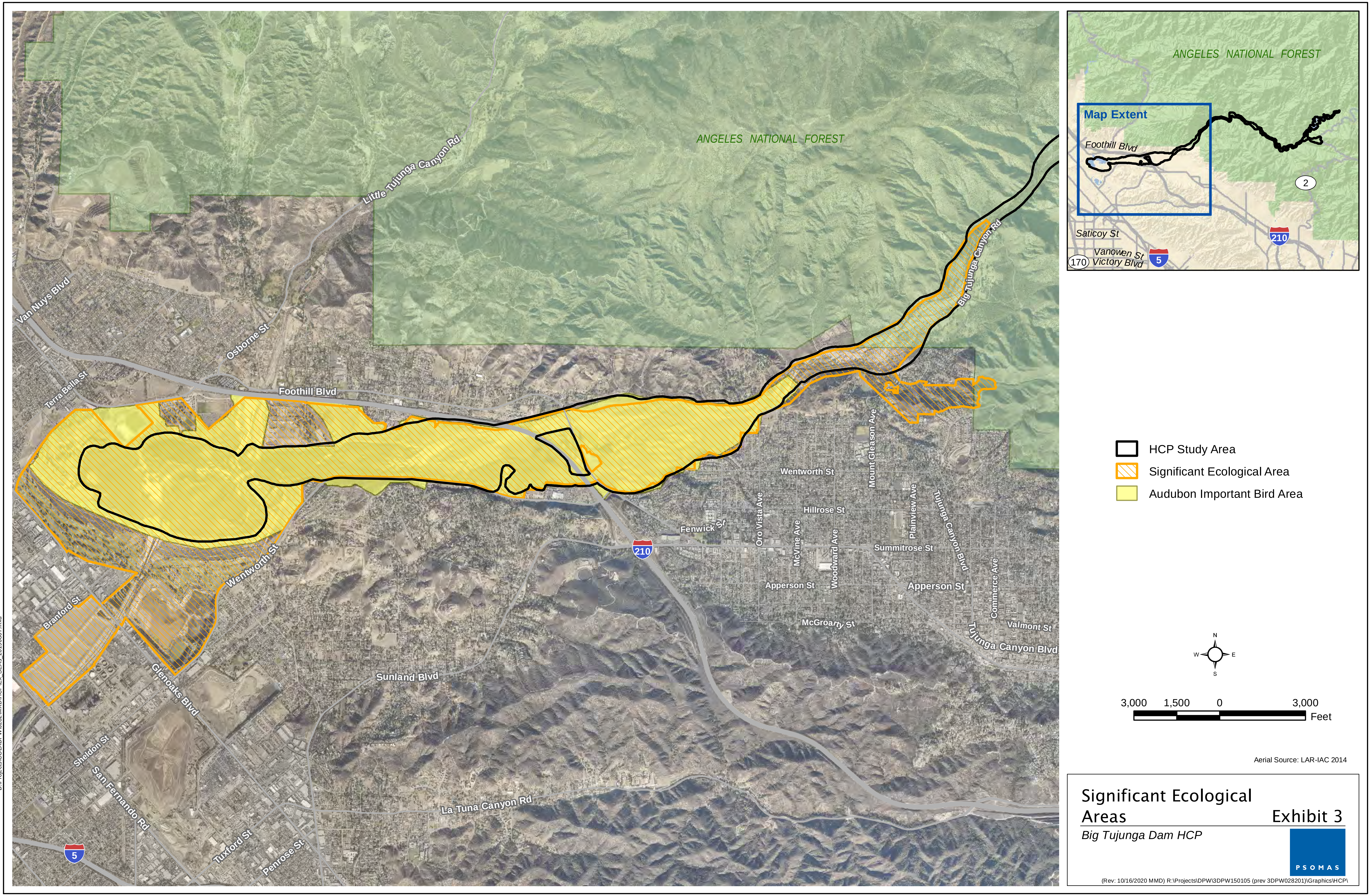
2.2.2 HYDROLOGY

Big Tujunga Creek (Hydrologic Unit Code[7] 180701050103) is within the 834-square-mile Los Angeles River Watershed (Exhibit 5). Big Tujunga Creek generally flows from east to west or southwest. Upstream of Big Tujunga Reservoir and through the majority of the HCP study area, Big Tujunga Creek is a perennial stream (i.e., water flows all year); however, at the lower end of the HCP study area, Big Tujunga Creek has portions that are intermittent (i.e., seasonal streams that flow when groundwater and runoff from rainfall provide enough water for surface flows) during the dry season depending on releases from Big Tujunga Dam.

The entirety of Big Tujunga Creek Watershed is approximately 153 square miles (USDOI-USGS 2018). Big Tujunga Dam subdivides the Big Tujunga Creek Watershed into two subwatersheds: Upper Big Tujunga Creek Watershed and Lower Big Tujunga Creek Watershed. The Upper Big Tujunga Creek Watershed (upstream of Big Tujunga Dam) has a drainage area of 82.3 square miles (Public Works 2017b). The lower Big Tujunga Creek watershed (downstream of Big Tujunga Dam) has an approximate drainage area of 70.7 square miles. Hansen Dam acts as the drainage point for the entirety of Big Tujunga Creek Watershed. Based on Public Works' 2005 Land Use data, the majority of the Big Tujunga Creek Watershed is less than 5 percent impervious; it is composed of natural, undeveloped land in the San Gabriel Mountains.

Of areas within Los Angeles County, the San Gabriel Mountains experience the highest annual precipitation with a seasonal normal of 26.67 inches per water year as of September 2019 (Public Works 2019). The entirety of Big Tujunga Creek Watershed experiences an average precipitation

7 The USGS created Hydrologic Unit Codes to provide a hierarchical process for cataloguing surface drainage basins, a combination of drainage basins, or distinct hydrologic features.



Significant Ecological Areas Exhibit 3

Big Tujunga Dam HCP

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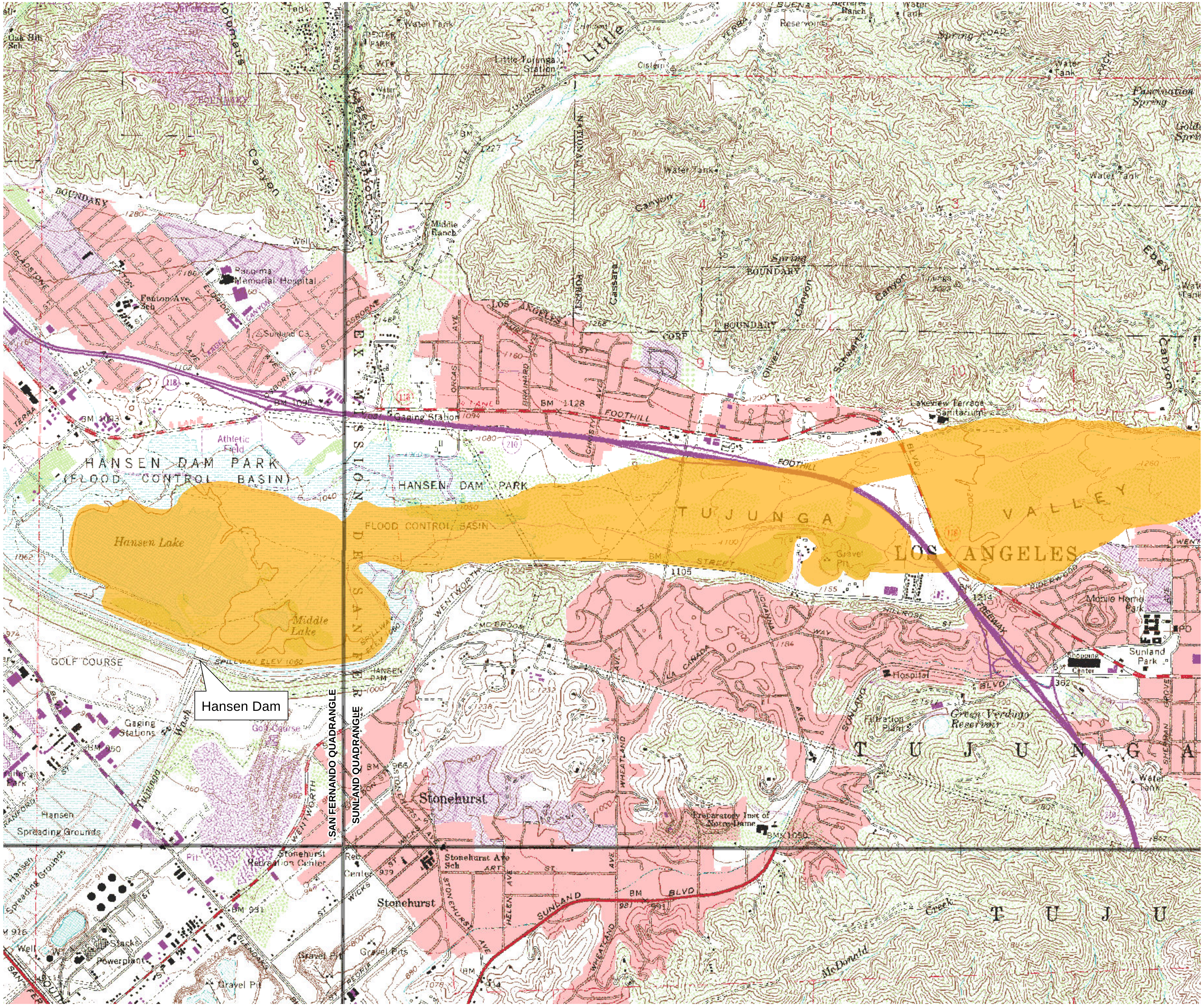

HCP Study Area

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Topography

Exhibit 4a

Big Tujunga Dam HCP

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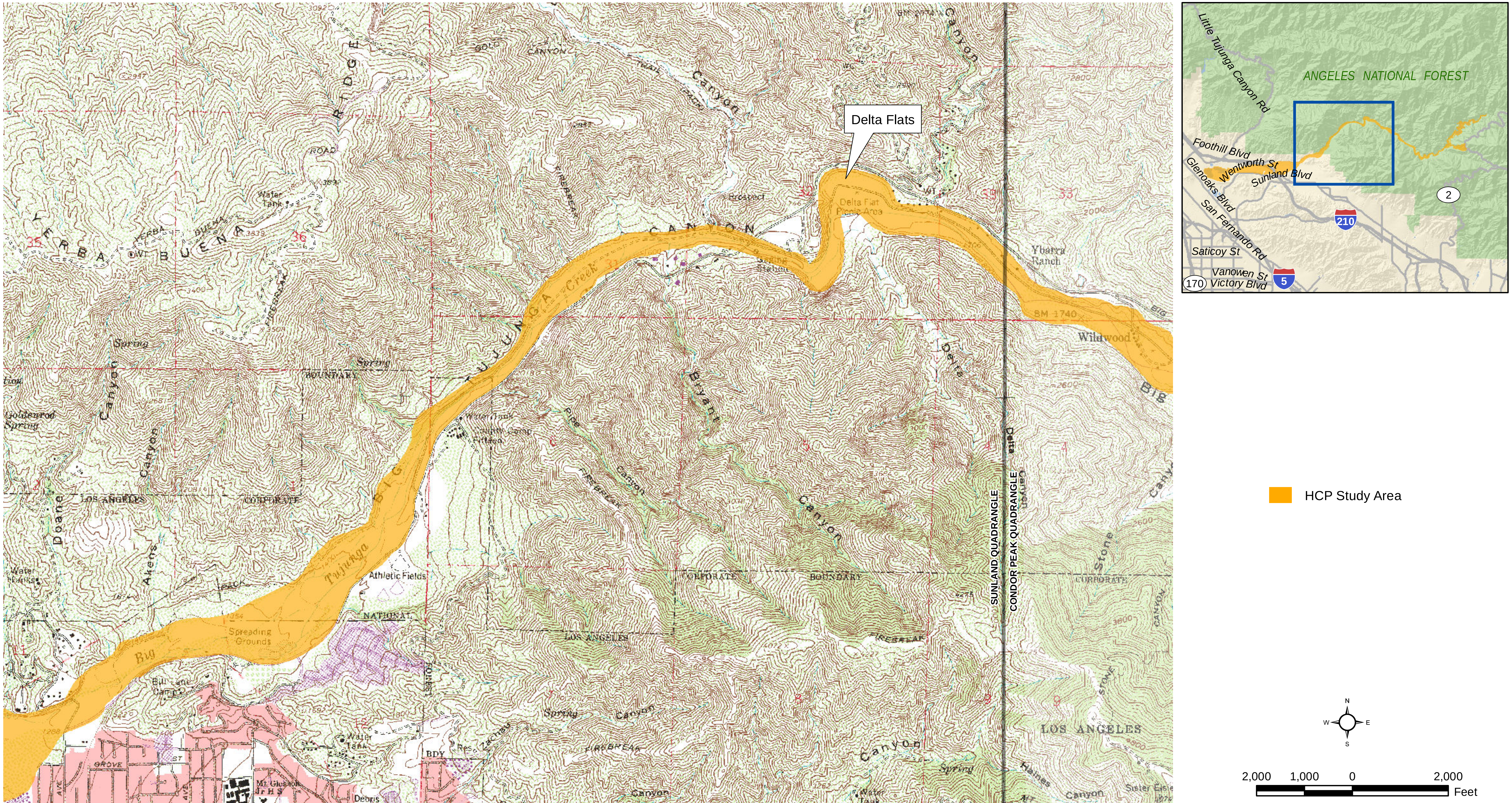

Topography

Exhibit 4b

Big Tujunga Dam HCP

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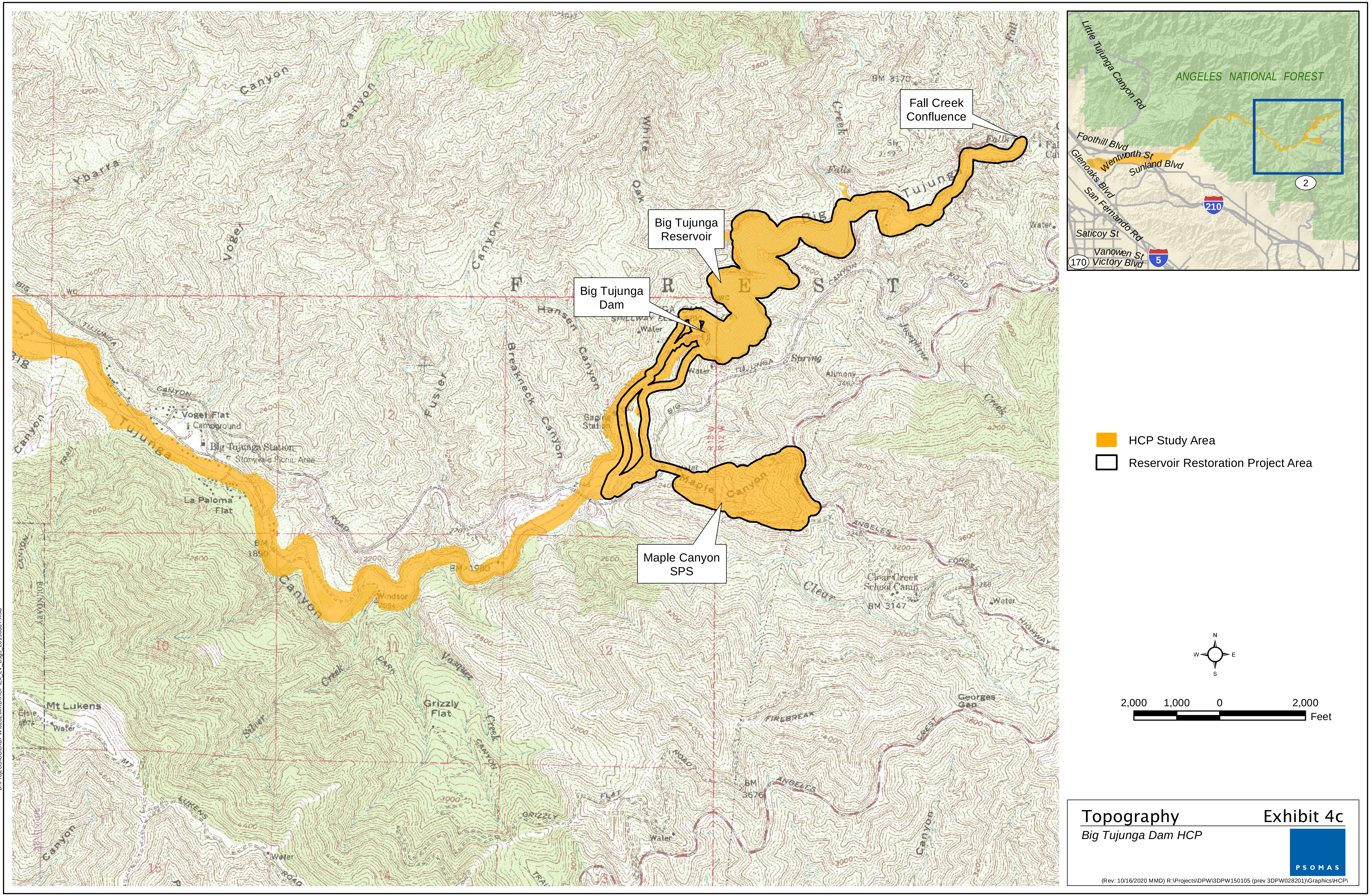
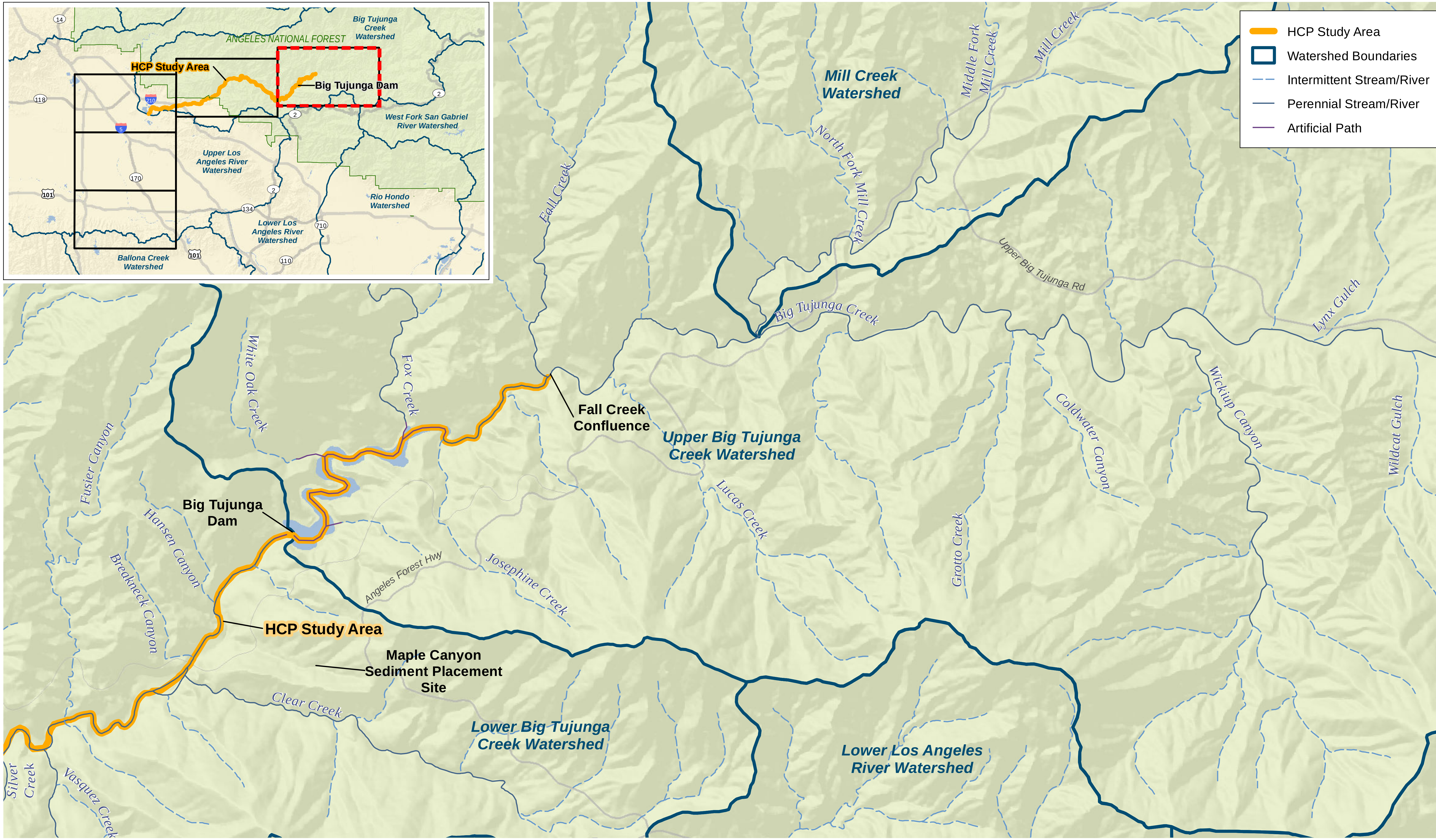


Topography Exhibit 4c

Big Tujunga Dam HCP



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Hydrology

Big Tujunga Dam HCP

Exhibit 5a

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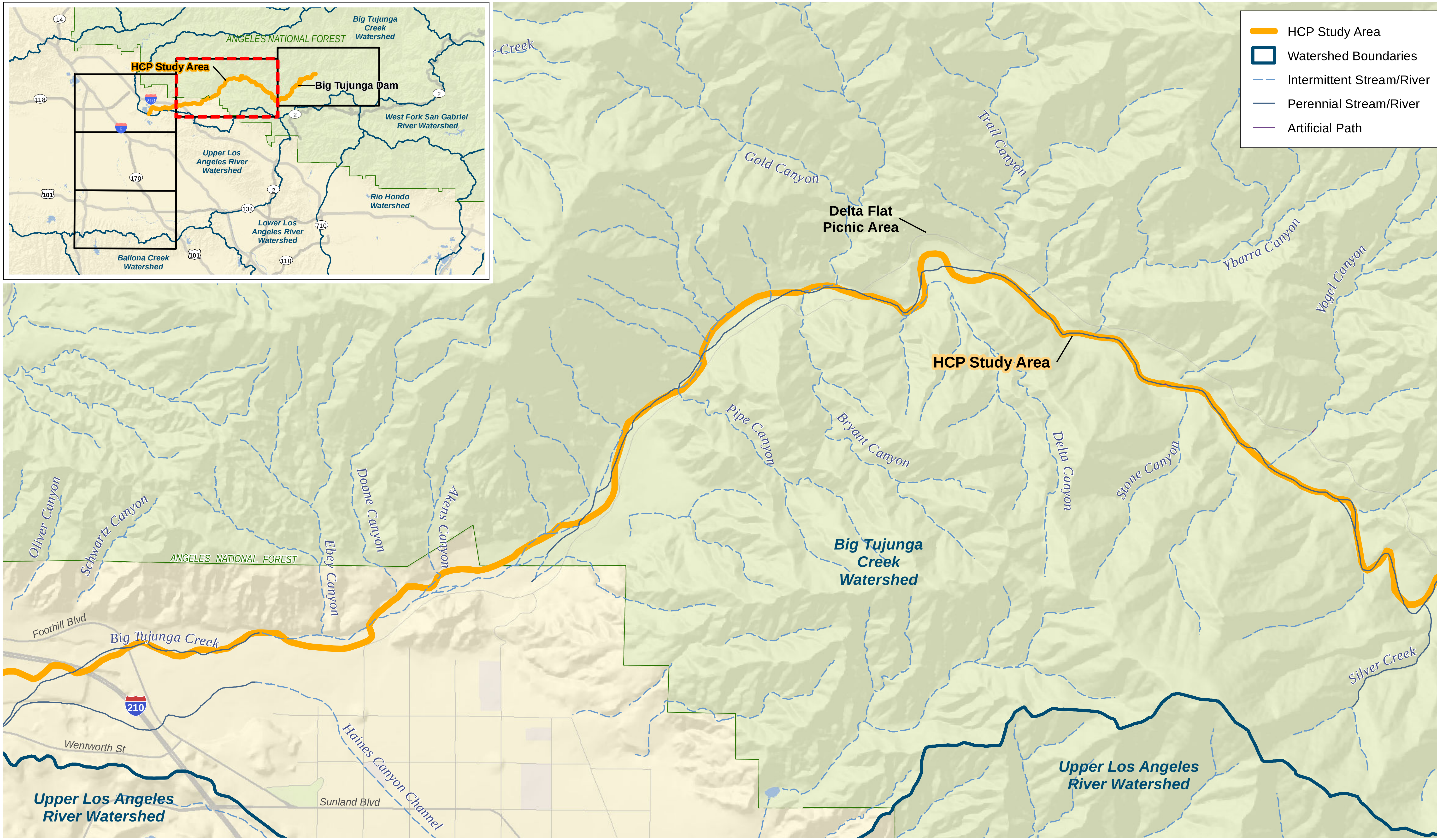

Hydrology

Exhibit 5b

Big Tujunga Dam HCP

N W E S

0.5 0.25 0 0.5 Miles

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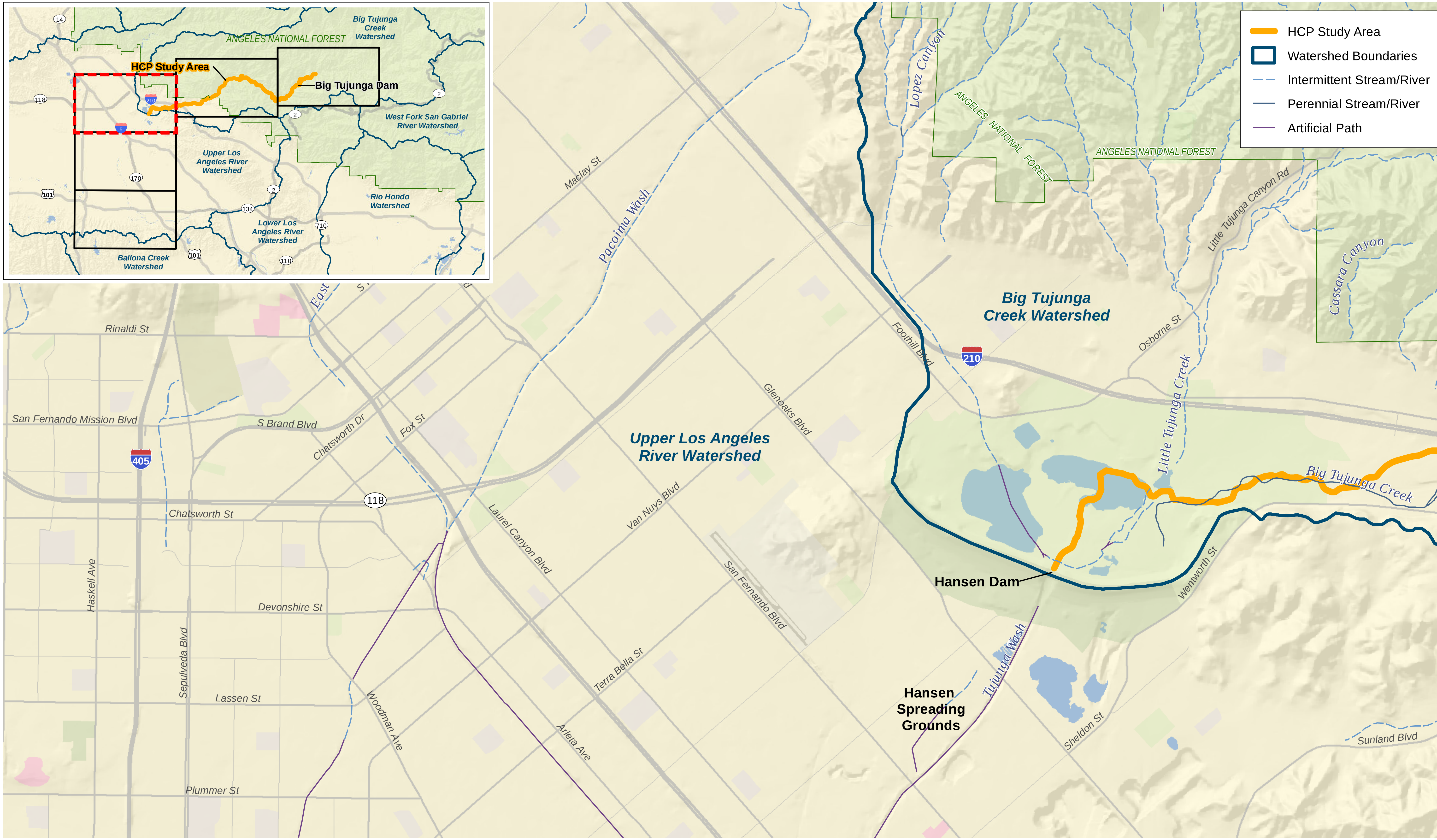

Hydrology

Big Tujunga Dam HCP

Exhibit 5c

0.5 0.25 0 0.5 Miles

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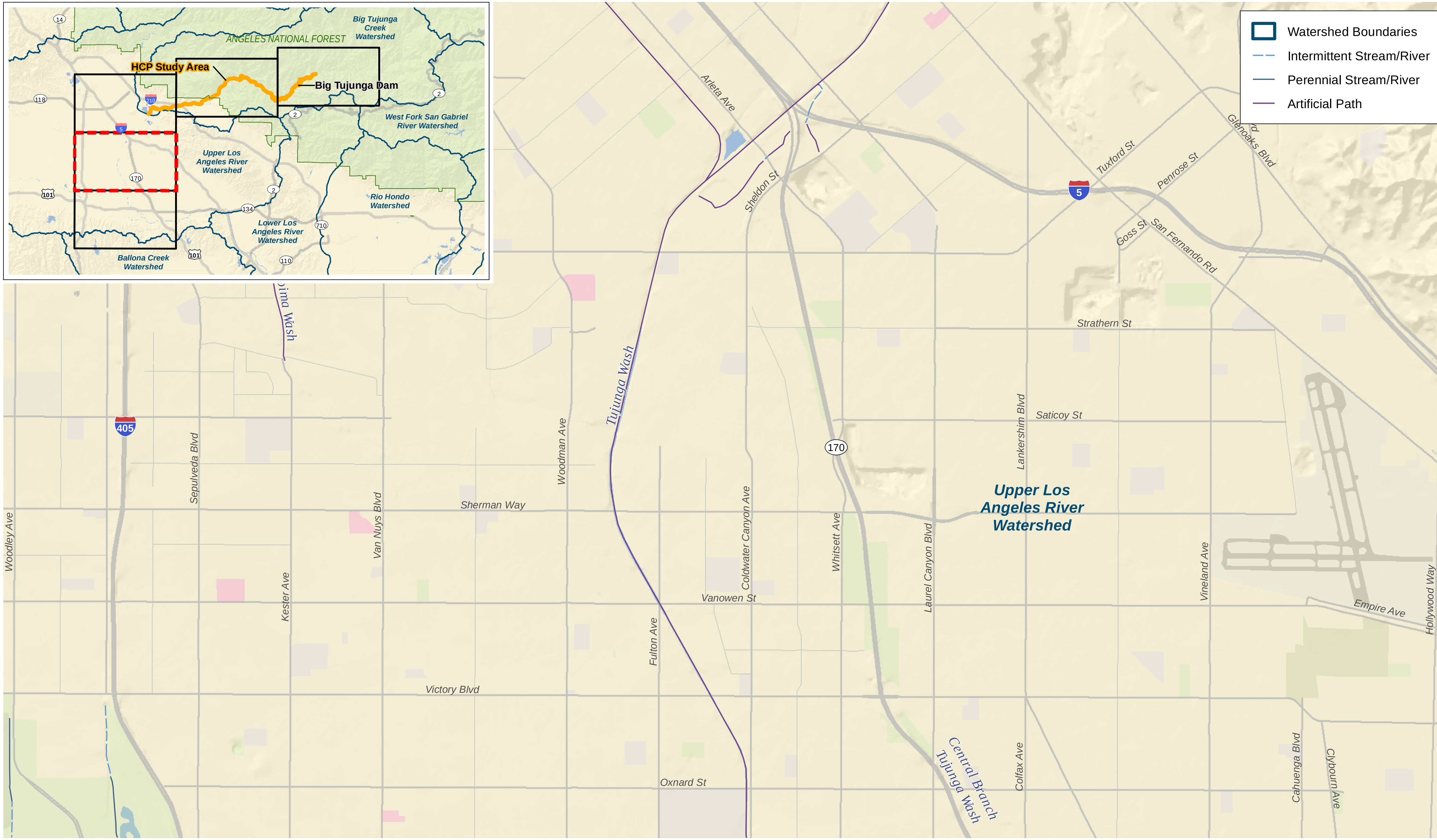

Hydrology

Big Tujunga Dam HCP

Exhibit 5d

0.5 0.25 0 0.5 Miles

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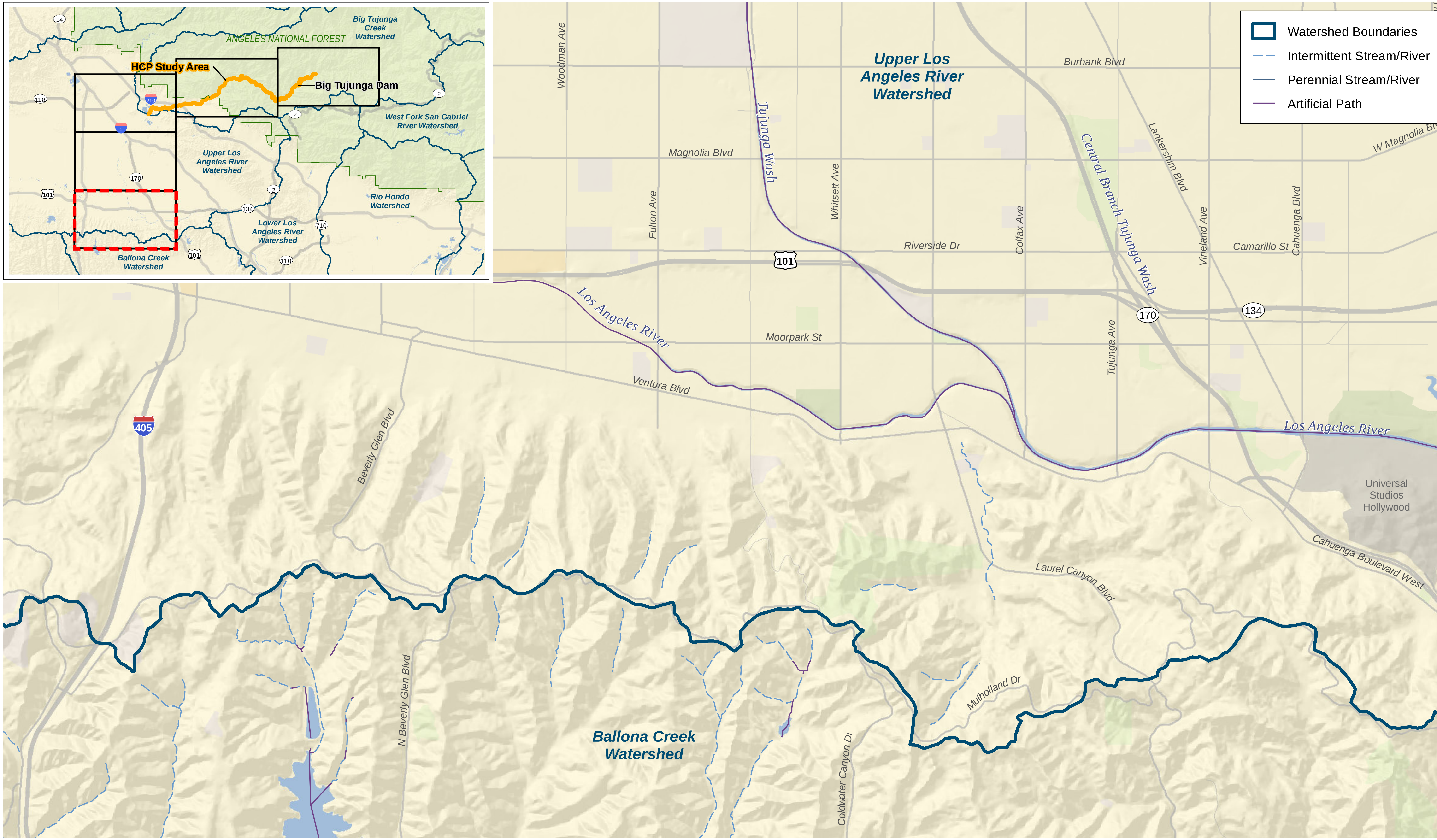

Hydrology

Exhibit 5e

Big Tujunga Dam HCP

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of 24.06 inches per year. The Upper Big Tujunga Creek Watershed experiences an average precipitation of 23.83 inches per year. The Lower Big Tujunga Creek Watershed experiences an average precipitation of 24.32 inches per year (Chang 2020; Public Works 2018). Historical annual precipitation at Big Tujunga Dam's rain gage is 26.05 inches per year (Zargaryan 2020).

The headwaters of Big Tujunga Creek occur at approximately 5,200 feet above msl, south of the Angeles Crest Highway, and east of Charlton Flat in the Angeles National Forest. As Big Tujunga Creek flows westerly, it is joined by several tributaries from the north and south; many of the tributaries are unnamed. Over time, erosion has deposited alluvium (including boulders, cobbles, gravel, and coarse to fine sandy soils) within the stream bed of Big Tujunga Creek. Topography is irregular within Big Tujunga Canyon; and the stream grade, width, and flow velocity vary but are generally moderate. The creek channel morphology in the HCP study area includes portions with narrow, incised, fast-moving water; portions with wider, slow-moving water; deep pools; and a relatively broad alluvial wash with multiple meanders.

Upstream of the HCP study area, Big Tujunga Creek is joined by Alder Creek, Wildcat Gulch, Lynx Gulch, Wickiup Canyon, Coldwater Canyon, Grotto Creek, Mill Creek, and Lucas Creek. Within the HCP study area upstream of Big Tujunga Reservoir, Big Tujunga Creek is joined by Fall Creek, Josephine Creek, and Fox Creek. White Oak Creek flows into the Big Tujunga Reservoir. Upstream of Big Tujunga Reservoir, Big Tujunga Creek and its tributaries are steep with rocky mountain streams and small waterfalls.

Big Tujunga Reservoir has been created by an arched dam across Big Tujunga Creek. Water inflow to Big Tujunga Reservoir varies considerably from day to day and from year to year, based on weather events. In general, the Reservoir elevation levels are maintained between 2,225 and 2,290 feet above msl. Flood control releases from the Dam generally match inflow (see discussion of operations in Section 3.0). Water conservation releases vary depending on accumulated recession flows (i.e., the runoff following storm events) and occur year-round; they may be augmented by supplemental releases, which are dependent on seasonal rainfall (see discussion of operations in Section 3.0). LACFCD has been making supplemental releases throughout the summer months to benefit the Santa Ana sucker since 2011 (see discussion of supplemental releases in Section 3.0).

From Big Tujunga Reservoir downstream to Delta Flats, Big Tujunga Creek is joined by Hansen Canyon, Maple Canyon (where Maple Canyon SPS is located), Clear Creek, Breakneck Canyon, Fusier Canyon, Vasquez Creek, Silver Creek, Vogel Canyon, Stone Canyon, Ybarra Canyon, Trail Canyon, and Delta Canyon. Beginning at Vogel Flats, topography is less steep and the canyon bottom is a little wider. This is the area where low-density rural development occurs scattered along the stream. In this portion, the creek is a mix of riffles and pools with some braiding of the active channel.

From Delta Flats downstream to Hansen Dam, Big Tujunga Creek is joined by Gold Canyon, Bryant Canyon, Pipe Canyon, Akens Canyon, Doane Canyon, Ebey Canyon, Haines Canyon Channel, Schwartz Canyon, Oliver Canyon, Cassara Canyon, Little Tujunga Creek, and Lopez Canyon. From Delta Flats to the Oro Vista crossing, the creek is a mix of riffles and pools with some braiding of the active channel. Downstream of the Oro Vista crossing, Big Tujunga Creek opens up into an alluvial wash as it flows through the Angeles National Golf Course and under I-210 to the Hansen Dam Flood Control Basin.

Downstream of the HCP study area (downstream of Hansen Dam), water enters Tujunga Wash and is directed to Hansen Spreading Grounds (owned and operated by LACFCD) for groundwater recharge. Water retained behind Hansen Dam and within the spreading grounds replenishes the San Fernando Groundwater Basin, which underlies Hansen Dam. Tujunga Wash continues approximately 8.5 miles south to join the Los Angeles River near Studio City, which ultimately discharges to the Pacific Ocean near the City of Long Beach. Downstream of the HCP study area, Tujunga Wash becomes an urban channel surrounded by dense urban development.

2.3 BIOLOGICAL SETTING

2.3.1 VEGETATION

2.3.1.1 METHODS

Vegetation mapping of the HCP study area included Big Tujunga Creek with a 100-foot buffer on each side of the creek. In places where Big Tujunga Canyon Road was closer than 100 feet, the buffer was truncated at the road.

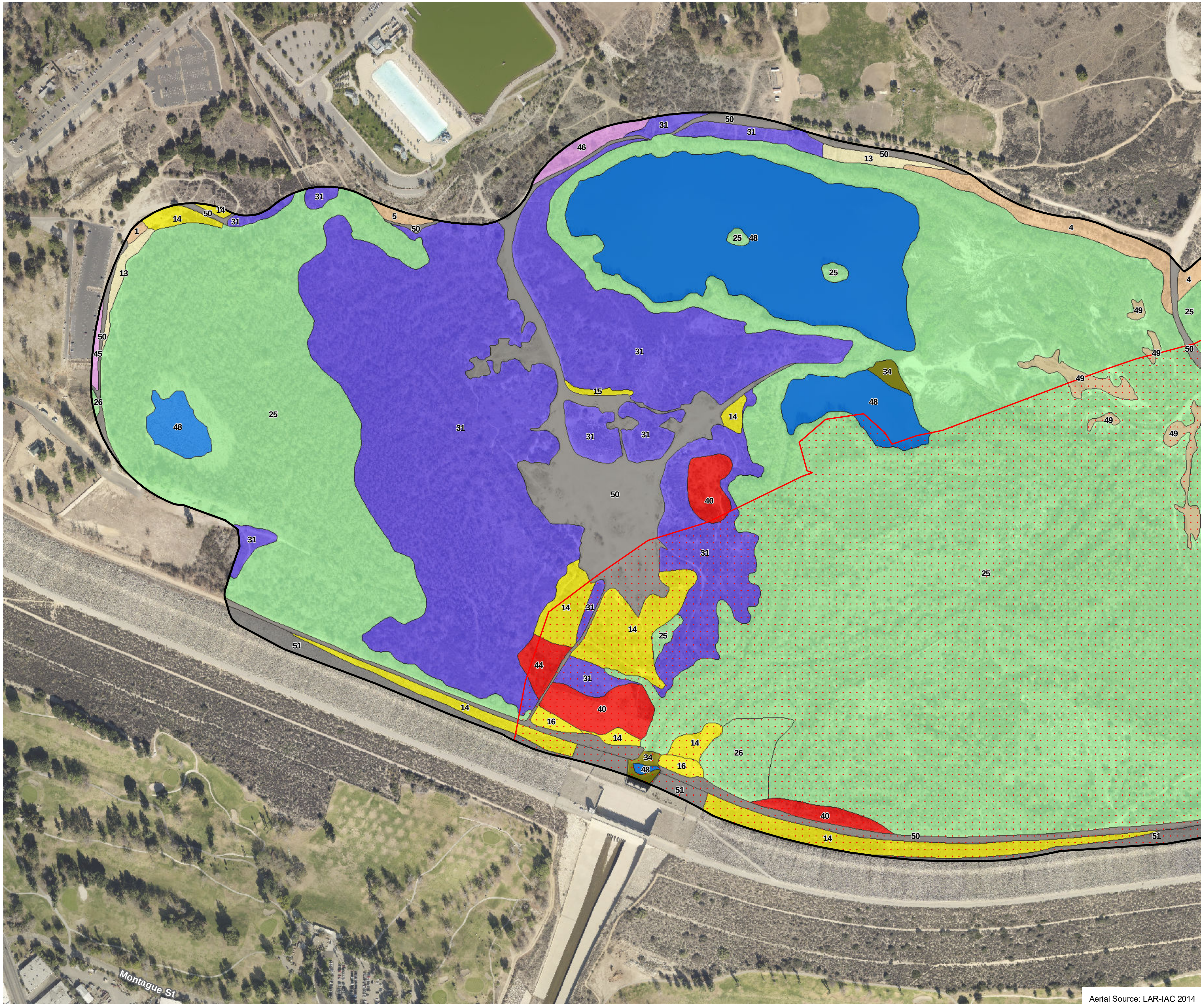
Psomas Senior Biologists Allison Rudalevige and Lindsay Messett conducted vegetation mapping for the HCP study area on August 16 through 18, August 21 and 22, and September 5, 2017. Vegetation was mapped in the field on an aerial photograph at a scale of 1inch equals 200 feet (1″ = 200′). A minimum mapping unit of 0.1 acre was used when differentiating vegetation types. Where vegetation overlapped another landcover (e.g., tree canopy over water or dry wash), the area was mapped according to the uppermost layer of vegetation. Where a bridge overlapped vegetation, the area was mapped according to the vegetation. Vegetation that was inaccessible due to steep topography or access issues was mapped from a distance with the use of binoculars. Representative photographs showing the most common vegetation types in the HCP study area are provided in Attachment A. All plant and wildlife species that were observed during the vegetation mapping were recorded.

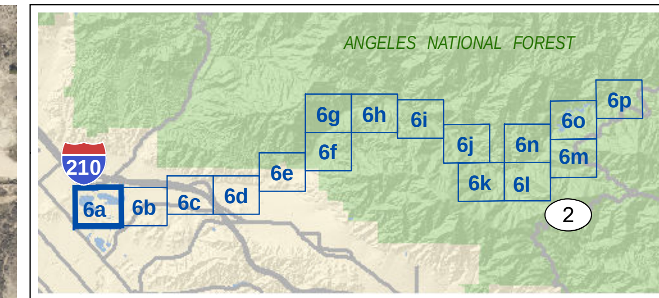
Nomenclature of vegetation types follows that of *A Manual of California Vegetation, Second Edition* which is the standard classification system currently recognized by CDFW and the California Native Plant Society (CNPS) (Sawyer et al. 2009). Nomenclature of special status plant species/subspecies conforms to the Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2018b) and the Jepson eFlora (Jepson Flora Project 2017) for all other plant species/subspecies; ornamental species not listed in the Jepson eFlora are named based on the *Sunset Western Garden Book* (Brenzel 2007).

2.3.1.2 VEGETATION TYPES

A variety of upland and riparian vegetation types occur in the HCP study area. Vegetation types and other land cover have been grouped into generalized types as follows: sage scrub, alluvial scrub, chaparral, grassland, riparian forest, riparian scrub, riparian herb, marsh, seep, forest/woodland, riparian invasive, ornamental plantings, cliff/rock, open water, alluvium, and other landcover (Exhibit 6). Table 3 provides the total area of each vegetation type; descriptions of the vegetation and other landcovers is provided below. Because there are many vegetation types, a numeric code was included for cross-referencing between Table 3, Exhibit 6, and the text below.

The December 2017 Creek Fire burned 834.54 acres of the lower portion of the HCP study area, which was mapped for the HCP in August 2017 (Exhibit 2). It should be noted that the 2009 Station Fire previously burned 869.57 acres of the upper portion of the HCP study area (Exhibit 2). The Station Fire acreage has not been shown in Table 3 because the HCP vegetation mapping was done eight years after the Station Fire, and the vegetation in the HCP study area has largely recovered. A total of 616.55 acres in the middle portion of the HCP study area has not been burned in the last ten years. The 2020 Bobcat Fire did not affect the HCP study area.





- HCP Study Area
- Creek Fire Burn Area (December 2017)
- Sage Scrub
  - 1 : California Sagebrush Scrub
  - 4 : California Sagebrush–California Buckwheat Scrub
  - 5 : Laurel Sumac Scrub
- Grassland
  - 13 : Annual Brome Grassland
- Ruderal
  - 14 : Upland Mustards
  - 15 : Maltese Star-thistle Patch
  - 16 : Russian Thistle Field
- Riparian Forest
  - 25 : Black Willow Thicket
  - 26 : Disturbed Black Willow Thicket
- Riparian Scrub
  - 31 : Disturbed Mulefat Thicket
- Marsh
  - 34 : Cattail Marsh
- Riparian Invasive
  - 40 : Tamarisk Thicket
  - 44 : Fennel Patch
- Ornamental Plantings
  - 45 : Native Planting
  - 46 : Non-native Planting
- Open Water
  - 48 : Open Water
- Alluvium
  - 49 : Dry Wash
- Other Landcover
  - 50 : Disturbed
  - 51 : Developed/Ornamental

500 250 0 500
Feet

N W E S

Vegetation Types — Exhibit 6a

Big Tujunga Dam HCP

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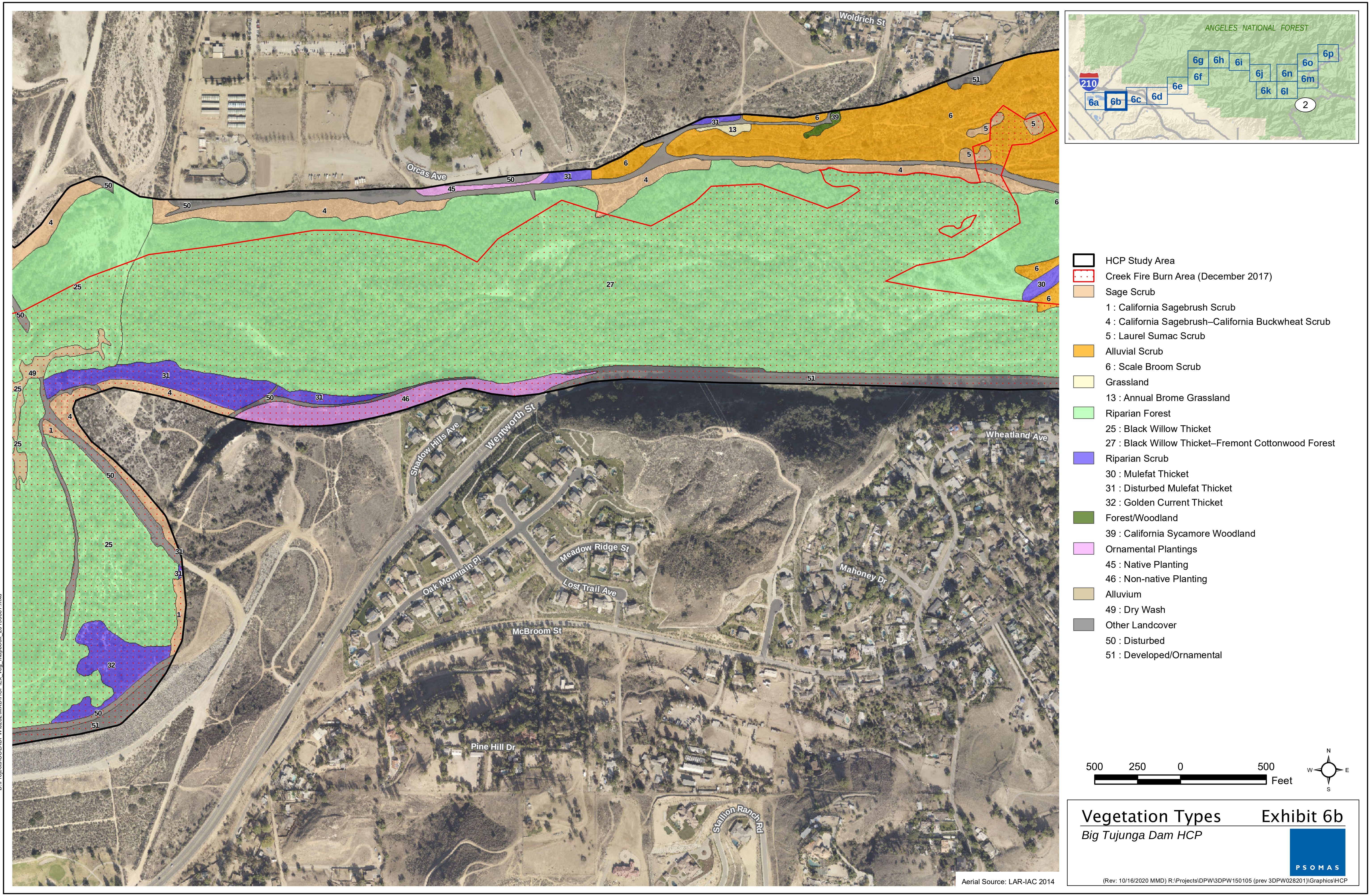
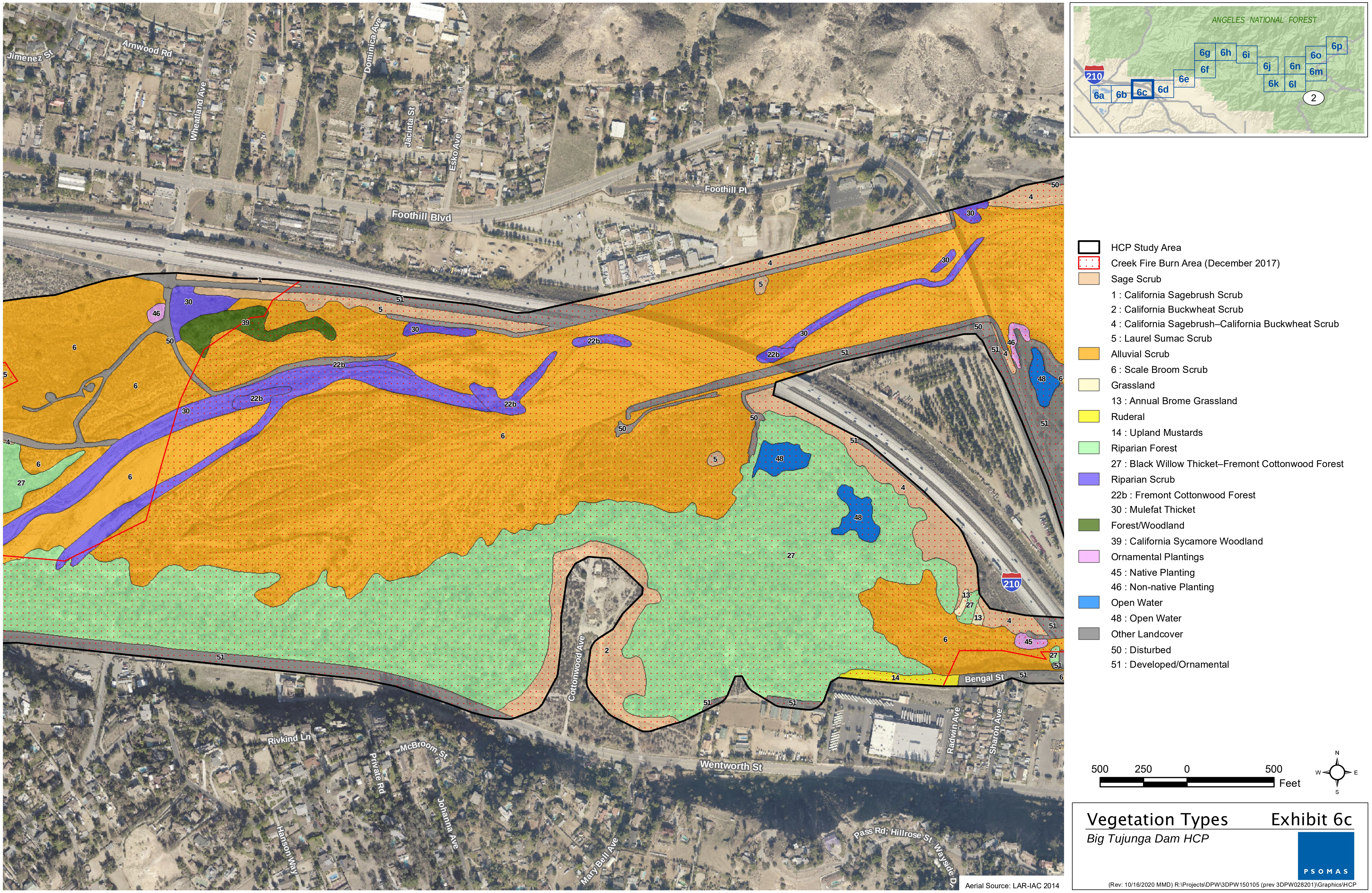


Vegetation Types — Exhibit 6b

Big Tujunga Dam HCP



Vegetation Types

Exhibit 6c

Big Tujunga Dam HCP

PSOMAS

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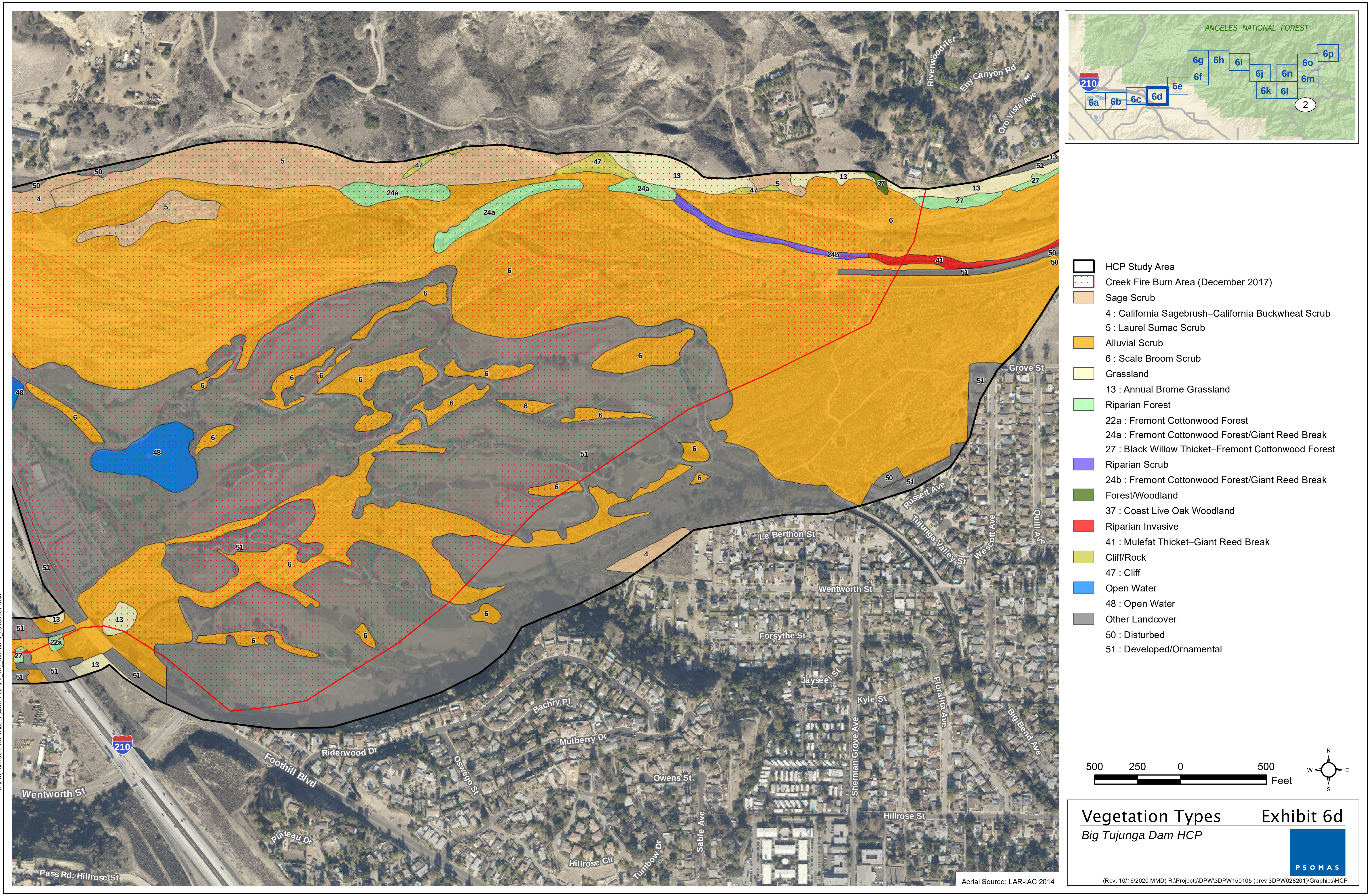

Vegetation Types Exhibit 6d

Big Tujunga Dam HCP

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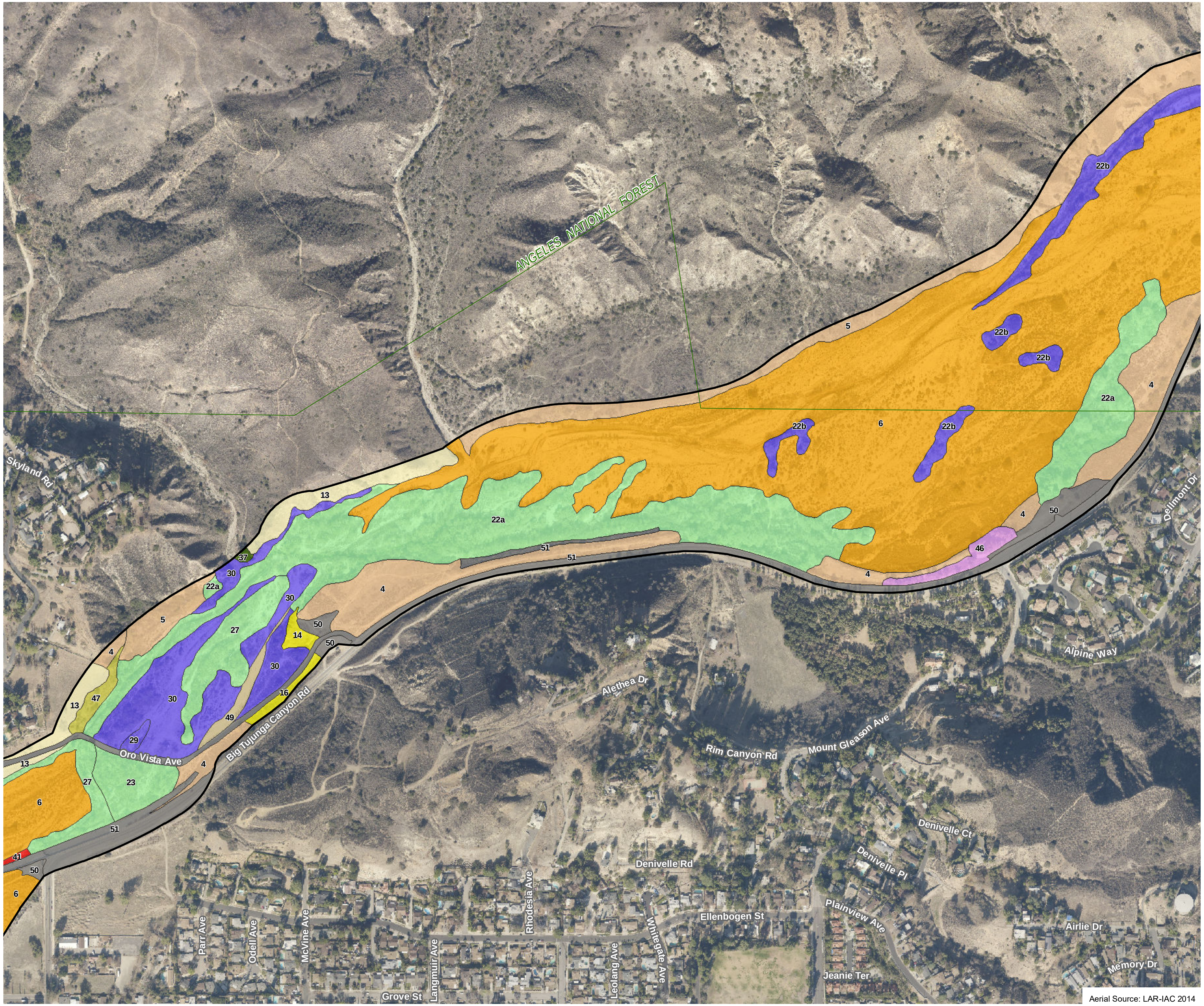

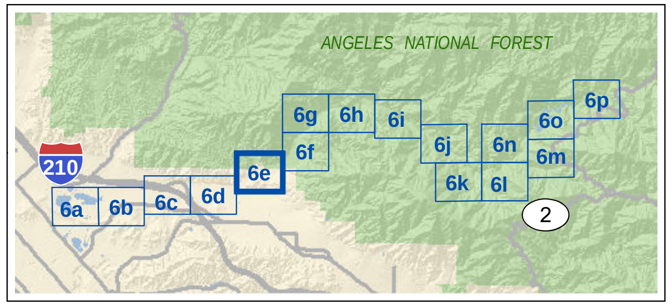

- HCP Study Area
- Sage Scrub
  - 4 : California Sagebrush–California Buckwheat Scrub
  - 5 : Laurel Sumac Scrub
- Alluvial Scrub
  - 6 : Scale Broom Scrub
- Grassland
  - 13 : Annual Brome Grassland
- Ruderal
  - 14 : Upland Mustards
  - 16 : Russian Thistle Field
- Riparian Forest
  - 22a : Fremont Cottonwood Forest
  - 23 : Fremont Cottonwood Forest–Arroyo Willow Thicket
  - 27 : Black Willow Thicket–Fremont Cottonwood Forest
- Riparian Scrub
  - 22b : Fremont Cottonwood Forest
  - 29 : Sandbar Willow Thicket
  - 30 : Mulefat Thicket
- Forest/Woodland
  - 37 : Coast Live Oak Woodland
- Riparian Invasive
  - 41 : Mulefat Thicket–Giant Reed Break
- Ornamental Plantings
  - 46 : Non-native Planting
- Cliff/Rock
  - 47 : Cliff
- Alluvium
  - 49 : Dry Wash
- Other Landcover
  - 50 : Disturbed
  - 51 : Developed/Ornamental

500 250 0 500 Feet

Vegetation Types — Exhibit 6e

Big Tujunga Dam HCP

PSOMAS

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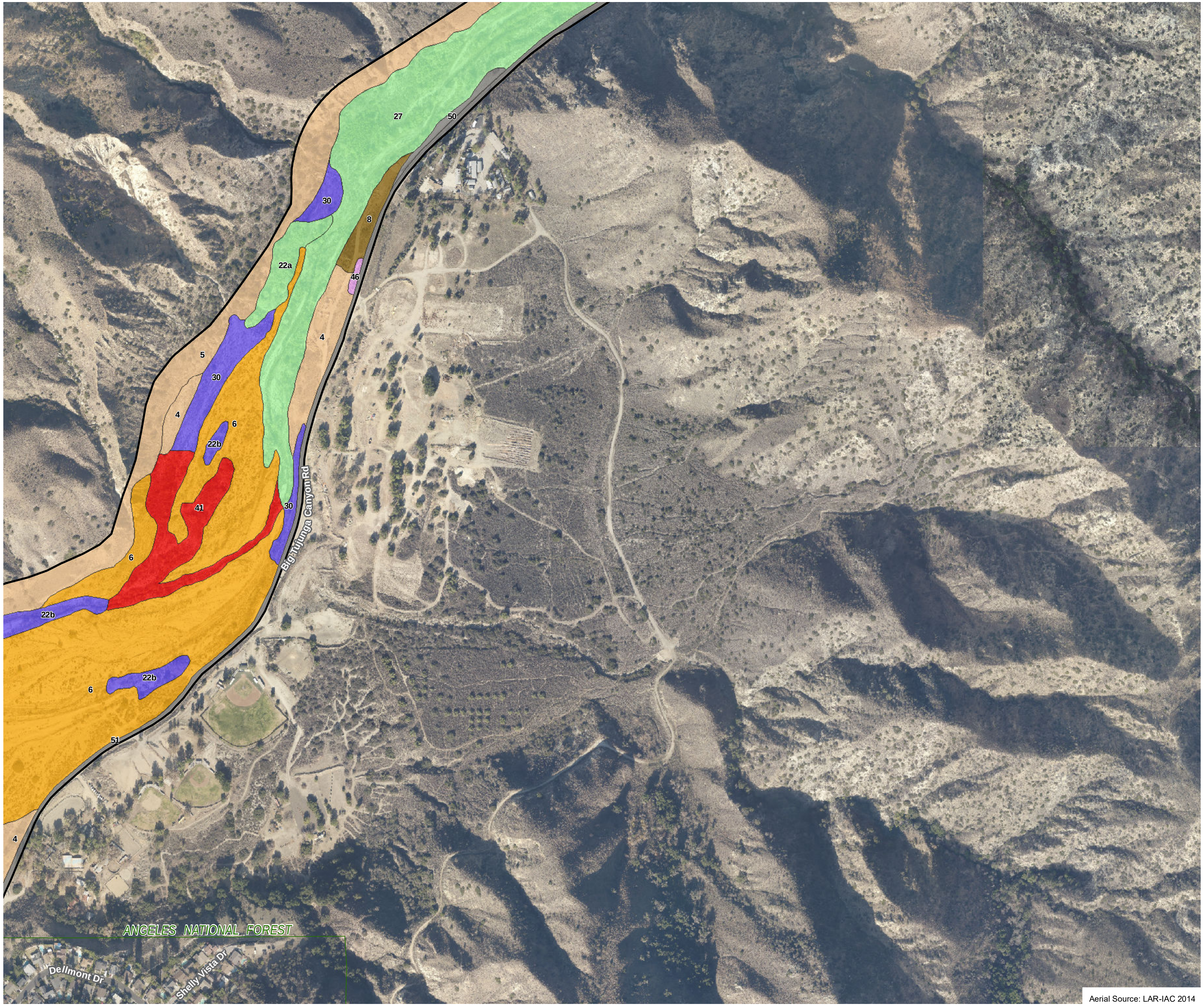

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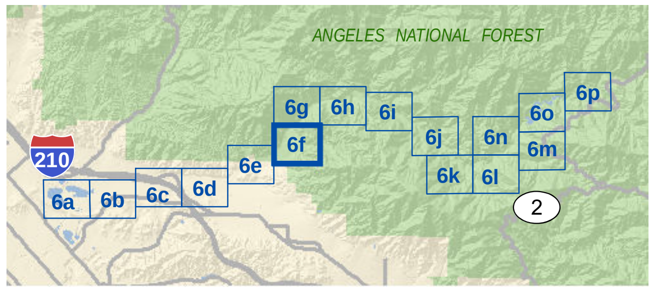

HCP Study Area

Sage Scrub
- 4 : California Sagebrush–California Buckwheat Scrub
- 5 : Laurel Sumac Scrub

Alluvial Scrub
- 6 : Scale Broom Scrub

Chaparral
- 8 : Chamise Chaparral

Riparian Forest
- 22a : Fremont Cottonwood Forest
- 27 : Black Willow Thicket–Fremont Cottonwood Forest

Riparian Scrub
- 22b : Fremont Cottonwood Forest
- 30 : Mulefat Thicket

Riparian Invasive
- 41 : Mulefat Thicket–Giant Reed Break

Ornamental Plantings
- 46 : Non-native Planting

Other Landcover
- 50 : Disturbed
- 51 : Developed/Ornamental

500 250 0 500 Feet

N W E S

Vegetation Types

Exhibit 6f

Big Tujunga Dam HCP

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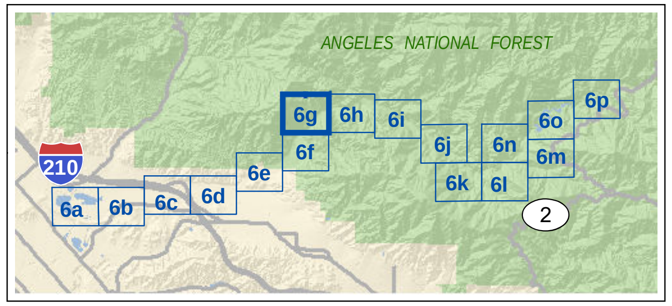

Aerial Source: LAR-IAC 2014

- HCP Study Area
- Sage Scrub
  - 4 : California Sagebrush–California Buckwheat Scrub
  - 5 : Laurel Sumac Scrub
- Alluvial Scrub
  - 6 : Scale Broom Scrub
- Chaparral
  - 8 : Chamise Chaparral
- Ruderal
  - 17 : Tree Tobacco Patch
- Riparian Forest
  - 27 : Black Willow Thicket–Fremont Cottonwood Forest
- Forest/Woodland
  - 37 : Coast Live Oak Woodland
- Other Landcover
  - 50 : Disturbed
  - 51 : Developed/Ornamental

500 250 0 500 Feet

N W E S

Vegetation Types Exhibit 6g

Big Tujunga Dam HCP

PSOMAS

(Rev: 10/16/2020 MMD) R:\Projects\DPW\3DPW150105 (prev 3DPW028201)\Graphics\HCP

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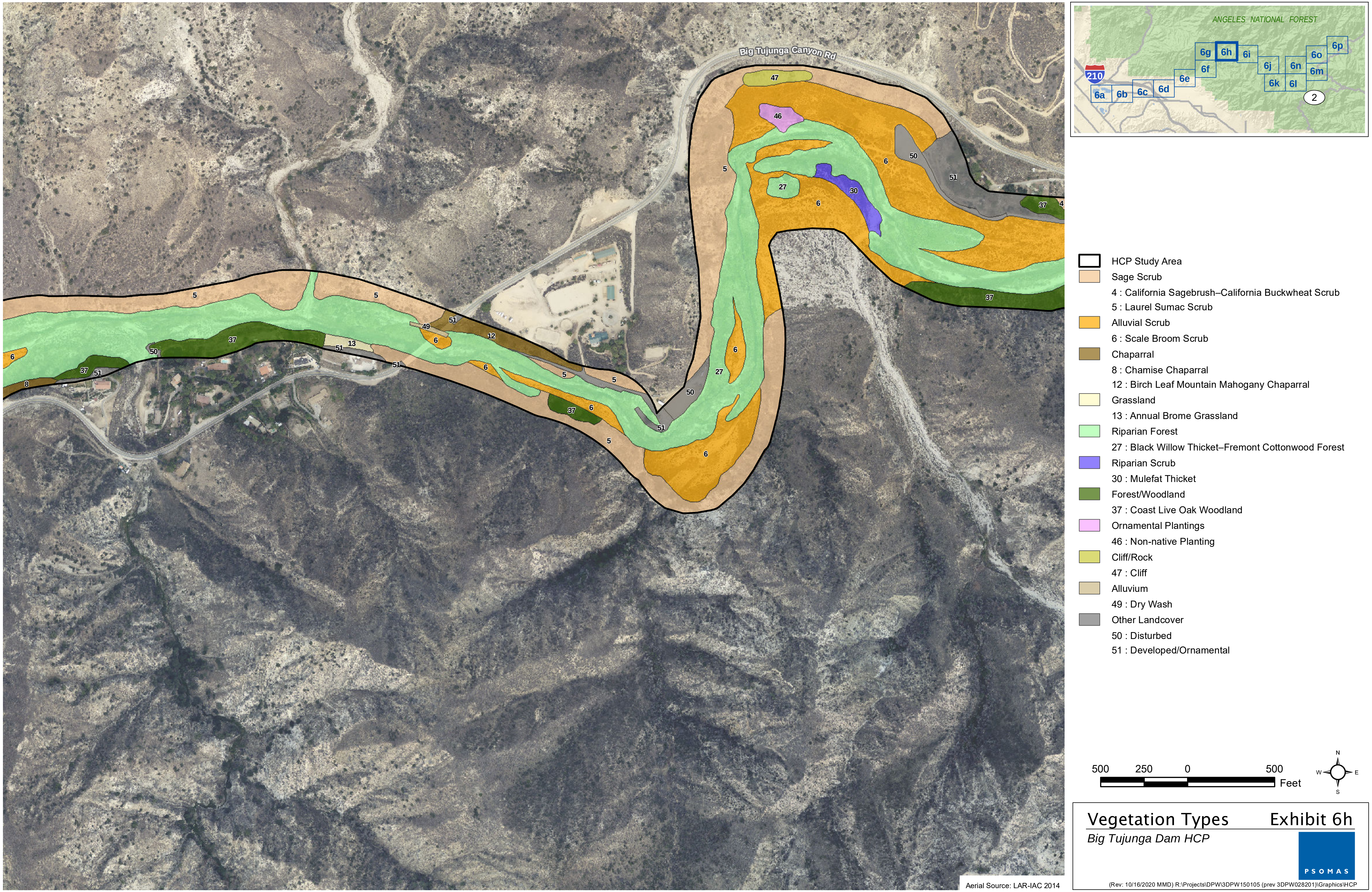

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Vegetation Types Exhibit 6h

Big Tujunga Dam HCP

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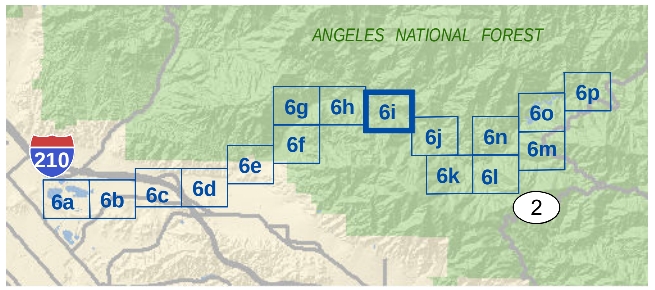

HCP Study Area
Sage Scrub
4 : California Sagebrush–California Buckwheat Scrub
5 : Laurel Sumac Scrub
Alluvial Scrub
6 : Scale Broom Scrub
Chaparral
7 : Thick Leaf Yerba Santa Scrub
Grassland
13 : Annual Brome Grassland
Riparian Forest
27 : Black Willow Thicket–Fremont Cottonwood Forest
Riparian Scrub
30 : Mulefat Thicket
Forest/Woodland
37 : Coast Live Oak Woodland
Riparian Invasive
42 : Giant Reed Break
Ornamental Plantings
46 : Non-native Planting
Other Landcover
50 : Disturbed
51 : Developed/Ornamental

500 250 0 500
Feet

Vegetation Types Exhibit 6i

Big Tujunga Dam HCP

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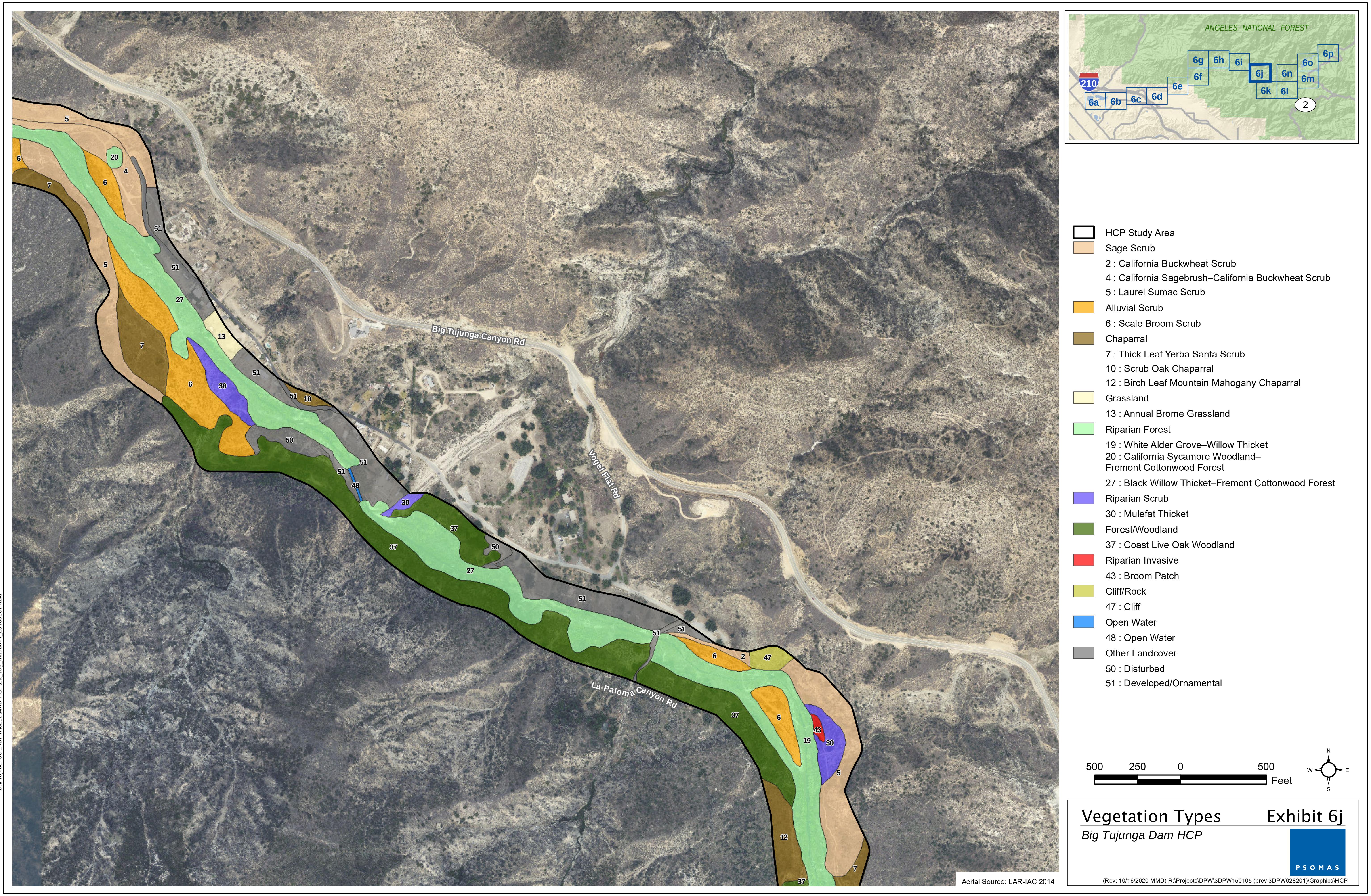
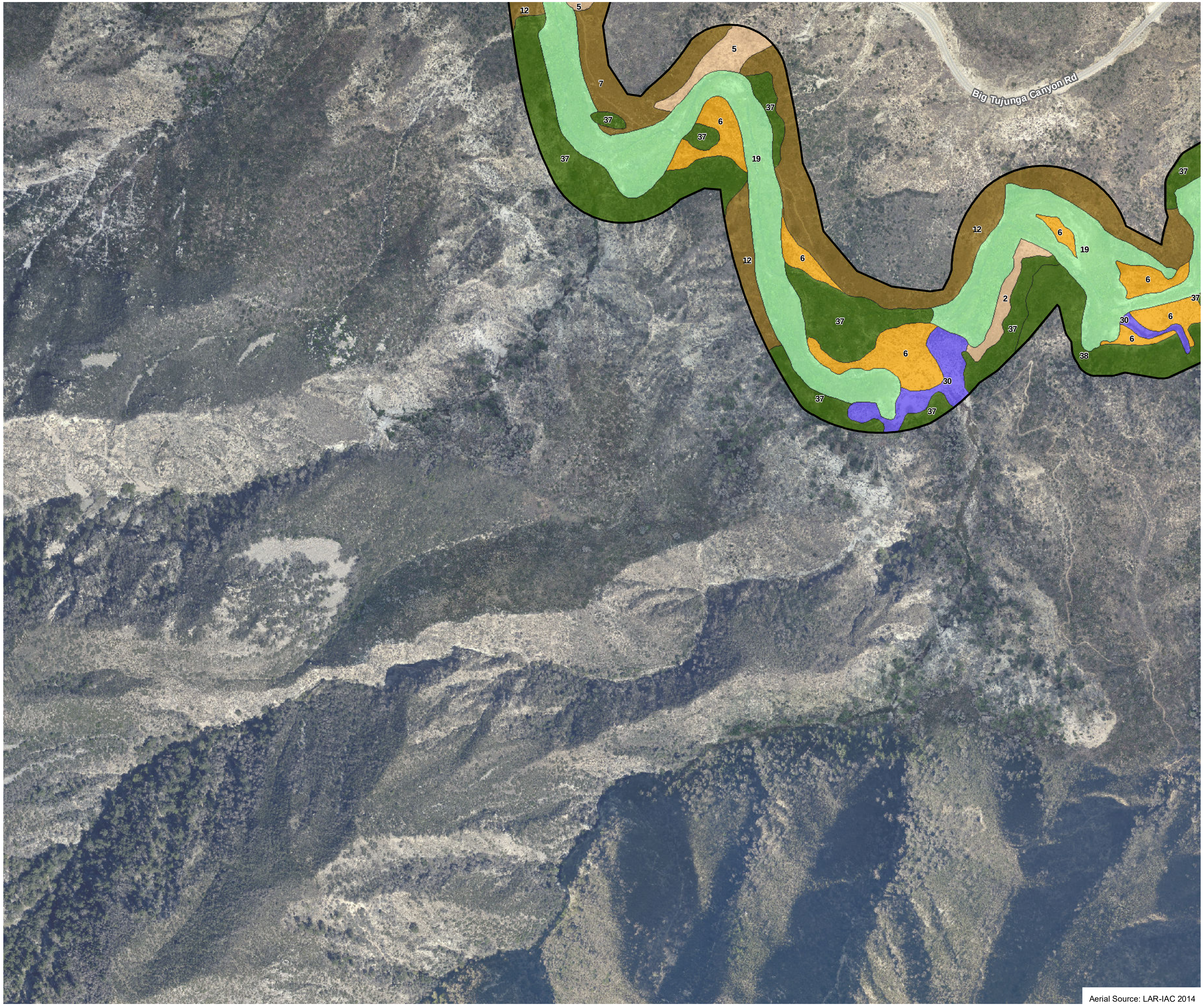
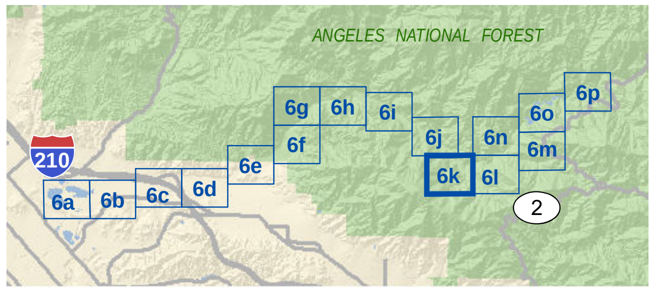


Vegetation Types Exhibit 6j

Big Tujunga Dam HCP





HCP Study Area

Sage Scrub

2 : California Buckwheat Scrub

5 : Laurel Sumac Scrub

Alluvial Scrub

6 : Scale Broom Scrub

Chaparral

7 : Thick Leaf Yerba Santa Scrub

12 : Birch Leaf Mountain Mahogany Chaparral

Riparian Forest

19 : White Alder Grove–Willow Thicket

Riparian Scrub

30 : Mulefat Thicket

Forest/Woodland

37 : Coast Live Oak Woodland

38 : Bigcone Douglas Fir–Canyon Live Oak Forest

500 250 0 500 Feet

N W E S

Vegetation Types Exhibit 6k

Big Tujunga Dam HCP

PSOMAS

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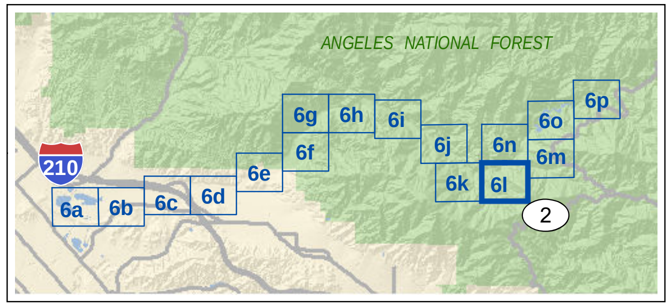

HCP Study Area
Sage Scrub
2 : California Buckwheat Scrub
Alluvial Scrub
6 : Scale Broom Scrub
Chaparral
7 : Thick Leaf Yerba Santa Scrub
8 : Chamise Chaparral
12 : Birch Leaf Mountain Mahogany Chaparral
Grassland
13 : Annual Brome Grassland
Riparian Forest
19 : White Alder Grove–Willow Thicket
22a : Fremont Cottonwood Forest
Riparian Scrub
30 : Mulefat Thicket
Forest/Woodland
37 : Coast Live Oak Woodland
38 : Bigcone Douglas Fir–Canyon Live Oak Forest
Riparian Invasive
43 : Broom Patch
Cliff/Rock
47 : Cliff
Alluvium
49 : Dry Wash
Other Landcover
50 : Disturbed

500 250 0 500 Feet

N W E S

Vegetation Types Exhibit 6l

Big Tujunga Dam HCP

PSOMAS

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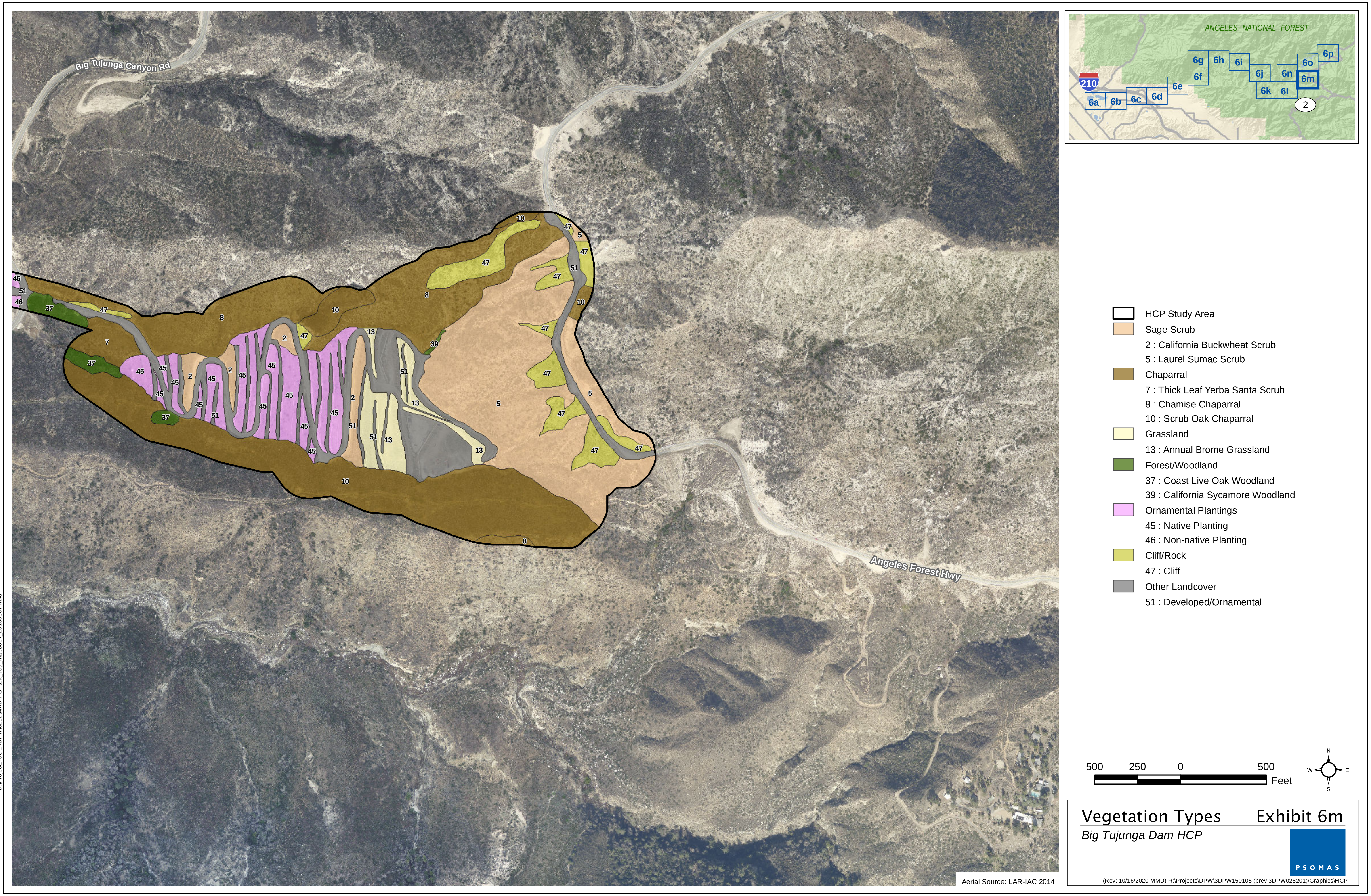
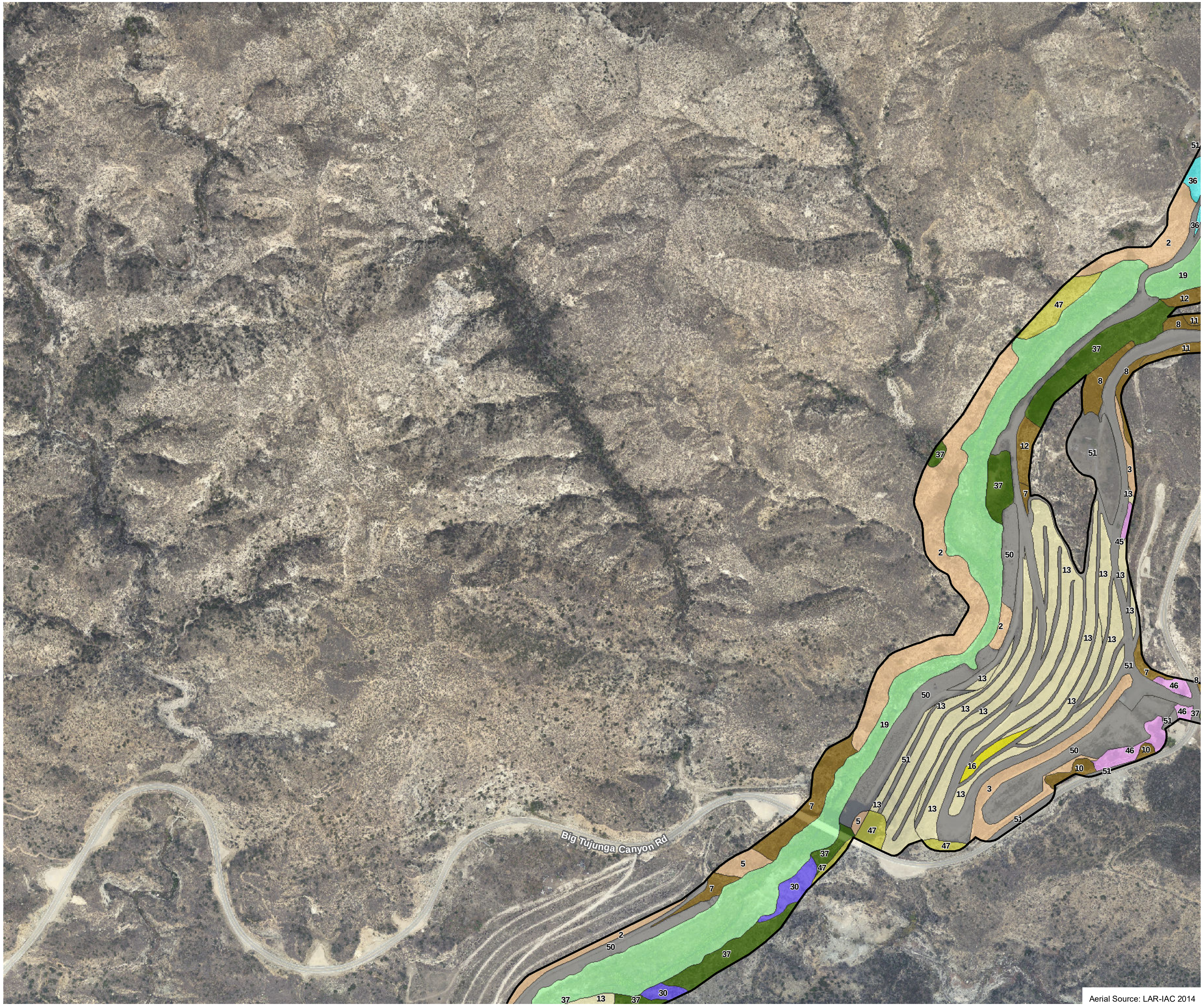
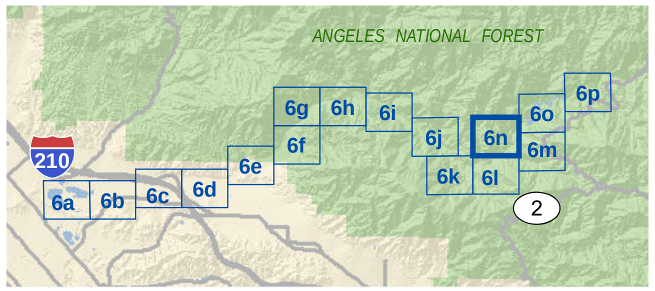


Vegetation Types
Exhibit 6m
Big Tujunga Dam HCP





- HCP Study Area
- Sage Scrub
  - 2 : California Buckwheat Scrub
  - 3 : Disturbed California Buckwheat Scrub
  - 5 : Laurel Sumac Scrub
- Chaparral
  - 7 : Thick Leaf Yerba Santa Scrub
  - 8 : Chamise Chaparral
  - 10 : Scrub Oak Chaparral
  - 11 : Hoary Leaf Ceanothus Chaparral
  - 12 : Birch Leaf Mountain Mahogany Chaparral
- Grassland
  - 13 : Annual Brome Grassland
- Ruderal
  - 16 : Russian Thistle Field
- Riparian Forest
  - 19 : White Alder Grove–Willow Thicket
- Riparian Scrub
  - 30 : Mulefat Thicket
- Seep
  - 36 : Disturbed Freshwater Seep
- Forest/Woodland
  - 37 : Coast Live Oak Woodland
- Ornamental Plantings
  - 45 : Native Planting
  - 46 : Non-native Planting
- Cliff/Rock
  - 47 : Cliff
- Other Landcover
  - 50 : Disturbed
  - 51 : Developed/Ornamental

500 250 0 500 Feet

N W E S

Vegetation Types Exhibit 6n

Big Tujunga Dam HCP

PSOMAS

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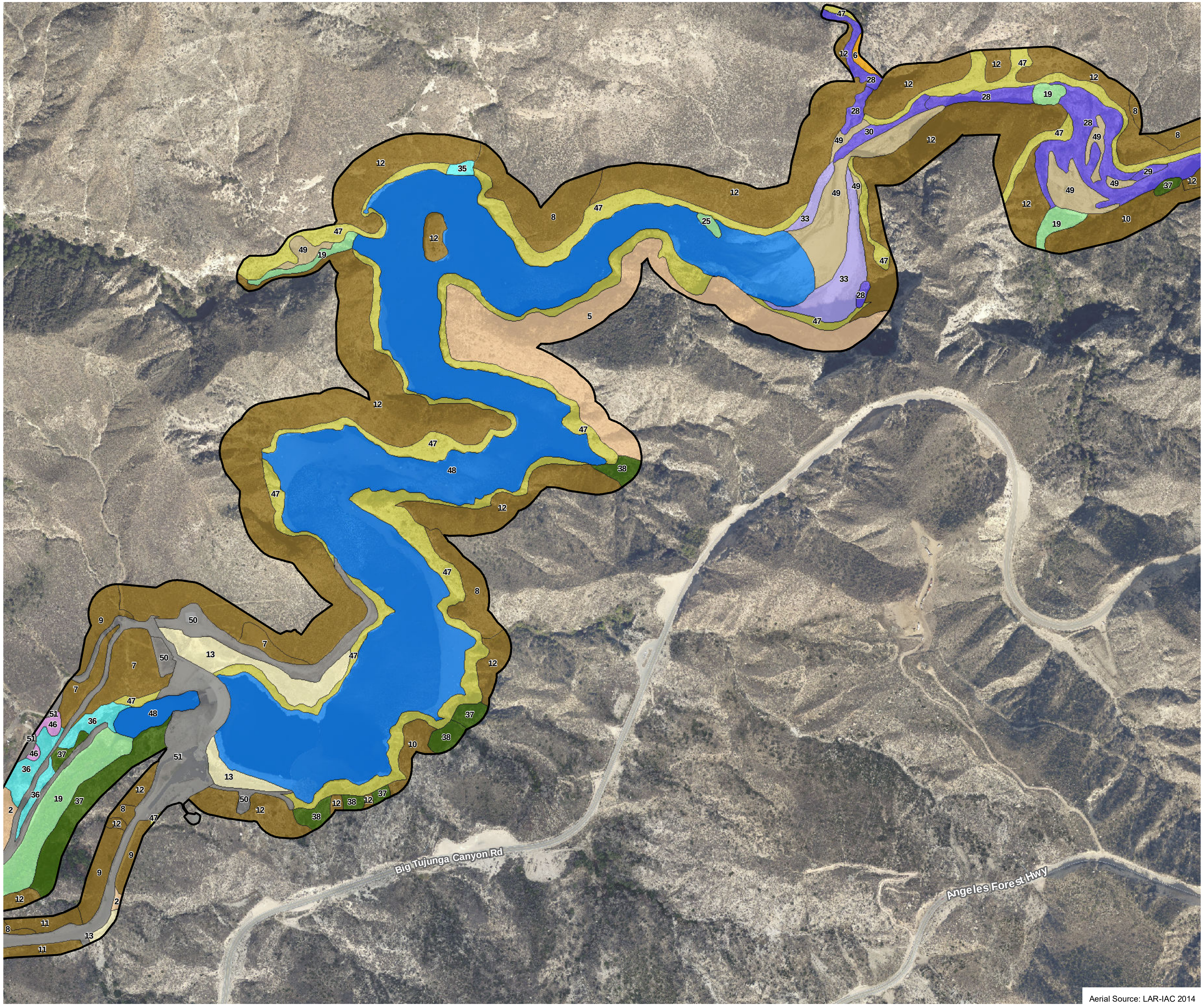
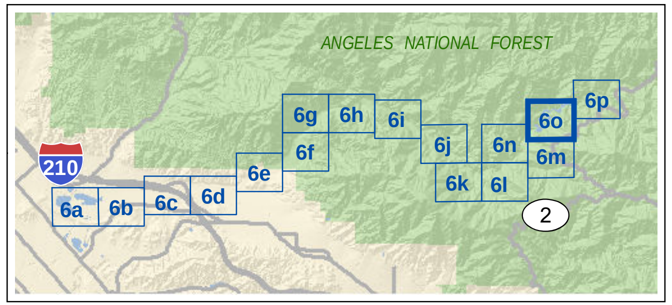




HCP Study Area

Sage Scrub
- 2 : California Buckwheat Scrub
- 5 : Laurel Sumac Scrub

Alluvial Scrub
- 6 : Scale Broom Scrub

Chaparral
- 7 : Thick Leaf Yerba Santa Scrub
- 8 : Chamise Chaparral
- 9 : Chamise Chaparral–Thick Leaf Yerba Santa Scrub
- 10 : Scrub Oak Chaparral
- 11 : Hoary Leaf Ceanothus Chaparral
- 12 : Birch Leaf Mountain Mahogany Chaparral

Grassland
- 13 : Annual Brome Grassland

Riparian Forest
- 19 : White Alder Grove–Willow Thicket
- 25 : Black Willow Thicket

Riparian Scrub
- 28 : Arroyo Willow Thicket
- 29 : Sandbar Willow Thicket
- 30 : Mulefat Thicket

Riparian Herb
- 33 : Smartweed–Cocklebur Patch

Seep
- 35 : Freshwater Seep
- 36 : Disturbed Freshwater Seep

Forest/Woodland
- 37 : Coast Live Oak Woodland
- 38 : Bigcone Douglas Fir–Canyon Live Oak Forest

Ornamental Plantings
- 46 : Non-native Planting

Cliff/Rock
- 47 : Cliff

Open Water
- 48 : Open Water

Alluvium
- 49 : Dry Wash

Other Landcover
- 50 : Disturbed
- 51 : Developed/Ornamental

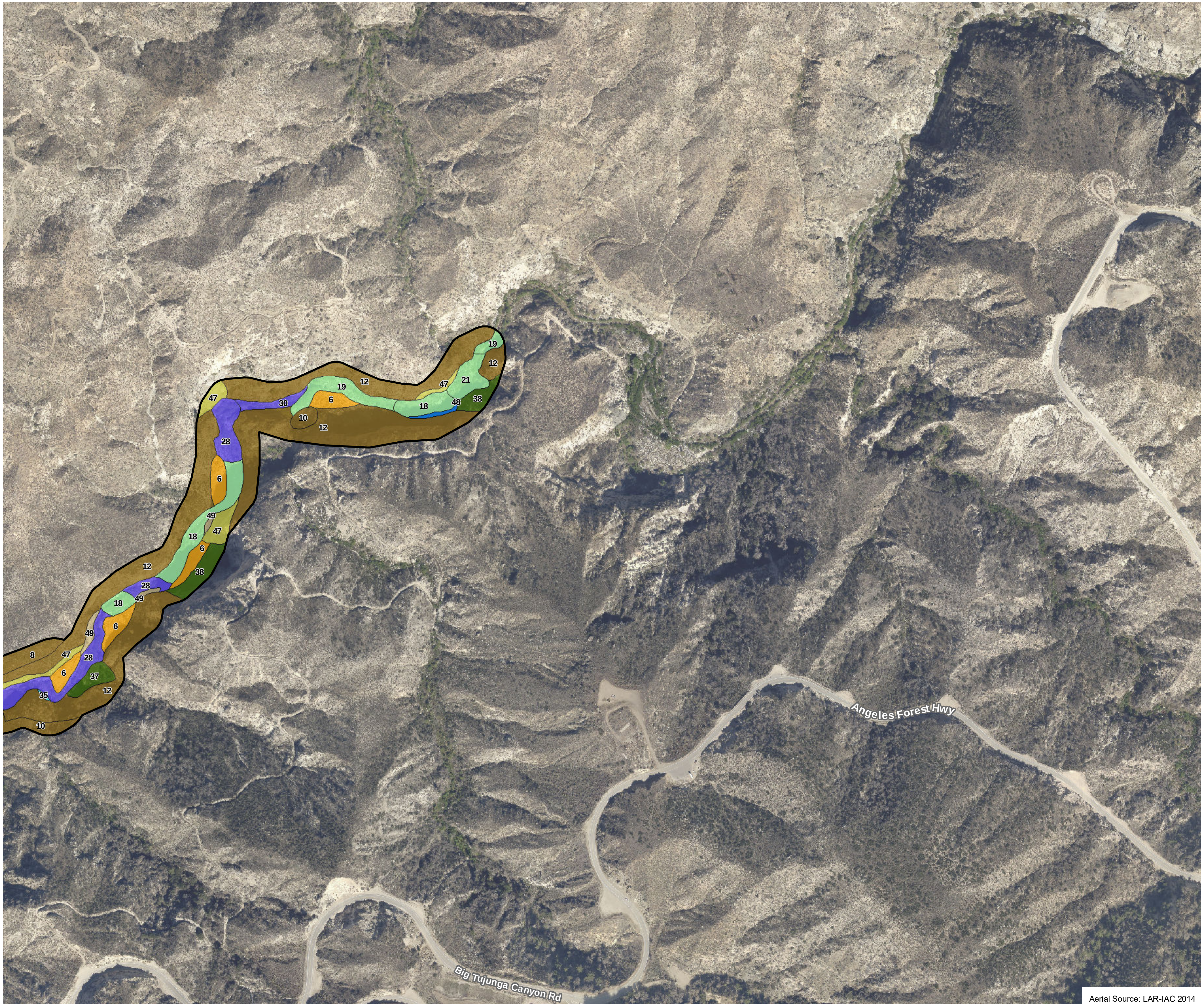
500 250 0 500 Feet

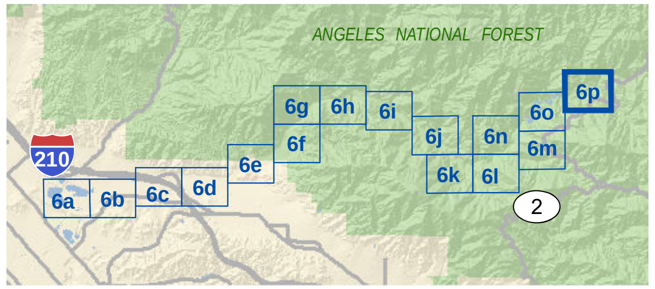
N W E S

Vegetation Types Exhibit 6o

Big Tujunga Dam HCP

PSOMAS





HCP Study Area

Alluvial Scrub
- 6 : Scale Broom Scrub

Chaparral
- 8 : Chamise Chaparral
- 10 : Scrub Oak Chaparral
- 12 : Birch Leaf Mountain Mahogany Chaparral

Riparian Forest
- 18 : White Alder Grove–California Sycamore Woodland
- 19 : White Alder Grove–Willow Thicket
- 21 : California Sycamore Woodland–Red Willow Thicket

Riparian Scrub
- 28 : Arroyo Willow Thicket
- 30 : Mulefat Thicket

Seep
- 35 : Freshwater Seep

Forest/Woodland
- 37 : Coast Live Oak Woodland
- 38 : Bigcone Douglas Fir–Canyon Live Oak Forest

Cliff/Rock
- 47 : Cliff

Open Water
- 48 : Open Water

Alluvium
- 49 : Dry Wash

500 250 0 500 Feet

N E S W

Vegetation Types — Exhibit 6p

Big Tujunga Dam HCP

PSOMAS

TABLE 3
VEGETATION TYPES AND OTHER LANDCOVERS IN THE HCP STUDY AREA

Vegetation Type or Landcover	Code	Total in HCP Study Area (Acres)	Burned in 2017 Creek Fire (Acres)	Unburned following 2017 Creek Fire (Acres)
Sage Scrub		**207.22**	**39.52**	**167.70**
California Sagebrush Scrub	1	1.34	0.78	0.56
California Buckwheat Scrub	2	20.30	6.96	13.34
Disturbed California Buckwheat Scrub	3	2.32	0.00	2.32
California Sagebrush–California Buckwheat Scrub	4	55.37	14.22	41.15
Laurel Sumac Scrub	5	127.89	17.56	110.33
Alluvial Scrub		**493.72**	**246.85**	**246.87**
Scale Broom Scrub	6	493.72	246.85	246.87
Chaparral		**154.15**	**0.00**	**154.15**
Thick Leaf Yerba Santa Scrub	7	20.28	0.00	20.28
Chamise Chaparral	8	25.80	0.00	25.80
Chamise Chaparral–Thick Leaf Yerba Santa Scrub	9	2.62	0.00	2.62
Scrub Oak Chaparral	10	25.12	0.00	25.12
Hoary Leaf Ceanothus Chaparral	11	1.35	0.00	1.35
Birch Leaf Mountain Mahogany Chaparral	12	78.98	0.00	78.98
Grassland		**49.98**	**15.55**	**34.43**
Annual Brome Grassland	13	33.61	3.88	29.73
Upland Mustards	14	14.28	10.86	3.42
Maltese Star-thistle Patch	15	0.23	0.00	0.23
Russian Thistle Field	16	1.67	0.81	0.86
Tree Tobacco Patch	17	0.19	0.00	0.19
Riparian Forest		**690.71**	**339.32**	**351.39**
White Alder Grove–California Sycamore Woodland	18	2.08	0.00	2.08
White Alder Grove–Willow Thicket	19	66.59	0.00	66.59
California Sycamore Woodland–Fremont Cottonwood Forest	20	0.23	0.00	0.23
California Sycamore Woodland–Red Willow Thicket	21	0.63	0.00	0.63
Fremont Cottonwood Forest	22a	29.37	0.06	29.31
Fremont Cottonwood Forest–Arroyo Willow Thicket	23	2.25	0.00	2.25
Fremont Cottonwood Forest/Giant Reed Break	24a	3.65	3.65	0.00
Black Willow Thicket	25	236.57	140.32	96.25
Disturbed Black Willow Thicket	26	3.09	3.00	0.09
Black Willow Thicket–Fremont Cottonwood Forest	27	346.25	192.29	153.96
Riparian Scrub		**142.48**	**26.63**	**115.85**
Fremont Cottonwood Forest	22b	9.65	2.56	7.09
Fremont Cottonwood Forest/Giant Reed Break	24b	1.04	1.04	0.00
Arroyo Willow Thicket	28	7.67	0.00	7.67
Sandbar Willow Thicket	29	0.41	0.00	0.41
Mulefat Thicket	30	35.21	7.68	27.53
Disturbed Mulefat Thicket	31	85.12	11.97	73.15
Golden Currant Thicket	32	3.38	3.38	0.00

TABLE 2
VEGETATION TYPES AND OTHER LANDCOVERS IN THE HCP STUDY AREA

Vegetation Type or Landcover	Code	Total in HCP Study Area (Acres)	Burned in 2017 Creek Fire (Acres)	Unburned following 2017 Creek Fire (Acres)
Riparian Herb		**2.71**	**0.00**	**2.71**
Smartweed–Cocklebur Patch	33	2.71	0.00	2.71
Marsh		**0.76**	**0.36**	**0.40**
Cattail Marsh	34	0.76	0.36	0.40
Seep		**2.05**	**0.00**	**2.05**
Freshwater Seep	35	0.23	0.00	0.23
Disturbed Freshwater Seep	36	1.82	0.00	1.82
Forest/Woodland		**96.47**	**1.18**	**95.29**
Coast Live Oak Woodland	37	84.04	0.17	83.87
Bigcone Douglas Fir–Canyon Live Oak Forest	38	9.75	0.00	9.75
California Sycamore Woodland	39	2.68	1.01	1.67
Riparian Invasive		**14.68**	**4.62**	**10.06**
Tamarisk Thicket	40	5.05	3.63	1.42
Mulefat Thicket–Giant Reed Break	41	5.97	0.20	5.77
Giant Reed Break	42	0.92	0.00	0.92
Broom Patch	43	1.69	0.00	1.69
Fennel Patch	44	1.05	0.79	0.26
Ornamental Plantings		**19.55**	**4.93**	**14.62**
Native Planting	45	9.55	0.28	9.27
Non-native Planting	46	10.00	4.65	5.35
Rock/Cliff		**35.70**	**1.19**	**34.51**
Cliff	47	35.70	1.19	34.51
Open Water		**91.85**	**6.82**	**85.03**
Open Water	48	91.85	6.82	85.03
Alluvium		**10.12**	**2.41**	**7.71**
Dry Wash	49	10.12	2.41	7.71
Other Landcover		**321.94**	**145.14**	**176.80**
Disturbed	50	54.27	12.08	42.19
Developed/Ornamental	51	267.67	133.06	134.61
Total		**2,334.09**	**834.52**	**1,499.57**

2.3.1.2.1 Sage Scrub

1: California Sagebrush Scrub

California sagebrush scrub occurs in upland areas adjacent to Big Tujunga Creek. This vegetation type is dominated by California sagebrush (*Artemisia californica*). Co-occurring species include thick-leaved yerba santa (*Eriodictyon crassifolium* var. *crassifolium*), tufted cottonthorn (*Tetradymia comosa*), and golden currant (*Ribes aureum*). Some areas contain non-native species such as grayish shortpod mustard (*Hirschfeldia incana*) and red brome (*Bromus madritensis* ssp. *rubens*).

2: California Buckwheat Scrub

California buckwheat scrub occurs in upland areas adjacent to Big Tujunga Creek. This vegetation type is dominated by California buckwheat (*Eriogonum fasciculatum*). Co-occurring species include Whipple's chaparral yucca (*Hesperoyucca whipplei*).

3: Disturbed California Buckwheat Scrub

Disturbed California buckwheat scrub occurs in upland areas along the access roads to Big Tujunga Dam. This vegetation type is dominated by California buckwheat in the shrub layer. It is disturbed by previous grading/terracing of the slopes and the presence of non-native species such as red brome, ripgut grass (*Bromus diandrus*), and Russian thistle (*Salsola tragus*).

4: California Sagebrush–California Buckwheat Scrub

California sagebrush–California buckwheat scrub occurs in upland areas adjacent to Big Tujunga Creek and around the Hansen Dam spreading grounds. This vegetation type is co-dominated by California sagebrush and California buckwheat, although the relative cover varies from patch to patch. Co-occurring species include deerweed (*Acmispon glaber*), black sage (*Salvia mellifera*), and mule fat (*Baccharis salicifolia* ssp. *salicifolia*). The understory often contains non-native bromes (*Bromus* spp.), oats (*Avena* sp.), and grayish shortpod mustard. The vegetation along Stoneyvale Road includes some restoration plantings of this vegetation type.

5: Laurel Sumac Scrub

Laurel sumac scrub occurs in upland areas adjacent to Big Tujunga Creek and on the slopes above Maple Canyon. This vegetation type is dominated by laurel sumac (*Malosma laurina*) in the shrub layer. Co-occurring species include California sagebrush, California buckwheat, thick-leaved yerba santa, chamise (*Adenostoma fasciculatum*), birch-leaf mountain-mahogany (*Cercocarpus betuloides*), and Whipple's chaparral yucca. The shrub cover is quite open in the HCP study area. Little herbaceous cover occurs in steep, rocky areas. Gentler slopes have a herbaceous layer dominated by non-native grasses (e.g., bromes and oats).

2.3.1.2.2 <u>Alluvial Scrub</u>

6: Scale Broom Scrub

Scale broom scrub occurs along the alluvial terraces and floodplain of Big Tujunga Creek. This vegetation type is characterized by the presence of scaly scale-broom (*Lepidospartum squamatum*), although the species may not be dominant in terms of cover. California buckwheat is present in most patches, often as the dominant species. Other co-occurring perennials include sessileflower goldenaster (*Heterotheca sessiliflora*), thick-leaved yerba santa, California sagebrush, white sage (*Salvia apiana*), Whipple's chaparral yucca, seaside prickly-pear (*Opuntia littoralis*), cane cholla (*Cylindropuntia californica* var. *parkeri*), and mule fat. Some areas have a sparse cover of annuals including bromes and oats. The overall vegetation density varies across the creek. The active floodplain and lowest terraces, which experience the most frequent flood events, have sparse cover. Vegetation density is greater on the higher terraces.

2.3.1.2.3 <u>Chaparral</u>

7: Thick Leaf Yerba Santa Scrub

Thick leaf yerba santa scrub occurs in upland areas adjacent to the upper reaches of Big Tujunga Creek. This vegetation type is dominated by thick-leaved yerba santa. Co-occurring species include mule fat, California sagebrush, California buckwheat, Whipple's chaparral yucca, and chamise, with an understory of bromes.

8: Chamise Chaparral

Chamise chaparral occurs in upland areas adjacent to the upper reaches of Big Tujunga Creek and on south-facing slopes above Maple Canyon. This vegetation type is dominated by chamise. Co-occurring species include birch-leaf mountain-mahogany, holly-leaved cherry (*Prunus ilicifolia*), California sagebrush, California buckwheat, and Whipple's chaparral yucca.

9: Chamise Chaparral–Thick Leaf Yerba Santa Scrub

Chamise chaparral–thick leaf yerba santa scrub occurs in upland areas adjacent to the upper reaches of Big Tujunga Reservoir. The species composition is similar to thick leaf yerba santa scrub and chamise chaparral, but thick-leaved yerba santa and chamise co-dominate here.

10: Scrub Oak Chaparral

Scrub oak chaparral occurs primarily on the north-facing slopes of the Maple Canyon SPS. This vegetation type is dominated by scrub oak (*Quercus berberidifolia*), with some areas co-dominated by canyon live oak (*Quercus chrysolepis*). Co-occurring species include heart-leaved bush penstemon (*Keckiella cordifolia*), bush poppy (*Dendromecon rigida*), California buckwheat, chaparral clematis (*Clematis lasiantha*), and California brickellbush (*Brickellia californica*). The understory includes species such as California poppy (*Eschscholzia californica*) and bromes.

11: Hoary Leaf Ceanothus Chaparral

Hoary leaf ceanothus chaparral occurs in upland areas along the access road to Big Tujunga Dam. This vegetation type is dominated by hoaryleaf ceanothus (*Ceanothus crassifolius*). Other species include chaparral whitethorn (*Ceanothus leucodermis*), thick-leaved yerba santa, sugar bush (*Rhus ovata*), canyon live oak, and Whipple's chaparral yucca.

12: Birch Leaf Mountain Mahogany Chaparral

Birch leaf mountain mahogany chaparral occurs in upland areas adjacent to the upper reaches of Big Tujunga Creek. This vegetation type is dominated by birch-leaf mountain-mahogany, although the overall shrub cover varies across the HCP study area. Co-occurring species include chamise, sugar bush, California buckwheat, thick-leaved yerba santa, and Whipple's chaparral yucca. Some areas also contain chaparral whitethorn, hoaryleaf ceanothus, few-flowered California-lilac (*Ceanothus oliganthus*), and big berry manzanita (*Arctostaphylos glauca*).

2.3.1.2.4 <u>Grassland</u>

13: Annual Brome Grassland

Annual brome grassland occurs in disturbed areas (e.g., along trails or roads). This vegetation type is dominated by non-native grasses such as ripgut grass, red brome, and oat.

14: Upland Mustards

Upland mustards occur in disturbed areas (e.g., along trails or roads). This vegetation type is dominated by the non-native, invasive grayish shortpod mustard. Co-occurring species include Russian thistle and cocklebur (*Xantium strumarium*).

15: Maltese Star-thistle Patch

Maltese star-thistle occurs in a disturbed area in the Hansen Dam spreading grounds. This vegetation type is dominated by the non-native, invasive Maltese star-thistle (*Centaurea melitensis*). Co-occurring species include grayish shortpod mustard, common horehound (*Marrubium vulgare*), and filaree (*Erodium* sp.).

16: Russian Thistle Field

Russian thistle field occurs in disturbed areas (e.g., along trails or roads). This vegetation type is dominated by Russian thistle. Co-occurring species include grayish shortpod mustard and cocklebur.

17: Tree Tobacco Patch

A tree tobacco patch occurs in a disturbed area along Big Tujunga Canyon Road. This vegetation type is dominated by the non-native invasive tree tobacco (*Nicotiana glauca*) with grayish shortpod mustard also occurring.

2.3.1.2.5 Riparian Forest

18: White Alder Grove–California Sycamore Woodland

White alder grove–California sycamore woodland occurs along Big Tujunga Creek upstream of Big Tujunga Reservoir. This vegetation type is co-dominated by mature white alder (*Alnus rhombifolia*) and western sycamore (*Platanus racemosa*) in a closed canopy. These patches lack a substantial cover of willows (*Salix* spp.).

19: White Alder Grove–Willow Thicket

White alder grove–willow thicket occurs throughout the upper reaches of Big Tujunga Creek, from Vogel Flat Road to the upstream end of the HCP study area. This vegetation type contains a variety of mature riparian tree species and has a closed canopy. In these areas, white alder is co-dominant with a variety of willow species, while Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) cover is low. Other tree species in this vegetation type include red willow (*Salix laevigata*), Pacific willow (*Salix lasiandra* var. *lasiandra*), Goodding's black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), and western sycamore. In the vicinity of Vogel Flat Road, Chinese elm (*Ulmus parvifolia*) and tree of heaven (*Ailanthus altissima*) are also present. In some areas, the understory in the interior of stands is very open, with abundant debris. Understory species along the margins include southern cattail (*Typha domingensis*), California blackberry (*Rubus ursinus*), mugwort (*Artemisia douglasiana*), California brickellbush, hoary nettle (*Urtica dioica* ssp. *holosericea*), and water cress (*Nasturtium officinale*). Along several portions of the stream, cattails extend throughout the active channel.

20: California Sycamore Woodland–Fremont Cottonwood Forest

California sycamore woodland–Fremont cottonwood forest occurs on a high terrace adjacent to Big Tujunga Creek at the terminus of Stonyvale Road. This vegetation type consists of a stand of western sycamore and Fremont cottonwood with an understory of species found in the adjacent scale broom scrub.

21: California Sycamore Woodland–Red Willow Thicket

California sycamore woodland–red willow thicket occurs along Big Tujunga Creek at the upstream end of the HCP study area. This vegetation type is similar to the adjacent riparian forest but is co-dominated by western sycamore and red willow and lacks white alder.

22a: Fremont Cottonwood Forest

Fremont cottonwood forest occurs along the low-flow channel and in the floodplain of the middle and lower reaches of Big Tujunga Creek. This vegetation type is dominated by mature Fremont cottonwood. Some areas contain a low cover of red willow, scaly scale-broom, mule fat, and giant reed. Note that this vegetation type was split based on vegetation structure (i.e., scrub versus forest); these areas were composed of taller trees with a more closed canopy and were grouped with riparian forest.

23: Fremont Cottonwood Forest–Arroyo Willow Thicket

Fremont cottonwood forest–arroyo willow thicket occurs along the lower middle reaches of Big Tujunga Creek near Oro Vista Avenue. This vegetation type is co-dominated by mature Fremont cottonwood and arroyo willow. Co-occurring species include white alder, coast live oak (*Quercus agrifolia*), laurel sumac, and mule fat at relatively low densities.

24a: Fremont Cottonwood Forest/Giant Reed Break

Fremont cottonwood forest/giant reed break occurs along the lower reaches of Big Tujunga Creek. This vegetation type consists of an open canopy of mature Fremont cottonwood intermixed with stands of the non-native, highly invasive giant reed. Note that this vegetation type was split based on vegetation structure (i.e., scrub versus forest); these areas were composed of taller trees and were grouped with riparian forest.

25: Black Willow Thicket

Black willow thicket occurs throughout the Hansen Dam spreading grounds and in the lower reaches of Big Tujunga Creek. This vegetation type has mature Goodding's black willow as the dominant species in the tree canopy. This vegetation type was grouped with riparian forest because most areas have a dense, closed canopy. Co-occurring trees include western sycamore, Fremont cottonwood, and arroyo willow at relatively low densities. The understory is largely unvegetated. Shrubby species such as mule fat, Hinds' willow (*Salix exigua* var. *hindsiana*), and cocklebur are present along the margins.

26: Disturbed Black Willow Thicket

Disturbed black willow thicket is present in the Hansen Dam spreading grounds. This vegetation type has mature Goodding's black willow as the dominant tree species; however, it has an open canopy and the trees are relatively sparse. It is degraded by the presence of non-native, invasive species such as giant reed, saltcedar (*Tamarix ramosissima*), and grayish shortpod mustard.

27: Black Willow Thicket–Fremont Cottonwood Forest

Black willow thicket–Fremont cottonwood forest occurs throughout the middle and lower reaches of Big Tujunga Creek, from just upstream of the Hansen Dam area upstream to Vogel Flat Road. This vegetation type is co-dominated by mature Goodding's black willow and Fremont cottonwood; the tree cover is generally continuous. Other co-occurring tree species at lower densities include arroyo willow, red willow, western sycamore, white alder, and coast live oak. Mule fat and scaly scale-broom occur along the margins, while southern cattail occurs along the waterline in some areas. Along several portions of the stream, cattails extend throughout the active channel. Some areas contain patches of giant reed that are too small to be mapped separately.

2.3.1.2.6 Riparian Scrub

22b: Fremont Cottonwood Forest

Fremont cottonwood forest occurs along the low-flow channel and in the floodplain of Big Tujunga Creek. This vegetation type is similar in composition to the riparian forest vegetation but has been mapped separately per the vegetation structure (i.e., it has a more open canopy and younger trees). Note that this vegetation type was split based on vegetation structure (i.e., scrub versus forest); these areas were composed of shrubbier trees with a more open canopy and were grouped with riparian scrub.

24b: Fremont Cottonwood Forest/Giant Reed Break

Fremont cottonwood forest/giant reed break occurs along the low-flow channel of Big Tujunga Creek. This vegetation type is similar in composition to the riparian forest vegetation but has been mapped separately per the vegetation structure (i.e., it has a more open canopy and younger trees). Note that this vegetation type was split based on vegetation structure (i.e., scrub versus forest); these areas were composed of shrubbier trees with a more open canopy and were grouped with riparian scrub.

28: Arroyo Willow Thicket

Arroyo willow thickets occur in the upper reaches of Big Tujunga Creek, upstream of the Reservoir. This vegetation type is dominated by the shrubby arroyo willow and is more open than riparian forest vegetation. Co-occurring species include mule fat, red willow, and Goodding's black willow. The understory contains western poison oak (*Toxicodendron diversilobum*), mugwort, branching phacelia (*Phacelia ramosissima*), crofton weed (*Ageratina adenophora*), white sweetclover (*Melilotus albus*), and various monkeyflowers (*Mimulus* spp.).

29: Sandbar Willow Thicket

Sandbar willow thickets occur in a few scattered patches along the low-flow channel of Big Tujunga Creek. This vegetation type is dominated by Hinds' willow; mule fat is also generally present.

30: Mulefat Thicket

Mulefat thickets occur throughout the HCP study area. This vegetation type is dominated by mule fat. It occurs along the low-flow channels of Big Tujunga Creek. In these areas, mule fat grows sparsely on either side of the narrow low-flow channels; some areas have scattered emergent Fremont cottonwood.

31: Disturbed Mulefat Thicket

Disturbed mulefat thickets occur in the Hansen Dam spreading grounds. This vegetation type is dominated by mule fat; co-occurring species include Hinds' willow, blue elderberry (*Sambucus nigra* ssp. *caerulea*), and scattered emergent Goodding's black willow and Fremont cottonwood. The vegetation is degraded by the presence of non-native, invasive species such as Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*), Maltese star-thistle, giant reed, prickly lettuce (*Lactuca serriola*), and bromes.

32: Golden Currant Thicket

A golden currant thicket occurs at the southeastern end of the Hansen Dam spreading grounds. This vegetation type consists of a large patch of golden currant. Co-occurring species include grayish shortpod mustard and horseweed (*Erigeron canadensis*).

2.3.1.2.7 Riparian Herb

33: Smartweed–Cocklebur Patch

Smartweed–cocklebur patches occur upstream of the Reservoir along Big Tujunga Creek. This vegetation type is dominated by cocklebur. Other herbaceous species include willow weed (*Persicaria lapathifolia*), red-dotted monkeyflower (*Mimulus guttatus*), bentgrass (*Agrostis* sp.), smilo grass (*Stipa miliacea* var. *miliacea*), long-leaved rush (*Juncus macrophyllus*), tall evening primrose (*Oenothera elata*), water speedwell (*Veronica anagallis-aquatica*), water cress, common beggar-ticks (*Bidens pilosa*), annual beard grass (*Polypogon monspeliensis*), crofton weed, white sweetclover, red monkeyflower (*Mimulus cardinalis*), cock's spur barnyard grass (*Echinochloa crus-galli*), false daisy (*Eclipta prostrata*), and lovegrass flatsedge (*Cyperus eragrostis*).

2.3.1.2.8 Marsh

34: Cattail Marsh

Cattail marsh occurs at the outlet structure on the south side of the Hansen Dam spreading grounds. This vegetation type is dominated by southern cattail. Flatsedge (*Cyperus* sp.) and white sweetclover also occur; peplis-like false loosestrife (*Ludwigia peploides*) is present in the standing water.

It should be noted that cattails are often in the understory of other common riparian vegetation types along the active channel; however, if a tree or shrub canopy extended over them, the areas were mapped according to the higher canopies (e.g., white alder grove–willow thicket and black willow thicket–Fremont cottonwood forest) as described in the methodology.

2.3.1.2.9 Seep

35: Freshwater Seep

Freshwater seep occurs along the canyon walls along Big Tujunga Creek upstream of the Reservoir. This vegetation type is dominated by stream orchid (*Epipactis gigantea*), California maidenhair (*Adiantum jordanii*), red monkeyflower, and western blue-eyed-grass (*Sisyrinchium bellum*).

36: Disturbed Freshwater Seep

Disturbed freshwater seep occurs along the canyon walls adjacent to the access road below Big Tujunga Dam and on a cliff adjacent to the Reservoir. This vegetation type contains an underlying native component of stream orchid, California maidenhair, red monkeyflower, and western blue-eyed-grass. However, it is disturbed by the presence of non-native crofton weed, barbed Mediterranean schismus (*Schismus barbatus*), fescue (*Festuca* sp.), and bromes.

2.3.1.2.10 Forest/Woodland

37: Coast Live Oak Woodland

Coast live oak woodland occurs along the margins of Big Tujunga Creek throughout the HCP study area. This vegetation type is dominated by coast live oak in the tree canopy. The understory includes species such as holly-leaved cherry, western poison oak, birch-leaf mountain mahogany, thick-leaved yerba santa, Whipple's chaparral yucca, California sagebrush, California buckwheat, black sage, and deerweed.

38: Bigcone Douglas Fir–Canyon Live Oak Forest

Bigcone Douglas fir–canyon live oak forest occurs on the steep slopes and side canyons of upper Big Tujunga Creek throughout the middle to upper reaches of the HCP study area. This vegetation type is dominated by bigcone Douglas-fir in the tree canopy. Co-occurring species include canyon live oak, coast live oak, sugar bush, and laurel sumac.

39: California Sycamore Woodland

California sycamore woodland occurs at Maple Canyon SPS and along Big Tujunga Creek on higher terraces above the creek. This vegetation type consists of an open canopy of western sycamore. Sage scrub species (e.g., California sagebrush, California buckwheat, and thick-leaved yerba santa) and annual grasses (e.g., bromes) are present in the understory.

2.3.1.2.11 Riparian Invasive

40: Tamarisk Thicket

Tamarisk thickets occur in patches in the Hansen Dam spreading grounds. This vegetation type is dominated by the non-native, highly invasive saltcedar. Co-occurring species include giant reed.

41: Mulefat Thicket–Giant Reed Break

Mulefat thicket–giant reed break occurs along the low-flow channel and in the floodplain along the middle and lower reaches of Big Tujunga Creek. This vegetation type is co-dominated by mule fat and the non-native, invasive giant reed.

42: Giant Reed Break

Giant reed break consists of a relatively large, dense monoculture of giant reed in the floodplain of the middle reaches of Big Tujunga Creek.

43: Broom Patch

Broom patches occur in a few patches on terraces and in upland areas along the upper middle reaches of Big Tujunga Creek. This vegetation type is dominated by the non-native, highly invasive Spanish broom (*Spartium junceum*). Brome grasses occur in the understory.

44: Fennel Patch

A fennel patch occurs in a disturbed area in the Hansen Dam spreading grounds. This vegetation type consists of a monoculture of fennel (*Foeniculum vulgare*).

2.3.1.2.12 <u>Ornamental/Non-native Plantings</u>

45: Native Planting

Native plantings occur in Maple Canyon SPS and in the vicinity of development. This vegetation type consists of landscaping that utilizes native tree species. The species vary by location but include coast live oak, Fremont cottonwood, and western sycamore. The graded, terraced slopes at the lower end of Maple Canyon contain fill material with planted coast live oaks.

46: Non-native Planting

Non-native plantings occur in the vicinity of development. This vegetation type consists of landscaping that utilizes non-native tree species. The species vary by location but include pepper tree (*Schinus molle*), gum tree (*Eucalyptus* sp.), tree of heaven, pine (*Pinus* spp.), and European olive (*Oleo europaea*). Understory species vary and include mule fat, blue elderberry, tree tobacco, grayish shortpod mustard, and brome grasses.

2.3.1.2.13 <u>Rock/Cliff</u>

47: Cliff

Cliffs primarily occur adjacent to Big Tujunga Reservoir and along the upper reaches of Big Tujunga Creek; they also occur in smaller areas adjacent to the middle and lower reaches of Big Tujunga Creek. These areas have steep, sometimes vertical, topography and consist of exposed rock. Areas mapped as cliff are unvegetated; steep, rocky slopes with scattered vegetation are mapped as the vegetation type corresponding to the dominant plant species. It should be noted that, due to the nature of mapping on aerial imagery, the vertical cliffs in the upper Big Tujunga Canyon are not always visible in the plan view. The actual surface area of cliffs immediately above the canyon floor is larger than shown on the map.

2.3.1.2.14 <u>Open Water</u>

48: Open Water

Open water occurs where surface water is present and not covered by a vegetation canopy. It primarily occurs in Big Tujunga Reservoir, in the Hansen Dam area, on the fairways of the Angeles National Golf Course, and along unvegetated portions of Big Tujunga Creek. In the Hansen Dam area and golf course, the lake/pond margins contain flatsedge, southern cattail, and/or white sweetclover; these areas were too small to be mapped separately.

2.3.1.2.15 Alluvium

49: Dry Wash

Dry wash occurs in alluvial areas, generally in the low-flow channels and active floodplains. These areas consist of sandy, gravelly, or cobbly substrate that has been scoured of vegetation. Alluvium present under a vegetative canopy is mapped as the vegetation type that corresponds to the dominant plant species.

2.3.1.2.16 Other Landcover

50: Disturbed

Disturbed areas consist of unvegetated or very sparsely vegetated bare ground that is not alluvial. This includes dirt trails, roads, road shoulders, and graded lots.

51: Developed/Ornamental

Developed/ornamental areas consist of human-made structures and closely associated landscaping. These areas include buildings; paved roads, picnic areas; the Angeles National Golf Course; and flood control structures such as riprap, concrete bank lining, and Big Tujunga Dam. Ornamental landscaping includes species such as European olive, pine, pepper trees, blue jacaranda (*Jacaranda mimosifolia*), common oleander (*Nerium oleander*), and turf grass of indeterminate species.

2.3.2 WILDLIFE

2.3.2.1 METHODS

A general walkover survey was conducted by Psomas Senior Biologists Allison Rudalevige and Lindsay Messett concurrently with the vegetation mapping of the HCP study area in August/September 2017. Active searches for reptiles and amphibians included lifting, overturning, and carefully replacing objects such as rocks, boards, and debris. Birds were identified by visual and auditory recognition. Mammals were identified by visual recognition or evidence of diagnostic sign including scat, footprints, scratch-outs, dust bowls, burrows, and trails. Nomenclature of wildlife taxa conforms to the Special Animals List (CDFW 2017) for special status species; nomenclature for non-special status wildlife generally follows Crother (2012) for amphibians and reptiles, American Ornithological Society (2017) for birds, and the Smithsonian National Museum of Natural History (2011) for mammals. HCP Proposed Covered Species were mapped when incidentally observed during the vegetation mapping.

Observations from multiple years of previous focused surveys have also been compiled in the results below.

2.3.2.2 WILDLIFE

2.3.2.2.1 Invertebrates[8]

The benthic macroinvertebrate community has been sampled annually along Big Tujunga Creek (downstream of Big Tujunga Dam to Delta Flats) since 2009. Species commonly encountered include midges (*Chironomidae*), damselflies (*Coenagrionidae*), caddisflies (*Brachycentridae*), and

[8] Because the focus of this HCP is aquatic/riparian habitat, only invertebrates from these habitats are discussed; many additional upland invertebrates would be expected to occur in the HCP study area.

freshwater snails (*Physidae*). Overall, monitoring results have indicated that invertebrates observed are indicative of high stream health (Psomas 2018d).

The non-native red-swamp crayfish occurs throughout Big Tujunga Creek. This species can act as a predator on the young of native aquatic species. It has become more widespread and more abundant through the HCP study area over the long-term monitoring effort; however, numbers decreased by 20 percent from 2015 to 2016 following a non-native species control program conducted by the USFS (Psomas 2017a). This species is also removed annually by Public Works at the Big Tujunga Wash Mitigation Area (ECORP 2016).

2.3.2.2.2 Fish

Big Tujunga Creek generally has perennial flows through the majority of the HCP study area. Several native fish species were observed in Big Tujunga Creek during surveys, including Santa Ana sucker, arroyo chub, Santa Ana speckled dace, and rainbow trout.

Non-native fish species also occur in Big Tujunga Reservoir and along portions of Big Tujunga Creek. Some of the most common non-native predatory fish species known to occur include red shiner (*Cyprinella lutrensis*), largemouth bass, black bullhead, and green sunfish. During the Santa Ana sucker long-term monitoring, a few individuals of these species have been observed each year in the sampling reaches (BonTerra Psomas 2015, 2016a; Psomas 2017a). Non-native western mosquitofish (*Gambusia affinis*) and fathead minnow (*Pimephales promelas*) also occur along Big Tujunga Creek downstream of Big Tujunga Dam and may be a competitor of native fish species. Fathead minnow has become more widespread and more abundant through the HCP study area over the long-term monitoring effort (see Santa Ana sucker background section below); however, numbers decreased by 70 percent from 2015 to 2016 following a non-native species control program conducted by the USFS (Psomas 2017a). Non-native fish species are also removed annually by Public Works at the Big Tujunga Wash Mitigation Area (ECORP 2016).

2.3.2.2.3 Amphibians

Amphibians require moisture for at least a portion of their life cycle and many require standing or flowing water for reproduction. Big Tujunga Creek provides high quality habitat for amphibians, and many were observed during surveys. Native amphibian species observed included arboreal salamander (*Aneides lugubris*), western toad (*Bufo boreas*), arroyo toad, California treefrog (*Pseudacris cadaverina*), and Baja California treefrog (*Pseudacris hypochondriaca*).

The non-native American bullfrog has also consistently been observed downstream of Big Tujunga Dam; this species is a voracious predator of native aquatic species. During the 2009 special status amphibian surveys, 460 American bullfrogs were captured and removed from Big Tujunga Creek between Big Tujunga Dam and Hansen Dam (BonTerra Consulting 2010b).

2.3.2.2.4 Reptiles

Diversity and abundance of reptiles typically varies with vegetation type and substrate characteristics. Reptile species observed in the HCP study area include coast horned lizard (*Phrynosoma blainvillii*), western fence lizard (*Sceloporus occidentalis*), common side-blotched lizard (*Uta stansburiana*), western skink (*Plestidon skiltonianus*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), southern alligator lizard (*Elgaria multicarinata*), striped whipsnake (*Coluber taeniatus*), San Bernardino ring-neck snake (*Diadophis punctatus modestus*), coast night snake (*Hypsiglena ochrorhyncha*), California mountain kingsnake (*Lampropeltis zonata*), gopher snake (*Pituophis catenifer*), western threadsnake (*Rena humilis*), two-striped garter snake (*Thamnophis hammondii*), and western diamond-backed rattlesnake (*Crotalus atrox*).

Both the native western pond turtle and non-native red-eared slider (*Trachemys scripta elegans*) have been observed within Big Tujunga Reservoir and along Big Tujunga Creek. Red-eared sliders can act as predators on native aquatic species.

2.3.2.2.5 Birds

Birds utilize nearly all vegetation types with greater variety and occur in higher densities in particularly valuable vegetation types. Riparian habitats are extremely important to birds, providing food, water, and cover throughout the year. These habitats also provide important breeding habitat for a wide variety of species. A variety of bird species are expected to be residents in the HCP study area and to use the habitats throughout the year, while other species are present only during certain seasons.

The following resident bird species have been observed in the HCP study area: Canada goose (*Branta canadensis*), cinnamon teal (*Spatula cyanoptera*), mallard (*Anas platyrhynchos*), mountain quail (*Oreortyx pictus*), California quail (*Callipepla californica*), pied-billed grebe (*Podilymbus podiceps*), band-tailed pigeon (*Patagioenas fasciata*), spotted dove (*Streptopelia chinensis*), mourning dove (*Zenaida macroura*), common poorwill (*Phalaenoptilus nuttallii*), white-throated swift (*Aeronautes saxatalis*), Anna's hummingbird (*Calypte anna*), American coot (*Fulica americana*), killdeer (*Charadrius vociferous*), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), green heron (*Butorides virescens*), black-crowned night-heron (*Nycticorax nycticorax*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), loggerhead shrike (*Lanius ludovicianus*), Hutton's vireo (*Vireo huttoni*), Steller's jay (*Cyanocitta stelleri*), California scrub-jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), tree swallow (*Tachycineta bicolor*), mountain chickadee (*Poecile gambeli*), oak titmouse (*Baeolophus inornatus*), bushtit (*Psaltriparus minimus*), white-breasted nuthatch (*Sitta canadensis*), rock wren (*Salpinctes obsoletus*), canyon wren (*Catherpes mexicanus*), house wren (*Troglodytes aedon*), Bewick's wren (*Thryomanes bewickii*), cactus wren (*Campylorhynchus brunneicapillus*), blue-gray gnatcatcher (*Polioptila caerulea*), American dipper (*Cinclus mexicanus*), wrentit (*Chamaea fasciata*), western bluebird (*Sialia mexicana*), American robin (*Turdus migratorius*), California thrasher (*Toxostoma redivivum*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), house finch (*Haemorhous mexicanus*), purple finch (*Haemorhous purpureus*), lesser goldfinch (*Spinus psaltria*), spotted towhee (*Pipilo maculatus*), rufous-crowned sparrow (*Aimophila ruficeps*), California towhee (*Melozone crissalis*), chipping sparrow (*Spizella passerina*), lark sparrow (*Chondestes grammacus*), Bell's sparrow (*Artemisiospiza belli*), song sparrow (*Melospiza melodia*), red-winged blackbird (*Agelaius phoeniceus*), great-tailed grackle (*Quiscalus mexicanus*), orange-crowned warbler (*Oreothlypis celata*), and common yellowthroat (*Geothlypis trichas*).

Species that have been observed and are present in the region only during the nesting season include black-chinned hummingbird (*Archilochus alexandri*), Costa's hummingbird (*Calypte costae*), rufous hummingbird (*Selasphorus rufus*), Allen's hummingbird (*Selasphorus sasin*), olive-sided flycatcher (*Contopus cooperi*), western wood-pewee (*Contopus sordidulus*), Hammond's flycatcher (*Empidonax hammondii*), dusky flycatcher (*Empidonax oberholseri*), Pacific-slope flycatcher (*Empidonax difficilis*), ash-throated flycatcher (*Myiarchus cinerascens*), Cassin's kingbird (*Tyrannus vociferans*), western kingbird (*Tyrannus verticalis*), Cassin's vireo (*Vireo cassinii*), warbling vireo (*Vireo gilvus*), violet-green swallow (*Tachycineta thalassina*), northern rough-winged swallow (*Stelgidopteryx serripennis*), cliff swallow (*Petrochelidon pyrrhonota*), barn swallow (*Hirundo rustica*), Swainson's thrush (*Catharus ustulatus*), phainopepla (*Phainopepla nitens*), Lawrence's goldfinch (*Spinus lawrencei*), black-chinned sparrow (*Spizella* *atrogularis*), yellow-breasted chat (*Icteria virens*), hooded oriole (*Icterus cucullatus*), Bullock's oriole (*Icterus bullockii*), brown-headed cowbird (*Molothrus ater*), yellow warbler (*Setophaga petechia*), black-throated gray warbler (*Setophaga nigrescens*), Wilson's warbler (*Cardellina pusilla*), western tanager (*Piranga ludoviciana*), black-headed grosbeak (*Pheucticus melanocephalus*), blue grosbeak (*Passerina caerulea*), and lazuli bunting (*Passerina amoena*). Brown-headed cowbird is a nest parasite that can affect the breeding success of native songbirds. It should be noted that a brown-headed cowbird trapping program is run by Public Works at the Big Tujunga Wash Mitigation Area (ECORP 2016).

Wintering species that have been observed include eared grebe (*Podiceps nigricollis*), spotted sandpiper (*Actitis macularius*), belted kingfisher (*Megaceryle alcyon*), ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), American goldfinch (*Spinus tristis*), Lincoln's sparrow (*Melospiza lincolnii*), white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Zonotrichia atricapilla*), dark-eyed junco (*Junco hyemalis*), Nashville warbler (*Oreothypis ruficapilla*), yellow-rumped warbler (*Setophaga coronata*), and Townsend's warbler (*Setophaga townsendi*).

Raptors (birds of prey) observed in the HCP study area include Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), peregrine falcon (*Falco peregrinus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), and great horned owl (*Bubo virginianus*). The turkey vulture (*Cathartes aura*), a scavenger, has also been observed in the HCP study area.

2.3.2.2.6 Mammals

Small mammals observed during surveys include western gray squirrel (*Sciurus griseus*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), big-eared woodrat (*Neotoma macrotis*), deer mouse (*Peromyscus maniculatus*), and ornate shrew (*Sorex ornatus*). Medium-sized mammals observed during surveys include cottontail (*Sylvilagus audubonii*), coyote (*Canis latrans*), common gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), ringtail (*Bassariscus astutus*), and northern raccoon (*Procyon lotor*). Large mammals observed during surveys include black bear (*Ursus americanus*) and mule deer (*Odocoileus hemionus*). Additional medium to large-sized mammals expected to occur in the HCP study area include bobcat (*Lynx rufous*) and mountain lion (*Puma concolor*).

Bats occur throughout most of Southern California and may use any portion of the HCP study area as foraging habitat. Bats may roost in the cliffs, rocky outcroppings, crevices of structures, or in large trees in the HCP study area. Most of the bats that could potentially occur in the HCP study area are inactive during the winter and either hibernate or migrate, depending on the species. A variety of bat species are expected to occur, including Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), canyon bat (*Parastrellus hesperus*), California myotis (*Myotis californicus*), Yuma bat (*Myotis yumanensis*), little brown bat (*Myotis lucifugus*), and long-legged bat (*Myotis volans*).

2.3.2.2.7 Wildlife Movement

Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic information. Corridors mitigate the effects of this fragmentation by (1) allowing animals to move between remaining habitats, thereby permitting depleted populations to be replenished and promoting genetic exchange; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (e.g., fire or disease) result in population or local species extinction; and (3) serving as travel routes for individual animals as they move in their home ranges in search of food, water, mates, and other necessary resources.

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas or individuals extending range distributions); (2) seasonal migration; and (3) movements related to home range activities (e.g., foraging for food or water; defending territories; or searching for mates, breeding areas, or cover). A number of terms such as "wildlife corridor," "travel route," "habitat linkage," and "wildlife crossing" have been used in various wildlife movement studies to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and to facilitate the discussion on wildlife movement in this analysis, these terms are defined as follows:

- Travel Route. A travel route is a landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and to provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another. It contains adequate food, water, and/or cover while moving between habitat areas and provides a relatively direct link between target habitat areas.
- Wildlife Corridor. A wildlife corridor is a piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bound by urban land or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors, often referred to as "habitat or landscape linkages," can provide both transitory and resident habitat for a variety of species.
- Wildlife Crossing. A wildlife crossing is a small, narrow area, relatively short in length and generally constricted in nature, which allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are man-made and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These often represent "choke points" along a movement corridor, which may impede wildlife movement and increase the risk of predation.

It is important to note that, in a large open space area where few or no man-made or naturally occurring physical constraints to wildlife movement are present, wildlife corridors as defined above may not yet exist. Given an open space area that is both large enough to maintain viable populations of species and to provide a variety of travel routes (e.g., canyons, ridgelines, trails, riverbeds, and others), wildlife will use these "local" routes while searching for food, water, shelter, and mates and will not need to cross into other large open space areas. Based on their size, location, vegetative composition, and availability of food, some of these movement areas (e.g., large drainages and canyons) are used for longer lengths of time and serve as source areas for food, water, and cover, particularly for small- and medium-sized animals. This is especially true if the travel route is within a larger open space area. However, once open space areas become constrained and/or fragmented as a result of urban development or construction of physical obstacles such as roads and highways, the remaining landscape features or travel routes that connect the larger open space areas become corridors as long as they provide adequate space, cover, food, and water and do not contain obstacles or distractions (e.g., man-made noise, lighting) that would generally hinder wildlife movement.

The upper end of the HCP study area is surrounded by the Angeles National Forest, which provides ample undeveloped open space for wildlife movement. Within this open landscape, wildlife tend to follow creeks; thus, Big Tujunga Creek is expected to provide regional wildlife movement. From the Angeles National Forest boundary downstream to Foothill Boulevard, the area to the north is generally undeveloped while the area to the south is developed; wildlife movement in this area is becoming constrained. Downstream of Foothill Boulevard, Big Tujunga Creek is surround by development on both sides. In the lower portion of the HCP study area (outside the Angeles National Forest), Big Tujunga Creek provides a wildlife corridor for movement through developed areas. The lower end of the HCP study area provides a connection between the Verdugo Mountains and the San Gabriel Mountains.

On a local level, Big Tujunga Dam and Reservoir pose a barrier to movement of aquatic species. Fish species are generally restricted to either upstream of Big Tujunga Reservoir or downstream of Big Tujunga Dam, as the Dam poses a barrier that fish are not able to pass. Amphibians and reptiles are not as limited by Big Tujunga Dam, as many species could use upland habitat for movement around the Dam. However, given the steep cliffs around much of Big Tujunga Reservoir, species would need to be far from the water's edge to move around the Reservoir/Dam; amphibian species that are inclined to stay close to the water's edge would be restricted to upstream of Big Tujunga Reservoir or downstream of Big Tujunga Dam. Birds can move through upland habitats; thus, Big Tujunga Dam would not pose a barrier to bird species in the HCP study area. Mammal species generally follow streams, roads, and ridgelines and would be able to move around Big Tujunga Dam. Thus, Big Tujunga Dam and Reservoir would be a barrier to movement for fish and some amphibian species; but it is not expected to be a barrier to movement of reptiles, birds, and mammals.

2.4 COVERED SPECIES BACKGROUND

2.4.1 COVERED FISH SPECIES

2.4.1.1 SANTA ANA SUCKER

Santa Ana sucker is a federally listed Threatened species. Santa Ana sucker is endemic to the Los Angeles Basin; and its historic range consisted of the Los Angeles, San Gabriel, and Santa Ana River systems; only the populations within its historic range are federally protected (USFWS 2000). The Santa Clara River population was not included in the species listing because it is believed to have been introduced based on the absence of the species in early collections (USFWS 2000).

Santa Ana sucker occur where there is a mix of shallow riffle, deeper runs, and pools (USFWS 2010; Haglund et al. 2001; Haglund and Baskin 2003). They occur on coarse substrates including gravel, cobble, and a mix of gravel and cobble with sand (USFWS 2010; Haglund et al. 2001; Haglund and Baskin 2003). They are most abundant where water is clear and unpolluted, although they can withstand seasonal turbidity; they are intolerant of polluted or highly modified streams (Moyle et al. 1995). Santa Ana sucker prefer cooler water (less than 72 degrees Fahrenheit) but have been found in conditions ranging from 59 to 82 degrees Fahrenheit in the Santa Ana River; water temperatures above 86 degrees likely limit the distribution of the species (USFWS 2000, 2010; Swift 2001). In-stream emergent and overhanging riparian vegetation are important to provide shade, shelter, and cover. Shade is important to reduce water temperatures of shallow waters during periods of high summer ambient temperatures (USFWS 2010). The majority of the Santa Ana sucker's diet consists of algae, diatoms, and organic detritus that it scrapes from rock surfaces, with aquatic insects making up a small percentage of their diet (USFWS 2000). Larger fish generally feed on more insects than smaller fish (Greenfield et al. 1970).

An adult Santa Ana sucker rarely exceeds a standard length of 8 inches (20 centimeters). It exhibits a broad mouth with notches at the junction of the upper and lower lips, and the median notch on the lower lip is not as well defined as the one on the upper lip. Its body coloration is silver on the ventral (belly/underside) surface and darker with irregular blotches on the dorsal (back/top) surface. Its scale pattern has longitudinal lateral striping (along the length of its body). The interradial membrane (membrane between the spines) of the caudal fin is pigmented, and the anal and pelvic fins normally lack pigment (Moyle et al. 1995).

In a study by Greenfield et al. (1970) in the Santa Clara River, Santa Ana sucker began to reproduce in their second summer (i.e., when they are about one year old) when fish standard length typically measures between 1.9 inches and 2.9 inches (49 millimeters [mm] and 74 mm). Santa Ana sucker in their third summer were measured between 3.0 inches and 4.3 inches (75 mm and 110 mm), and those in their fourth summer measured between 5.6 inches and 6.0 inches (141 mm and 153 mm). Mortality often occurred following the third summer, although some fish lived into their fourth and even fifth summers (Greenfield et al. 1970). Santa Ana sucker have lived up to seven years in captivity (Russell 2015).

There is no sexual dimorphism (distinguishable appearances between males and females), although reproductive males develop breeding tubercles (small bumps) over most of the body during the breeding season (Moyle et al. 1995).

Santa Ana sucker spawning occurs from early April until early July and peaks in late May and early June (USFWS 2000; Greenfield et al. 1970; Moyle 1976). However, evidence of breeding has been observed as early as November, indicating that Santa Ana sucker can have a protracted (prolonged) spawning period (USFWS 2000). Santa Ana sucker spawn over gravel beds in flowing water where the female deposits the eggs in fine gravel substrate. Appropriate water velocities are needed to oxygenate eggs; Santa Ana sucker have been observed spawning in water velocities of 0.65 and 0.77 feet per second (USFWS 2010; Haglund et al. 2003). The Santa Ana sucker has an exceptionally high fecundity (many eggs) for a small sucker species (Moyle 1976). The eggs hatch within 36 hours at approximately 55 degrees Fahrenheit; and the fry (fish hatchlings) congregate in shallow, slow-moving waters along the stream margins in water depths ranging from 0.4 inch to 5.5 inches (1 to 14 centimeters [cm]), often over very soft sandy or muddy substrates (Moyle 2002). Edgewater habitat is probably used by fry because: (1) it typically contains fewer predatory fish, (2) shallow water may be warmer and could allow the sucker to grow more quickly, and (3) it has slower flow rate (USFWS 2010). The combination of early sexual maturity, a protracted spawning period, and high fecundity allow the Santa Ana sucker to quickly repopulate streams following periodic flood events that could decimate populations (Moyle 1976).

The primary threat to the Santa Ana sucker includes past and ongoing habitat loss through hydrological modifications throughout the range of the species. The USFWS Recovery Plan (2017a) lists the following effects that have led to a decline in Santa Ana sucker: (1) loss and degradation of available habitat, caused by dams, changes in water allocations, and other hydrological modifications; (2) degraded water quality; (3) recreational pressures; (4) potential effects of non-native vegetation and predation; and (5) impassable barriers or areas of unsuitable habitat that limit gene flow. Small populations are vulnerable to a range of environmental stochastic factors and inbreeding depression (USFWS 2017a). At the time of its listing, the USFWS estimated that the Santa Ana sucker had lost approximately 80 percent of habitat in its historic range within the Los Angeles Basin, limiting it to Big Tujunga Creek between Big Tujunga Dam and Hansen Dam (USFWS 2000). At the time of listing, the lower sections of Big Tujunga Creek would go dry in the summer and fall (USFWS 2000).

2.4.1.1.1 Critical Habitat

On December 14, 2010, the USFWS published the Final Revised Critical Habitat designating 9,331 acres for the Santa Ana sucker including habitat in the Santa Ana River in San Bernardino, Riverside, and Orange Counties; the San Gabriel River in Los Angeles County; and Big Tujunga Creek in Los Angeles County (USFWS 2010). The HCP study area comprises the majority of Unit 3A of the 2010 Revised Critical Habitat for Santa Ana sucker, the mainstem of Big Tujunga Creek from Big Tujunga Dam to Hansen Dam and Haines Creek (Exhibit 7). Subunit 3B contains three currently unoccupied tributaries to Big Tujunga Creek: Gold Canyon, Delta Canyon, and Stone Canyon Creeks. These additional unoccupied tributaries were designated to maintain transport of sediment necessary to maintain preferred substrates in Big Tujunga Creek. These tributaries are not expected to be occupied by Santa Ana sucker in the future because their slope appears too steep to be passable by the species (USFWS 2010).

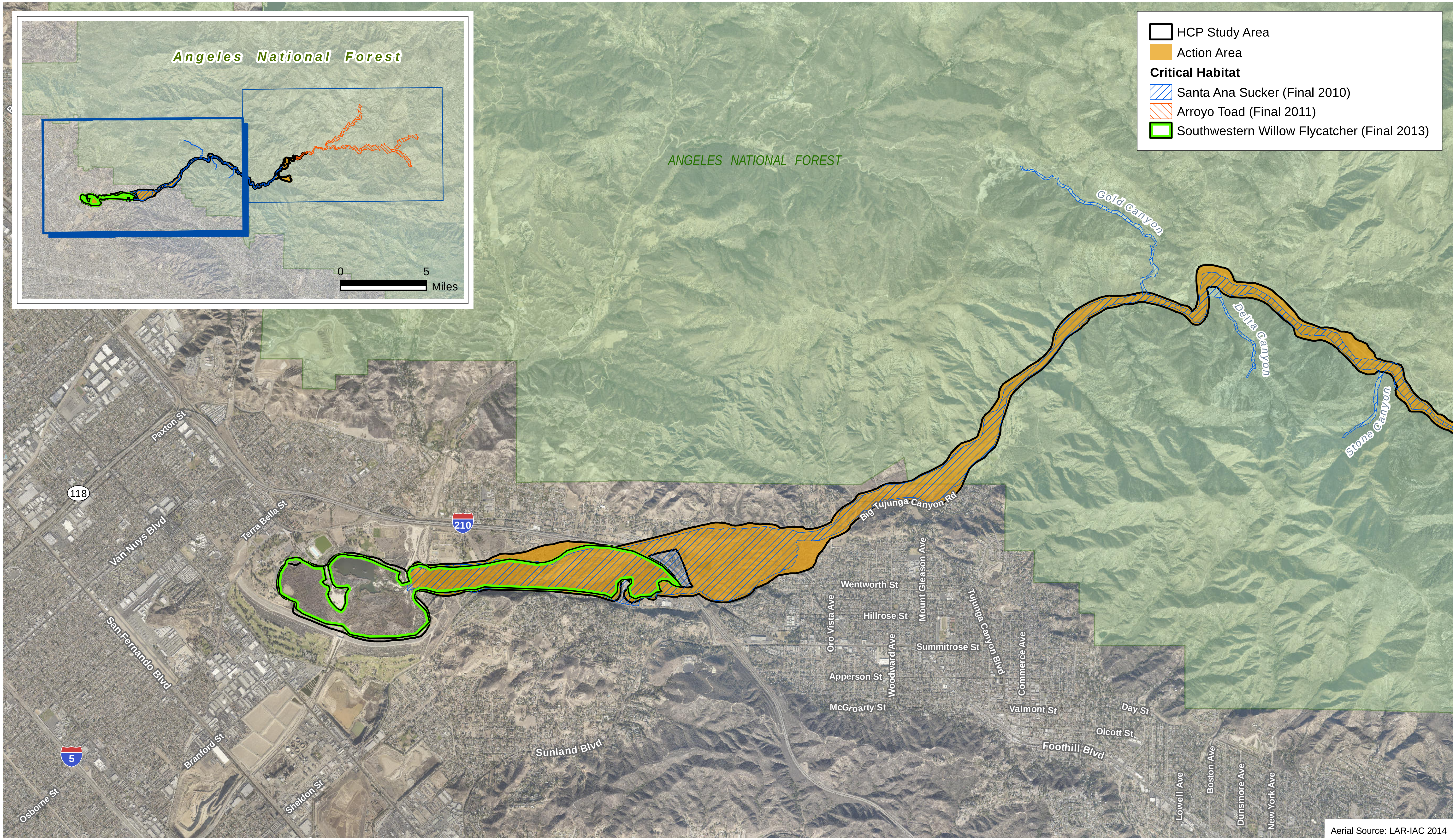
The 2010 Critical Habitat designation lists the following physical and biological features (PBFs)[9] for the Santa Ana sucker:

1. A functioning hydrological system within the historical geographic range of Santa Ana sucker that experiences peaks and ebbs in the water volume (either naturally or regulated) that encompasses areas that provide or contain sources of water and coarse sediment necessary to maintain all life stages of the species, including adults, juveniles, larvae, and eggs, in the riverine environment
2. Stream channel substrate consisting of a mosaic of loose sand, gravel, cobble, and boulder substrates in a series of riffles, runs, pools, and shallow sandy stream margins necessary to maintain various life stages of the species, including adults, juveniles, larvae, and eggs, in the riverine environment
3. Water depths greater than 1.2 inches and bottom water velocities greater than 0.01 foot per second
4. Clear or only occasionally turbid water
5. Water temperatures less than 86 degrees Fahrenheit (°F)
6. In-stream habitat that includes food sources (such as zooplankton, phytoplankton, and aquatic invertebrates) and associated vegetation such as aquatic emergent vegetation and adjacent riparian vegetation to provide: (a) shading to reduce water temperature when ambient temperatures are high, (b) shelter during periods of high water velocity, and (c) protective cover from predators
7. Areas within perennial stream courses that may be periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted

2.4.1.1.2 Recovery Plan

On February 28, 2017, the USFWS published the Recovery Plan for the Santa Ana Sucker (USFWS 2017a). The Recovery Plan details recovery actions and goals to be accomplished to increase the Santa Ana sucker populations in the three watersheds in which it occurs: the Santa

[9] The designation(s) of critical habitat use(s) the term primary constituent element or essential features. The new critical habitat regulations (81 FR 7214) replace this term with PBFs. This shift in terminology does not change the approach used in conducting our analysis, whether the original designation identified primary constituent elements, PBFs, or essential features. In this document, we use the term PBFs to mean primary constituent elements or essential features, as appropriate for the specific critical habitat.



Critical Habitat

Exhibit 7a

Big Tujunga Dam HCP

N W E S

0.75 0 0.75 Miles

PSOMAS

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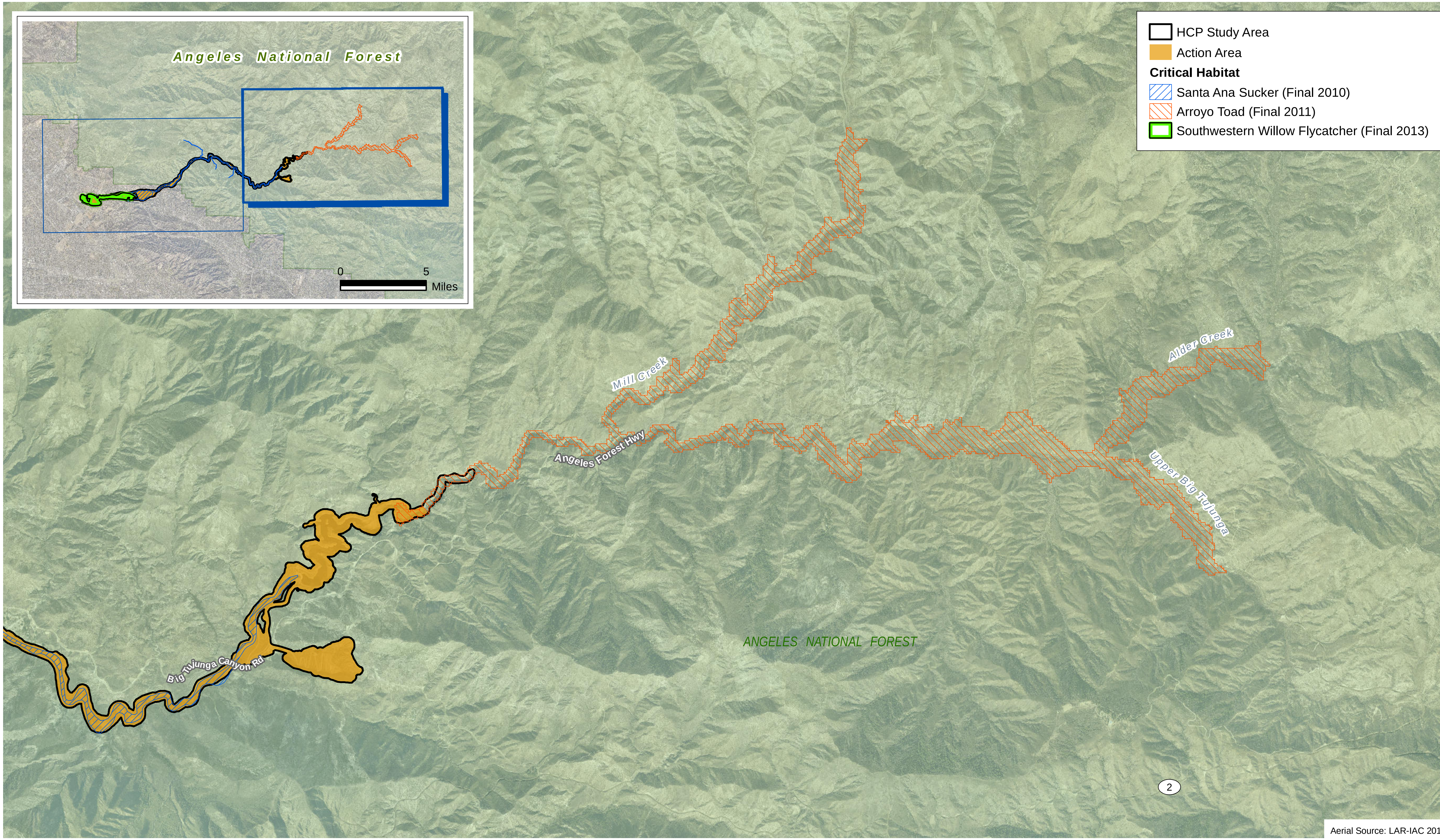


Critical Habitat

Big Tujunga Dam HCP

Exhibit 7b

N W E S

0.75 0 0.75 Miles

PSOMAS

Ana River, the San Gabriel River, and the Los Angeles River Watersheds. The ultimate intent of the Recovery Plan is to recover the species so that it can be delisted.

The highest priority for the recovery of Santa Ana sucker is to increase the amount of occupied, high-quality habitat that allows for feeding, breeding, and sheltering for all of the species' life stages in each of the three watersheds. High-quality Santa Ana sucker habitat is considered to be areas in the mainstem or tributaries with cool water flowing in riffles, runs, or pools with gravel, gravel-sand, cobble, or cobble-sand substrates (USFWS 2017a). To accomplish an increase in occupied high-quality habitat, additional areas of high-quality habitat will need to be created through habitat restoration/creation, and by removal of existing barriers to fish passage to allow recolonization of currently unoccupied high-quality habitat. If necessary, active reintroduction may also be used (USFWS 2017a).

In order to be considered for delisting, a Population Viability Analysis must show a stable or increasing population averaged over 15 years. The Los Angeles River Recovery Unit must show a viable population (i.e., self-sustaining over time) with occupation of Big Tujunga Creek between Big Tujunga Dam and Hansen Dam (referred to as the Hansen Reach in the Recovery Plan), two tributaries between Big Tujunga Dam and Hansen Dam (e.g., Little Tujunga Creek, Haines Creek, Gold Creek, Delta Canyon Creek, Stone Canyon Creek, Vogel Canyon Creek, or Clear Creek), and one tributary in either the Big Tujunga Reach (upstream of Big Tujunga Dam) or the Los Angeles Reach (between Big Tujunga Dam and Hansen Dam). Tributaries being considered for possible reintroduction in the Los Angeles River Recovery Unit include: Big Tujunga Creek upstream of Big Tujunga Dam, Fall Creek, Mill Creek, Arroyo Seco Creek, Pacoima Wash, Bell Creek, and the Los Angeles River (USFWS 2017a).

The Recovery Plan includes the following recovery actions:

1. Develop a range-wide monitoring protocol including measuring the following: Santa Ana sucker population variables (abundance, age-structure, distribution, and population-level genetics), habitat suitability for various life stages (water quality, water quantity, substrate, and food sources), and threats (barriers to dispersal, predators, non-native vegetation, and off-highway vehicle use).

2. Conduct research to inform management actions including identifying optimal habitat conditions and how to best minimize impacts related to reduced water quality, altered hydrology, non-native species, and small population size.

    - Water quality variables to be evaluated include water temperature, thermal fluctuations, dissolved oxygen, turbidity, nitrates and nitrites, total dissolved solids, perchlorate, chlorine, sulfides, ammonia, various metals, organic wastewater compounds, and endocrine-disrupting compounds.
    - Hydrology variables to be evaluated include the timing and magnitude of flows that will maintain the complex diversity of habitat variables necessary to support each life stage (e.g., sufficient sediment with appropriate grain size for spawning, pools, riffles, shallow stream margins, undercut banks, emergent aquatic vegetation, and riparian vegetation). The historical flow regime should be evaluated to determine the hydrological conditions that led to the creation of suitable habitat for the species and should be restored to the extent possible.
    - Sediment transport variables to be evaluated include sediment sources and transport to determine if sufficient sediment is available to maintain appropriate gradient and substrate composition.

- Habitat variables to be evaluated include those to determine the optimal gradient, water quality, water velocity, and substrate that are conducive to supporting breeding and feeding for the Santa Ana sucker. Spawning studies may include research on spawning cues, spawning behavior, egg adhesion, and egg viability and should be conducted over a range of environmental conditions.
- Non-native species efforts may include stomach content analysis on non-native predators to determine which life stages are most affected. Additionally, management actions to remove non-native plants (i.e., giant reed) and non-native predators should be considered.
- Captive propagation efforts may be considered (currently identified for only the Santa Ana Recovery Unit).
- Population Viability Analysis will be constructed using monitoring data from each Recovery Unit.

3. Work with partners to implement management for the Santa Ana sucker within each Recovery Unit. This action includes preparation of a Recovery Unit-specific management plan to conserve and restore habitat for the species. Specifically, the management plan should be designed to ameliorate the effects of hydrological modifications (such as those resulting from flood control operations, water conservation [storage] activities, and wastewater inputs) and associated changes in sediment transport that are affecting the Santa Ana sucker and its habitat. It also includes securing sufficient water flows and sources of sediment to maintain habitat for all life stages of the Santa Ana sucker using the results of research and monitoring (e.g., hydrology, sediment transport, and life history studies). Natural hydrological functions should be maintained, augmented, or mimicked to the extent possible; and habitat should be managed to simulate natural processes as necessary to maintain suitable habitat for the species, especially in areas with regulated discharge.

    - Restore natural water flows (or flows that mimic the natural hydrologic regime) sufficient to maintain habitat for Santa Ana sucker.
    - Provide supplemental water to restore or create Santa Ana sucker habitat using appropriate sources, which could potentially include potable water supplies. How and where these activities will occur will be determined in coordination with appropriate partners and stakeholders and with due consideration of applicable policies and laws.
    - Work with partners and stakeholders to improve habitat conditions through modification of water-related operations. Changes in operations (such as amount and timing of releases) may contribute to restoration of a more natural system of water flow and sediment transport, which would improve habitat quality for the Santa Ana sucker.
    - Manage sediment supply and distribution (for example, use sluice gates or other mechanisms to allow sediment transport through detention facilities) to sustain and improve Santa Ana sucker habitat.
    - Restore natural gradient in streams where flood control structures have altered the natural gradient.
    - Manage vegetation and channel configuration to emulate conditions caused by flood-related disturbances.

    The management plan would also include working with partners to reduce impacts of maintenance activities associated with flood control and related infrastructure, specifically, to determine if operation or design of flood control facilities could be altered to reduce the frequency of disturbance to the Santa Ana sucker and its habitat.

- Evaluate and change flood control facility maintenance practices to reduce the frequency of disturbance required.
- Redesign levees/embankments to eliminate the need for frequent repairs associated with storm flows.
- Enlarge, redesign, or replace culverts to efficiently convey sediment transport and minimize clogging and to accommodate two-way fish passage.

The management plan would also include working with partners to improve up-stream and down-stream movement of Santa Ana suckers by removing or modifying existing fish-passage barriers and preventing the creation of future barriers. Potential barriers include the following:

- Recreational Dams. Identify and remove recreational dams that are barriers to dispersal or otherwise impact Santa Ana sucker, post signs prohibiting the construction of recreational dams, create educational brochures for distribution on public lands, and work with land managers to allow for recreational opportunities at more compatible sites.
- Road Crossings. Create low-flow channels or fish ladders within cement aprons under bridge crossings. Install bridges or culverts of a size and configuration that will allow fish passage over a wide range of flow levels.
- Tributary Connections. Reestablish connectivity between a watershed's mainstem and its tributaries by, for example, removing cement barriers or cement lining in channels to increase the amount of Santa Ana sucker habitat and refuge areas for adults and juveniles. Restore tributary flow rates sufficient to keep the low flow channel clear of vegetation and suitable for Santa Ana sucker.
- Dewatered Floodplains. Acquire and restore riverine processes to man-made uplands within the floodplain, such as abandoned golf courses and other areas adults and juveniles. Restore tributary flow rates sufficient to keep the low-flow have left the watercourse unduly dry.

The management plan would also include working with partners to improve water quality based on the results of water quality studies, as necessary, to support high-quality habitat for the Santa Ana sucker.

- Identify and address, where appropriate, those water quality variables that are affected by water quantity, source, and flow rates.
- Identify and implement best management practices for dams and other facilities to maintain suitable water quality.
- Integrate appropriate water quality standards for Santa Ana sucker into stakeholder monitoring programs.

The management plan would also include working with partners to manage the threat from non-native predators and non-native vegetation.

- Work with partners to alter operations of dams and other facilities to help suppress non-native species by periodically increasing flow releases when there is an abundance of non-native species such that there is a net benefit to the Santa Ana sucker.

- Reduce the extent of habitat available to support non-native predators (e.g., remove recreational dams and non-native riparian vegetation where appropriate).
- Reduce the introduction of non-native predators into habitat for Santa Ana sucker (e.g., install fish screens to prevent escape of non-native predators from ponds and artificial wetlands).
- Remove non-native riparian vegetation in areas that will improve habitat conditions for Santa Ana sucker.
- Coordinate with appropriate partners and stakeholders, including those already conducting non-native riparian vegetation removal programs, to target areas that will improve habitat conditions for Santa Ana sucker.
- Control the extent of the invasive red algae (currently known only from the Santa Ana Recovery Unit) by drying, chemical treatment, managing flows, or altering water quality.

The management plan would also include working with partners to manage the threat from recreational activities. Management actions may include the following:

- Limit the number of activity permits issued and implement timing restrictions.
- Reduce the number of access points.
- Increase the number of trash facilities and the frequency of trash collection.
- Install signs informing the public of authorized activities.
- Patrol and enforce limitations on authorized activities.
- Develop and implement educational programs.

4. Expand the current range of the Santa Ana sucker by restoring Santa Ana sucker habitat for all life stages and by reintroducing populations (where appropriate) within the species' historical range. Expansion of the Santa Ana sucker's range can occur passively through the removal of fish passage barriers, which would then allow natural dispersal, or actively through the intentional reintroduction of the Santa Ana sucker to appropriate areas of habitat within its historical range. This includes preparation of a restoration and reintroduction plan for each Recovery Unit that includes the following:

    - A description of existing habitat conditions (for example, water quality, hydrology, stream gradient, substrate, cover, and other habitat variables determined to be important for supporting the species)
    - A description of potential threats to Santa Ana suckers (for example, altered hydrology, non-native species, recreation, poor water quality)
    - The methodology for restoration of suitable habitat (if necessary)
    - Number, age class(es), and origin of donor fish (if necessary). The origin of fish should incorporate genetic data to ensure the proposed relocation does not have unintended consequences.
    - Methods for transport and release of fish (if necessary)
    - Timing of project implementation

- Pre- and post-project monitoring strategy to assess effectiveness of the habitat restoration or reintroductions. Monitoring should be conducted for a sufficiently long period of time to determine if the project was successful.
- Long-term management activities required to maintain the species within the expanded range and to address ongoing threats. Adaptive Management strategies should be incorporated as needed to address new threats as they are identified. For isolated populations, management should consider whether future introductions may be necessary to ensure minimal genetic drift, genetic bottlenecks, and other risks associated with low genetic variability.

The Recovery Plan is anticipated to take 25 years and to cost approximately $7,060,000 for the first five years of implementation. Implementation of the Los Angeles River portion of the Recovery Plan is expected to cost approximately $2,455,000 plus costs for tasks with a cost to be determined for the first five years. Both Public Works and LADWP are named as potential Responsible Parties in the Recovery Plan. Responsible parties are those partnering agencies who may voluntarily participate in any aspect of implementation of tasks listed in the Recovery Plan. Responsible parties may willingly participate in project planning, assistance with funding or staff time, or help with any other means of implementation.

2.4.1.1.3 Project Surveys to Date

2009–2018 Annual Monitoring

Public Works has conducted annual monitoring for the Santa Ana sucker and benthic macroinvertebrates along Big Tujunga Creek from Big Tujunga Dam downstream to Delta Flats from 2009 through 2018 (SMEA 2010a, 2010b; BonTerra Consulting 2012c, 2012e; BonTerra Psomas 2014, 2015, 2016a; Psomas 2017a, 2018d, 2019b). Reaches were initially selected by San Marino Environmental Associates (SMEA) during the 2007–2008 Habitat Suitability Survey; however, several of the selected reaches were dry during the first year of annual monitoring, which immediately followed the Station Fire. From 2009 to 2011, 18 reaches were surveyed. In 2012, four additional reaches were added to the study. The following 22 reaches located between Big Tujunga Dam and Delta Flats were surveyed each year (from downstream to upstream): 567–568, 578–579, 584–585, 629–630, 631–632, 708–709, 711–712, 725–726, 929–930, 937, 939, and 965–966.

Annual monitoring surveys for the Santa Ana sucker in Big Tujunga Creek are conducted from mid-September through the beginning of October. Barrier nets are placed at the upper and lower ends of each reach prior to the survey to ensure that no fish can enter or leave the sampling area. Photographs are taken to document the conditions, and water quality parameters are measured. Electrofishing using the multiple-pass depletion method has been conducted in every year except 2015 (out of concern for low population numbers during low rainfall conditions). Snorkel surveys were added to a subset of the reaches in 2013, and to all reaches from 2014 to present. Snorkel survey results are compared to the results of electrofishing to evaluate the best long-term sampling method.

Santa Ana suckers captured during electrofishing are weighed and measured; this data is used to calculate body condition and also to approximate age structure of the population. Snorkel surveyors also record the approximate size of fish (i.e., less than or greater than 3 inches) to approximate age structure (juvenile or adult). While the surveys focused on Santa Ana sucker, other fish, amphibians, and invertebrate species were incidentally captured. All fish were identified to species; special status fish were counted and recorded in field notes. Captured native species were released in the reach area after identification. Non-native fishes and invertebrates were not returned to Big Tujunga Creek.

Habitat suitability surveys are also conducted annually to rank the habitat value for sucker and so that comparisons can be made between years. The physical habitat variables are assessed within the wetted area of the river between the upper and lower boundaries of each reach surveyed. The following parameters were used to evaluate sucker habitat suitability:

1. Wetted stream width measured at the lower boundary of each 25-meter reach
2. Visual estimate of the percent of each habitat type (i.e., pool, riffle, run, and edgewater habitats)
3. Visual estimate of the percent substrate composition following categories of the American Geophysical Union Sediment Classification System
4. Maximum depths of each habitat type (i.e., pool, riffle, and run) present in each 25-meter reach
5. Visual estimate of the percent cover of riparian vegetation overhanging the water surface for the entire reach
6. Visual estimate of fry habitat (edgewater) for the entire reach, including a qualitative estimate of whether fry habitat was good (+) or poor (-)

The data collected are then used to calculate habitat scores for each of three Santa Ana sucker life history stages (i.e., fry, juvenile, and adult) based on criteria (food, shelter, and the right conditions for reproduction) for each life stage. The habitat scoring equations are based on findings of Santa Ana sucker habitat affinity studies (Haglund and Baskin 2003, 2005; Haglund et al. 2004; EDAW and SMEA 2009). These studies show that, compared to habitat availability, sucker use particular habitats more than other habitats.

A composite total habitat quality score, which incorporates the habitat ranking score for each life history stage, is also calculated for each 25-meter reach to determine the overall habitat suitability for sucker for each reach. The weight of each score is based on the relative importance of each life history stage (EDAW and SMEA 2009). The score for each life stage accounts for the varying habitat preferences of each life stage, as discussed above.

<u>Results</u>

The overall habitat suitability scores for the twenty-two 25-meter reaches are shown below in Table 4. As noted above, the sampling reaches recommended by the 2007–2008 Habitat Suitability Survey, which represented an equal number of reaches ranked as Excellent, Good, and Fair (SMEA 2010a), could not be surveyed for fish following the Station Fire because many of them were dry; therefore, sampling reaches were adjusted to include reaches that contained water following the fire. However, they did not begin with an evenly stratified sampling of reaches ranked as Excellent, Good, Fair, and Poor. In 2007–2008, the overall habitat score was Good (2.6), which represented their condition prior to the Station Fire. In 2010, following the 2009 Station Fire, habitat scores declined to Good (2.0), as would be expected. By 2011, habitat scores had returned to the pre–Station Fire value of Good (2.6) and remained at this score in 2012. Rainfall was below average from 2013 to 2016, and habitat scores showed a declining trend from Good (2.4) in 2013 to Fair (1.7) in 2016. Rainfall was approximately average in 2016–2017, and habitat scores increased slightly to Fair (1.9). Rainfall was low again in 2017–2018, but habitat scores continued to increase to Good (2.3).

The area of Big Tujunga Creek between Big Tujunga Dam and Delta Flats is consistently occupied by Santa Ana sucker (see reaches mapped on Exhibit 8), although the numbers have fluctuated dramatically over the long-term monitoring. The total number of Santa Ana sucker, average number of Santa Ana sucker per reach, median number of Santa Ana sucker per reach observed, and number of reaches occupied from 2009 to 2018 is shown below in Table 5 (Psomas 2019b). The first year of surveys immediately followed the Station Fire; only 31 Santa Ana sucker were observed in 4 of the 18 sampled reaches. The population increased substantially by the following year (2010); 546 Santa Ana sucker were captured in 15 of the 18 sampled reaches. The 2010–2011 rainfall year brought a high amount of rainfall; the Dam went to spillway during the storm season. During the following survey in 2011, a record number of Santa Ana sucker were observed; 1,255 Santa Ana sucker were observed in 17 of the 18 surveyed reaches, an average of 70 sucker observed per surveyed reach. The next year of surveys followed an average rainfall year; a total of 710 Santa Ana sucker were observed in 2012. While the number of Santa Ana sucker observed was a little more than half of the number observed the prior year, they remained distributed throughout the surveyed reaches with 20 of 22 surveyed reaches occupied. The next few years were consecutive years of below-average rainfall; physical habitat variables and overall habitat scores declined. The number of Santa Ana sucker observed declined precipitously, with 87 Santa Ana sucker observed in 14 of 22 surveyed reaches in 2013; 55 Santa Ana sucker observed in 8 of 22 surveyed reaches in 2014; 20 Santa Ana sucker observed in 6 of 22 surveyed reaches in 2015; and 5 Santa Ana sucker observed in 2 of 22 surveyed reaches in 2016. Although 2016–2017 was a more normal rainfall year, it followed five consecutive years of drought in Southern California; habitat scores were slightly higher but were still very low. A total of 6 Santa Ana sucker were observed in 4 of 22 surveyed reaches in 2017. Another low rainfall year occurred in 2017–2018; 9 Santa Ana sucker were observed in 4 of 20 surveyed reaches in 2018.

Overall, the long-term monitoring has demonstrated the "boom or bust" nature of Santa Ana sucker populations; when conditions are favorable, the population "booms" (i.e., is very high), and when conditions are unfavorable, the population "busts" (i.e., is very low). A population bust followed immediately after the 2009 Station Fire. The population boomed in 2011 following a season of very high rainfall; favorable conditions likely allowed Santa Ana sucker to breed multiple times, and survivorship of individuals was likely high. Consecutive years of drought (2013–2016) have caused another population bust, from which the population has not yet recovered because habitat conditions are still largely unfavorable. Monitoring reports over the last several years have demonstrated the need for flushing flows to "reset" the system (e.g., clearing silt and sand embedded in the cobble substrate to make conditions favorable for spawning and foraging, clearing vegetation in the main channel to increase stream velocities and open up riffle and run habitat, etc.) (Psomas 2017a; BonTerra Psomas 2015, 2016a). Winter storm events in 2016–2017 were not high enough to provide these flushing flows. While habitat conditions slightly improved, it was not enough to make a substantial change in the status of the system (Psomas 2018d, 2019b).

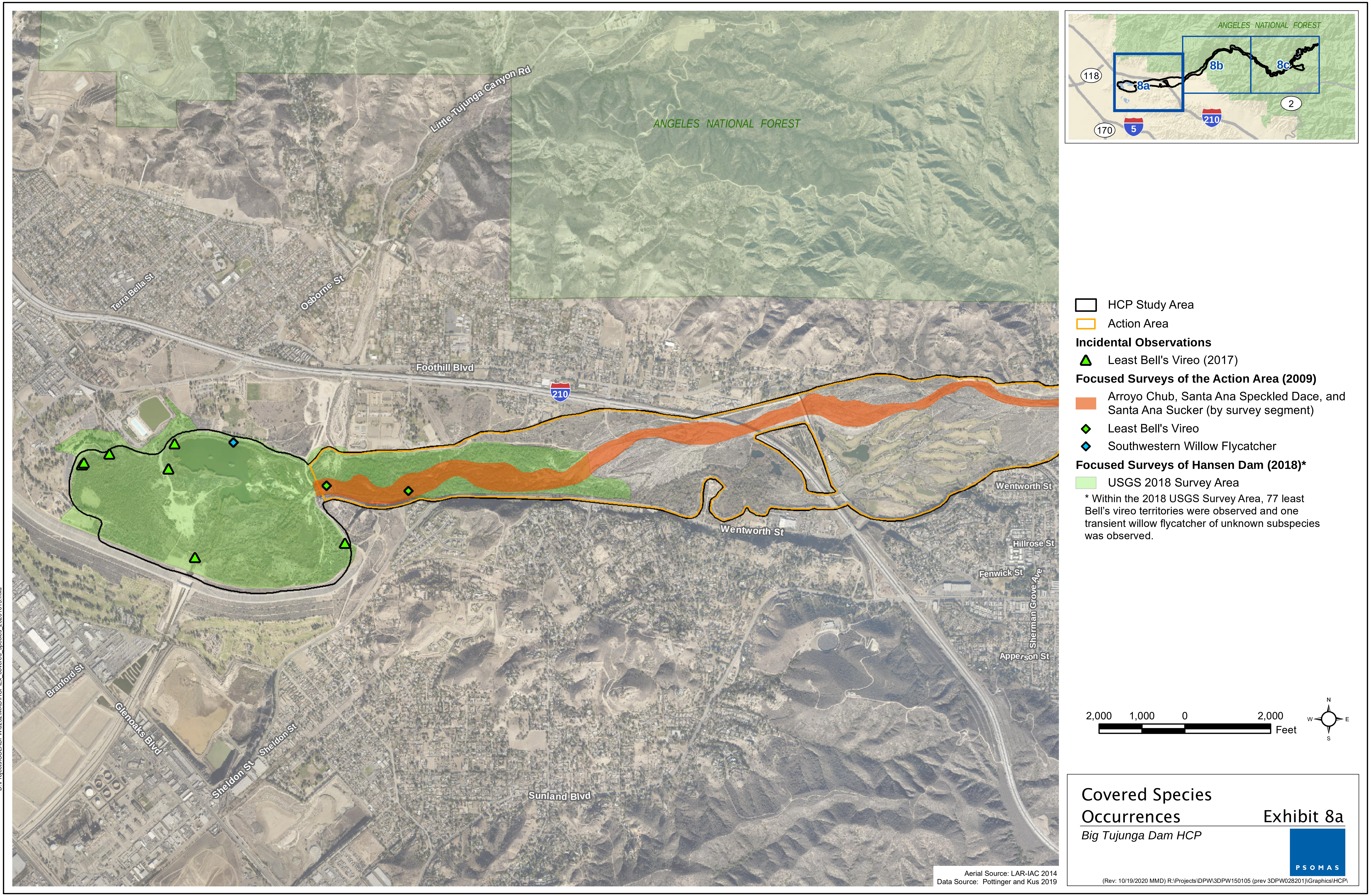
TABLE 4
COMPARISON OF TOTAL HABITAT SUITABILITY RANKING SCORES FOR ALL SURVEY YEARS

	Total Habitat Suitability Ranking Scores									
Reach Number	**2007–2008**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Median (All Reaches)	Good (2.6)	Good (2.0)	Good (2.6)	Good (2.6)	Good (2.4)	Good (2.1)	Fair (1.9)	Fair (1.7)	Fair (1.9)	Good (2.3)

—: Reach not included in survey set for these years.

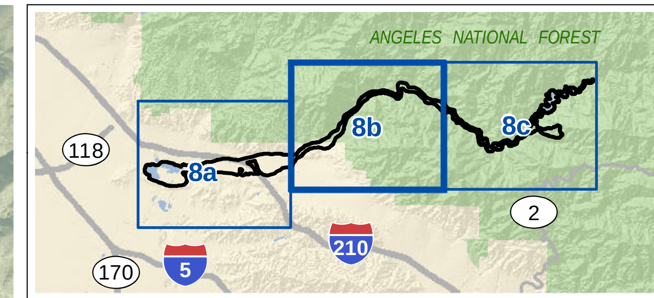
Habitat Quality
0–1.0: Poor
1.01–2.0: Fair
2.01–3:0 Good
3.01–4.0: Excellent

Note that Physical Habitat scores collected in 2007–2008 (pre-Station Fire) were the values used for the 2009 survey (SMEA 2010a).



Covered Species Occurrences Exhibit 8a

Big Tujunga Dam HCP



HCP Study Area

Action Area

Incidental Observations

Least Bell's Vireo (2018)

Santa Ana Sucker Long-term Monitoring (2011-2017)

Arroyo Chub, Santa Ana Speckled Dace, and Santa Ana Sucker (observed in all reaches)

Focused Surveys of the Action Area (2009)

Arroyo Chub, Santa Ana Speckled Dace, and Santa Ana Sucker (by survey segment)

2,000 1,000 0 2,000 Feet

N W E S

Covered Species Occurrences

Exhibit 8b

Big Tujunga Dam HCP

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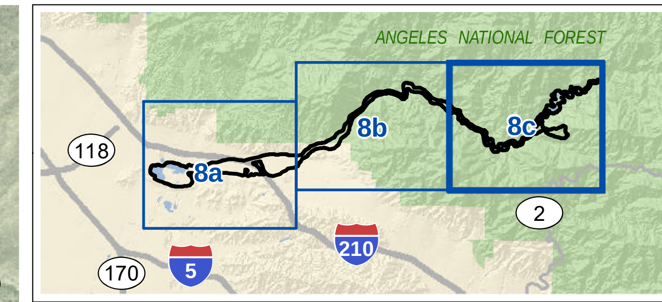

HCP Study Area

Action Area

Incidental Observations

- Arroyo Chub (2017)
- Least Bell's Vireo (2017)
- Willow Flycatcher (migrant, 2017)

Focused Surveys for the Sediment Removal Project (2011-2018)

- Arroyo Chub (2011)
- Arroyo Toad (2011) †
- Arroyo Toad (2017) †
- Arroyo Toad (2018)
- Least Bell's Vireo (2017)
- Santa Ana Speckled Dace (2011)
- Santa Ana Sucker (2011)
- Western pond turtle (2017)
- Western pond turtle (2018)
- Willow Flycatcher (migrant, 2018)

Santa Ana Sucker Long-term Monitoring (2011-2017)

- Arroyo Chub, Santa Ana Speckled Dace, and Santa Ana Sucker (observed in all reaches)

Focused Surveys of the Action Area (2009)

- Arroyo Chub, Santa Ana Speckled Dace, and Santa Ana Sucker (by survey segment)
- Western Pond Turtle (by survey segment)

† These are multiple observations of one individual observed in 2011 and one individual observed in 2017.

2,000 1,000 0 2,000 Feet

N W E S

Covered Species Occurrences

Exhibit 8c

Big Tujunga Dam HCP

PSOMAS

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TABLE 5
POPULATION ESTIMATES FOR SANTA ANA SUCKER 2009–2018

Reach Number	2009 Santa Ana Sucker Population Estimate	2010 Santa Ana Sucker Population Estimate	2011 Santa Ana Sucker Population Estimate	2012 Santa Ana Sucker Population Estimate	2013 Santa Ana Sucker Captured Per Reach	2014 Santa Ana Sucker Captured Per Reach	2015 Santa Ana Sucker Observed Per Reach[a]	2016 Santa Ana Sucker Observed Per Reach[b]	2017 Santa Ana Sucker Observed Per Reach[b]	2018 Santa Ana Sucker Observed Per Reach	Median Santa Ana Sucker Population Count All Years
Total Observed (All Reaches)	31	546	1,255	710	87	55	20	5	6	9	55
Average Number Observed Per Surveyed Reach	2	30	70	32	4	3	1	0.25	0.27	0.45	2.50
Median Number Observed Per Surveyed Reach	0	19	44	23	2	0	0	0	0	0	0
Number of Occupied Reaches/Number of Reaches Surveyed (%)	4/18 (22%)	15/18 (83%)	17/18 (94%)	20/22 (91%)	14/22 (64%)	8/22 (36%)	6/22 (27%)	2/22 (9%)	4/22 (18%)	4/20 (20%)	32%

[a] In all years except for 2015, the methodology used to sample fish was electrofishing. In 2015, only snorkel surveys were conducted. It should be noted that the target species was Santa Ana sucker, but other special status fish species incidentally observed were also counted. At these low population numbers, snorkel surveys have been found to have results that were similar to or better than electrofishing (Psomas 2017a); thus, it is expected that the 2015 number should be representative of the number of fish present that year.

[b] For 2016 and 2017, the total is the combined total of suckers observed during electrofishing and snorkeling surveys of the same reaches.

2011 Focused Surveys for Santa Ana Sucker

Focused surveys were conducted in 2011 within the Reservoir Restoration Project area, which includes the area from the upper boundary of the HCP study area (Fall Creek) downstream to 1.0 mile downstream of Big Tujunga Dam (BonTerra Consulting 2011b). Survey methods included electrofishing and seining, depending on the location. Electrofishing was conducted in Big Tujunga Creek upstream of the Reservoir on August 15, 2011, and immediately downstream of the Dam on August 17, 2011. Native fishes were released unharmed at the point of capture. Non-native fishes were not returned to Big Tujunga Creek.

Four large seine hauls were conducted along the edges of the Reservoir, and one seine haul was conducted in the plunge pool immediately below the Dam. Seining along the edges of the Reservoir was accomplished using a small motorized boat to deploy the seine net, which was then hauled onto the shore. Captured non-native fishes and invertebrates were not returned to Big Tujunga Reservoir or Big Tujunga Creek. All fish observed during the survey were recorded in field notes.

Results

During the August 2011 focused survey, 1 large adult Santa Ana sucker was captured and 20 others were visually observed in Big Tujunga Creek immediately downstream of the Dam plunge pool (upstream of the access road) (Exhibit 8). No Santa Ana suckers were observed in Big Tujunga Reservoir or upstream of the Reservoir along Big Tujunga Creek.

2019 Focused Surveys for the Reservoir Restoration Project

Focused surveys for the Reservoir Restoration Project were updated in Fall 2019 (Psomas 2019e). The survey area included Big Tujunga Creek extending from Big Tujunga Reservoir upstream to Fall Creek. The area downstream of Big Tujunga Creek was not surveyed because it has been sufficiently covered during the annual Santa Ana sucker long-term surveys.

Survey methods included electrofishing, seining, and use of underwater cameras, depending on the location. Native fishes would have been released unharmed at the point of capture. Non-native fishes would not have been returned to Big Tujunga Creek.

<u>Results</u>

No fish were observed during the survey upstream of Big Tujunga Reservoir.

2.4.1.1.4 <u>Species Occurrence in HCP Study Area</u>

The Santa Ana sucker is expected to occur throughout Big Tujunga Creek between Big Tujunga Dam and Hansen Dam. Based on the results of ten consecutive years of long-term monitoring of the Santa Ana sucker population between Big Tujunga Dam and Delta Flats, the population size is expected to vary widely depending on habitat conditions and other stochastic events such as fire (Psomas 2019b). The population numbers are currently very low but are expected to increase substantially following the return of favorable conditions.

A total of nine hundred sixty-eight 25-meter reaches were surveyed during the Habitat Suitability Study (EDAW and SMEA 2009). Santa Ana sucker are not distributed evenly along the creek; some areas contain much higher densities than others. However, for the purposes of providing a rough estimate, it can be assumed that the 22 sampled reaches represent the habitat variation observed over the entire area. Using the minimum and maximum average number of Santa Ana sucker observed per reach over the long-term monitoring (Table 5), it is estimated that the number of Santa Ana sucker between Big Tujunga Dam and Hansen Dam ranges from 242 to 67,760 individuals. Using the minimum and maximum median number of Santa Ana sucker observed per reach over the long-term monitoring (Table 5), it is estimated that the number of Santa Ana sucker occurring between Big Tujunga Dam and Hansen Dam ranges from 0 to 42,592. Over the long-term monitoring period, the median occupation is 32 percent of reaches are occupied.

The Santa Ana sucker is absent from Big Tujunga Creek upstream of Big Tujunga Reservoir within the HCP study area, based on the results of 2011 and 2019 focused surveys (BonTerra Consulting 2011b; Psomas 2019e). The Santa Ana Sucker Recovery Plan states that Santa Ana sucker has been extirpated from the area upstream of the Dam and is not expected to occur upstream of the Reservoir without a reintroduction effort (USFWS 2017a).

2.4.1.2 ARROYO CHUB

Arroyo chub is a California Species of Special Concern and a USFS Sensitive Species. It is a small freshwater fish native to the watersheds of the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita Rivers and those of Malibu and San Juan Creeks. Arroyo chub has also been successfully introduced into the Santa Ynez, Santa Maria, Cuyama, and Mojave River systems and other smaller coastal streams (Moyle 2002).

Arroyo chub is abundant at only a few of its native locations: Santa Margarita and De Luz Creeks in San Diego County; Trabuco Creek, San Juan Creek, and the middle Santa Ana River and its tributaries in Orange County; and Malibu Creek, Big Tujunga Creek, and the West Fork of the San Gabriel River in Los Angeles County (Swift et al. 1993; Deinstadt et al. 1990; O'Brien unpublished data[10]). Additionally, they are also common and widespread in the Ventura and Santa Clara River systems, where they were introduced (CDFW 2015). They are also present along the North Fork and East Fork of the San Gabriel River, along the San Gabriel River downstream of Morris Dam, Pacoima Creek upstream of Pacoima Reservoir, Sepulveda Flood Control Basin, the Los Angeles River drainage, Topanga Creek, Arroyo Simi, and Bear Creek (Swift et al. 1993; O'Brien 2009; O'Brien unpublished data). In 2008, some arroyo chub from Big Tujunga Creek were used to restore the species in the Arroyo Seco downstream of Devil's Gate Dam (O'Brien 2009).

Arroyo chub is a small fish that can reach a standard length of 4.7 inches (12 cm), although the typical adult length varies between 2.8 and 3.9 inches (7 and 10 cm) (CDFW 2015). Males are distinguished from females by their larger fins and, when breeding, by the prominent patch of tubercles on the upper surface of the pectoral fins (forelimbs). Arroyo chub has a chunky body, fairly large eyes, and a small mouth. Its body color is silver or grey to olive-green dorsally and white ventrally; and it usually has a dull grey lateral band (Moyle 2002).

Arroyo chub is found in coastal freshwater streams and rivers with sustained flows and emergent vegetation. It prefers low-gradient pools and flat-water habitat with gravel and sand substrate that supports some aquatic emergent vegetation (O'Brien unpublished data 2009); however, it can also occur in relatively fast-moving (2.6 feet per second [80 cm/second] or more) sections of stream and in pool habitats with gravel, cobble, and boulder substrates (O'Brien unpublished data 2006–2012). Arroyo chub prefer gradients of less than 2.5 percent slope and water with depths greater than 15 inches (40 cm) (Feeney and Swift 2008; Wells and Diana 1975). This species is adapted to survive in widely fluctuating water temperatures (50 to 77 degrees Fahrenheit) and fluctuating dissolved oxygen levels that are common in coastal streams. Arroyo chub forms schools and feeds heavily on algae and other plants as well as small crustaceans and aquatic

10 References to unpublished data were cited in CDFW 2015.

insect larvae (Moyle 2002). They also feed extensively on the roots of floating water fern (*Azolla* sp.), which is infested with nematodes (Greenfield and Greenfield 1972).

Arroyo chub rarely lives beyond four years and begins to reproduce at one year of age (McGinnis 2006). Arroyo chub breeds continuously from February through August, although most spawning occurs in June and July. The majority of spawning occurs in pools or in quiet edgewaters with temperatures of 57 to 72 degrees Fahrenheit. Eggs adhere to the substrate or plants and hatch in approximately four days. After hatching, the fry spend the next three to four months in quiet water in the water column and usually occur among vegetation or other flooded cover (Moyle 2002).

Arroyo chub is threatened by a combination of urbanization and non-native species introductions (CDFW 2015). Many streams containing arroyo chub are channelized or dammed, or water is diverted. Dams are barriers to movement and can also result in dewatering of the area downstream; however, minimum flow releases can also create summer habitat where it was previously scarce (e.g., West Fork of the San Gabriel River) (CDFW 2015). Urbanization can degrade streams through channelization, trash and pollution in runoff (e.g., pH, heavy metals, pathogens, bacteria, nutrients, trash, scum algae, total dissolved solids, and turbidity), and heavy recreational pressure (i.e., water play). Road crossings can often form a barrier to movement. Non-native species are also predators on arroyo chub; species such as largemouth bass and green sunfish pose a threat to arroyo chub and could be responsible for their extirpation from many areas (Moyle et al. 1995; Swift 2005). Western mosquitofish can also be predators of arroyo chub, while red shiner and fathead minnow could be competitors of arroyo chub (O'Brien personal observation; Feeney and Swift 2008).

Because arroyo chub are adapted to survive in low oxygen conditions, large temperature fluctuations, low flow, and "flashy" flow conditions of southern California streams, they may be able to adapt to changes in stream conditions due to climate change. However, the low-gradient reaches that they prefer may go dry over the summer months. In order to persist, surface flows need to be maintained. Moyle et al. (2013) rated arroyo chub as less vulnerable to the effects of climate change than most fish; however, the effects of climate change may still lead to its overall decline.

2.4.1.2.1 Critical Habitat

This species is not currently listed under the FESA; therefore, no critical habitat is designated for this species.

2.4.1.2.2 Recovery Plan

This species is not currently listed under the FESA; therefore, no recovery plan has been developed for this species.

2.4.1.2.3 Project Surveys to Date

2009–2018 Annual Monitoring Surveys

As described above for the Santa Ana sucker, Public Works has conducted annual monitoring for the Santa Ana sucker and benthic macroinvertebrates along Big Tujunga Creek from Big Tujunga Dam downstream to Delta Flats from 2009 through 2017 (SMEA 2010a, 2010b; BonTerra Consulting 2012c, 2012e; BonTerra Psomas 2014, 2015, 2016a; Psomas 2017a, 2018d, 2019b). Arroyo chub incidentally captured during electrofishing and incidentally observed during snorkel surveys are counted and recorded in field notes. Captured native species were released in the reach area after identification. Non-native fishes and invertebrates were not returned to Big Tujunga Creek.

Results

The area of Big Tujunga Creek between Big Tujunga Dam and Delta Flats is consistently occupied by arroyo chub (see reaches mapped on Exhibit 8), although the numbers have fluctuated over the long-term monitoring. The total number of arroyo chub, average number of arroyo chub per reach, and median number of arroyo chub per reach observed from 2009 to 2018 is shown below in Table 6 (Psomas 2019b).

The first year of surveys immediately followed the Station Fire; 1,344 arroyo chub were observed in 16 of the 18 sampled reaches. The population increased the following year (2010); 1,587 arroyo chub were captured in 15 of the 18 sampled reaches. The 2010–2011 rainfall year brought a high amount of rainfall; the Dam went to spillway during the storm season. During the following survey in 2011, the number of arroyo chub increased again; 1,884 arroyo chub were observed in all 18 of the surveyed reaches. The next year of surveys (2012) followed an average rainfall year and the highest number of arroyo chub were observed; a total of 2,728 arroyo chub were observed in all 22 of the surveyed reaches. The next few years were consecutive years of below-average rainfall; the number of arroyo chub observed declined in 2013 to 1,089; increased the following year to 2,263 arroyo chub observed in 2014; declined to 1,064 arroyo chub observed in 2015; and remained approximately the same with 1,093 arroyo chub observed in 2016. Although 2016–2017 was a more normal rainfall year, it followed five consecutive years of drought in Southern California; a total of 860 arroyo chub were observed in 2017. Another low rainfall year occurred in 2017–2018; a total of 1,474 arroyo chub were observed in 2018. Throughout the long-term monitoring, arroyo chub were detected in substantial numbers throughout the surveyed reaches.

Over the long-term monitoring, arroyo chub numbers have fluctuated with conditions but remained relatively stable. Even in years with the lowest population counts, arroyo chub were observed with at least 30 individuals per surveyed reach (median number) and triple that in years with the highest population counts. The arroyo chub has consistently occupied all reaches in moderate numbers through five consecutive years of drought (2013–2016), which is likely attributable to this species' preference for lower flows and pool-like conditions with sand and silt substrate.

TABLE 6
POPULATION ESTIMATES FOR ARROYO CHUB 2009–2018

Reach Number	2009 Arroyo Chub Population Estimate	2010 Arroyo Chub Population Estimate	2011 Arroyo Chub Population Estimate	2012 Arroyo Chub Population Estimate	2013 Arroyo Chub Captured Per Reach	2014 Arroyo Chub Captured Per Reach	2015 Arroyo Chub Observed Per Reach[a]	2016 Arroyo Chub Observed Per Reach	2017 Arroyo Chub Observed Per Reach	2018 Arroyo Chub Observed Per Reach	Median Arroyo Chub Population Count All Years
Total Observed (All Reaches)	1,344	1,587	1,884	2,728	1,089	2,263	1,064	1,093	860	1,474	1,409
Average Number Observed Per Surveyed Reach	75	88	105	124	50	103	48	50	39	74	75
Median Number Observed Per Surveyed Reach	83	30	88	91	51	92	45	47	30	44	49
Number of Occupied Reaches/ Number of Reaches Surveyed (%)	16/18 (89%)	15/18 (83%)	18/18 (100%)	22/22 (100%)	22/22 (100%)	22/22 (100%)	21/22 (95%)	22/22 (100%)	22/22 (100%)	20/20 (100%)	100%

[a] In all years except for 2015, the methodology used to sample fish was electrofishing. In 2015, only snorkel surveys were conducted. It should be noted that the target species was Santa Ana sucker, but other special status fish species incidentally observed were also counted. At these low population numbers, snorkel surveys have been found to have results that were similar to or better than electrofishing (Psomas 2017a); thus, it is expected that the 2015 number should be representative of the number of fish present that year.

2011 Focused Surveys for Arroyo Chub

As discussed above for Santa Ana sucker, focused surveys were conducted in 2011 within the Reservoir Restoration Project area, which includes the area from the upper boundary of the HCP study area (Fall Creek) downstream to 1.0 mile downstream of Big Tujunga Dam (BonTerra Consulting 2011b). Survey methods included electrofishing and seining, depending on the location. Electrofishing was conducted in Big Tujunga Creek upstream of the Reservoir on August 15, 2011, and immediately downstream of the Dam on August 17, 2011. Native fishes were released unharmed at the point of capture. Non-native fishes were not returned to Big Tujunga Creek.

Four large seine hauls were conducted along the edges of the Reservoir, and one seine haul was conducted in the plunge pool immediately below the Dam. Seining along the edges of the Reservoir was accomplished using a small motorized boat to deploy the seine net, which was then hauled onto the shore. Captured non-native fishes and invertebrates were not returned to Big Tujunga Reservoir or Big Tujunga Creek. All fish observed during the survey were recorded in field notes.

<u>Results</u>

A total of 96 arroyo chub were captured, and over 150 others were visually observed in the Big Tujunga Dam plunge pool and in Big Tujunga Creek downstream of the plunge pool (BonTerra Consulting 2011b; see Exhibit 8). No arroyo chub were observed in Big Tujunga Reservoir or upstream of the Reservoir along Big Tujunga Creek.

2019 Focused Surveys for the Reservoir Restoration Project

Focused surveys for the Reservoir Restoration Project were updated in Fall 2019 (Psomas 2019e). The survey area included Big Tujunga Creek extending from Big Tujunga Reservoir upstream to Fall Creek. The area downstream of Big Tujunga Creek was not surveyed because it has been sufficiently covered during the annual Santa Ana sucker long-term surveys.

Survey methods included electrofishing, seining, and use of an underwater camera, depending on the location. Native fishes would have been released unharmed at the point of capture. Non-native fishes would not have been returned to Big Tujunga Creek.

<u>Results</u>

No fish were observed during the survey upstream of Big Tujunga Reservoir.

2.4.1.2.4 <u>Species Occurrence in HCP Study Area</u>

Arroyo chub is expected to occur throughout Big Tujunga Creek between Big Tujunga Dam and Hansen Dam. Based on the results of ten consecutive years of long-term monitoring between Big Tujunga Dam and Delta Flats, the population size is expected to vary depending on habitat conditions (Psomas 2018b). The population numbers are currently the lowest that they have been over the course of the nine-year monitoring but are expected to increase with favorable hydrologic conditions.

A total of nine hundred sixty-eight 25-meter reaches were surveyed during the Habitat Suitability Study (EDAW and SMEA 2009). Arroyo chub are not distributed evenly along the creek; some areas contain much higher densities than others. However, for the purposes of providing a rough estimate, it can be assumed that the 22 sampled reaches represent the habitat variation observed over the entire area. Using the minimum and maximum average number of arroyo chub observed per reach over the long-term monitoring (Table 6), it is estimated that the number of arroyo chub between Big Tujunga Dam and Hansen Dam ranges from 37,752 to 101,640 individuals. Using the minimum and maximum median number of arroyo chub observed per reach over the long-term monitoring (Table 6), it is estimated that the number of arroyo chub occurring between Big Tujunga Dam and Hansen Dam ranges from 29,040 to 89,056. Over the long-term monitoring period, the median occupation is 100 percent of reaches are occupied.

Arroyo chub is absent from Big Tujunga Creek upstream of Big Tujunga Reservoir within the HCP study area, based on the results of 2011 and 2019 focused surveys (BonTerra Consulting 2011b; Psomas 2019e).

2.4.1.3 SANTA ANA SPECKLED DACE

Santa Ana speckled dace is a California Species of Special Concern and a USFS Sensitive Species. Although the Santa Ana speckled dace has not been formally described as a subspecies, many believe that it deserves subspecies status because it has morphological and genetic differences that distinguish it from other California speckled dace (Cornelius 1969; Hubbs et al. 1979; Haglund 1996; Metcalf 2008). Santa Ana speckled dace has finer scales, a better developed frenum (a flap of skin attaching the snout to upper lip), a longer head, and smaller eggs than other speckled dace (Moyle et al. 1995).

Santa Ana speckled dace were historically distributed throughout upland portions of Los Angeles, San Gabriel, and Santa Ana River systems but currently have a limited distribution in headwaters of the Santa Ana River (Lytle Creek, Cajon Creek, City Creek, Plunge Creek), San Jacinto River (Indian Creek), San Gabriel River (West, East, and North Forks; Fish Canyon), and Los Angeles River (Big Tujunga Creek, Haines Canyon) (Moyle et al. 1995; O'Brien 2009; Abbas 2008).

Santa Ana speckled dace is a small, freshwater fish that typically measures 3.1 to 4.3 inches (8 to 11 cm) in length. Physical characteristics of the Santa Ana speckled dace include one barbel (whisker-like tactile organ) at the end of each jaw and a frenum on the upper lip. The back and sides of the fish are dusky yellow or olive and are covered with dark speckles and splotches, a dark lateral band that extends to the snout, a pale belly, and a spot on the caudal peduncle (tail). During breeding, the fins in both sexes are tipped by orange, and the snouts and lips of males often turn red. Also, males usually develop tubercles on their pectoral fins and head (Moyle 2002; CDFW 2015).

Santa Ana speckled dace requires perennial streams fed by cool springs with summer water temperatures of 62 to 68 degrees Fahrenheit. It prefers riffle habitats in clean, rocky bottomed streams and rivers but is also found near the shores of lakes (Moyle et al. 1995). Deinstadt et. al. (1990) described their preferred habitat as shallow riffles dominated by gravel and cobble. Feeney and Swift (2008) described their preferred habitat as low-gradient streams (less than 2.5 percent slope) with sand to boulder substrates and slow-moving waters but noted they were also found along stream edges in fast-moving water. O'Brien et al. (2011) observed this species in a variety of habitats including riffles, runs, and pools of the San Gabriel River. This species exhibits predatory avoidance behaviors such as nocturnal feeding and hiding among the bottom rocks during daylight hours. Except for the breeding season, this species does not form large groups but instead forages in small groups that can easily blend into the bottom rocks to avoid predation. "Speckled dace generally forage on small benthic invertebrates, especially taxa common in riffles, including hydropsychid caddisflies, baetid mayflies, and chironomid and simuliid midges, but will also occasionally feed on filamentous algae" (Li and Moyle 1976; Baltz et al. 1982; Hiss 1984; Moyle et al. 1991).

Santa Ana speckled dace typically has a life span of three years but can live up to six years or more. It becomes sexually mature in its second year; and spawning occurs from March to May, cued by rising water temperatures and/or high flow events (Moyle 2002; CDFW 2015). Speckled dace lay and fertilize their eggs on the stream bottom among rocks and gravel. The eggs hatch in six days; and, similar to most other minnows, the young seek out calm, inshore areas where zooplankton are available to feed upon (Moyle 2002; McGinnis 2006).

Santa Ana speckled dace is threatened by dams and water diversions; habitat loss and degradation, especially due to urbanization; grazing; agriculture; mining; recreation; wildfires; and non-native species (Swift et al. 1993; Moyle et al. 1995; Moyle 2002; Swift 2005). Many streams containing Santa Ana speckled dace are channelized or dammed, or water is diverted. Dams are barriers to movement and can also result in dewatering of the area downstream (CDFW 2015). Urbanization can degrade streams through channelization, trash and pollution in runoff (e.g., pH, heavy metals, pathogens, bacteria, nutrients, trash, scum algae, total dissolved solids, and turbidity), and heavy recreational pressure (i.e., water play). Road crossings can often form a barrier to movement. Agriculture can degrade streams through runoff of pollutants. Rock quarry mining threatens a population of Santa Ana speckled dace in Cattle Canyon (East Fork of the San Gabriel River); however, suction dredging is banned in California streams. Non-native species are also predators on arroyo chub; species such as brown trout (*Salmo trutta*), rainbow trout, largemouth bass, American bullfrog, and red-swamp crayfish pose a threat to Santa Ana speckled dace, while red shiner could be competitors of Santa Ana speckled dace (CDFW 2015). Giant reed could also degrade habitat for this species and has secondary effects on water quality, raising the pH and ammonia level and decreasing dissolved oxygen (CDFW 2015). Lastly, fire frequency has been increasing; debris flows following large fires can bury stream habitat (CDFW 2015).

Moyle et al. (2013) considered Santa Ana speckled dace as critically vulnerable to the effects of climate change primarily due to the potential to further isolate their populations through decreases in summer base flows that lead to dry stream reaches and prevent repopulation and genetic mixing (Moyle et al. 1995). Increasing temperatures; changes in precipitation patterns; and increases in fire frequency, intensity, and duration threaten Santa Ana speckled dace habitat quality and stability.

2.4.1.3.1 Critical Habitat

This species is not currently listed under the FESA; therefore, no critical habitat is designated for this species.

2.4.1.3.2 Recovery Plan

This species is not currently listed under the FESA; therefore, no recovery plan has been developed for this species.

2.4.1.3.3 Project Surveys to Date

2009–2018 Annual Monitoring Surveys

As described above for the Santa Ana sucker, Public Works has conducted annual monitoring for the Santa Ana sucker and benthic macroinvertebrates along Big Tujunga Creek from Big Tujunga Dam downstream to Delta Flats from 2009 through 2018 (SMEA 2010a, 2010b; BonTerra Consulting 2012c, 2012e; BonTerra Psomas 2014, 2015, 2016a; Psomas 2017a, 2018d, 2019b). Santa Ana speckled dace incidentally captured during electrofishing and incidentally observed during snorkel surveys are counted and recorded in field notes. Captured native species were released in the reach area after identification. Non-native fishes and invertebrates were not returned to Big Tujunga Creek.

<u>Results</u>

The area of Big Tujunga Creek between Big Tujunga Dam and Delta Flats is consistently occupied by Santa Ana speckled dace (see reaches mapped on Exhibit 8), although the numbers have fluctuated widely over the long-term monitoring. The total number of Santa Ana speckled dace, average number of Santa Ana speckled dace per reach, and median number of Santa Ana speckled dace per reach observed from 2009 to 2018 is shown below in Table 7 (Psomas 2019b).

The first year of surveys immediately followed the Station Fire; zero Santa Ana speckled dace were observed in the 18 surveyed reaches. The population increased the following year (2010); 263 Santa Ana speckled dace were captured in 10 of the 18 sampled reaches. The 2010–2011 rainfall year brought a high amount of rainfall; the Dam went to spillway during the storm season. During the following survey in 2011, the number of Santa Ana speckled dace increased substantially; 3,215 were observed in 16 of the 18 surveyed reaches. The next year of surveys (2012) followed an average rainfall year and Santa Ana speckled dace numbers decreased; a total of 1,879 Santa Ana speckled dace were observed in 15 of the 22 surveyed reaches. The next few years were consecutive years of below-average rainfall; the number of Santa Ana speckled dace observed declined substantially in 2013 to 146; increased the following year to 217 Santa Ana speckled dace observed in 2014; declined to 78 Santa Ana speckled dace observed in 2015; and declined to 25 Santa Ana speckled dace in 2016. Although 2016–2017 was a more normal rainfall year, it followed five consecutive years of drought in Southern California; a total of 29 Santa Ana speckled dace were observed in 2017. Another low rainfall year occurred in 2017–2018; 32 Santa Ana speckled dace were observed in 6 of 20 surveyed reaches in 2018.

Throughout the long-term monitoring, Santa Ana speckled dace have roughly fluctuated with Santa Ana sucker numbers in the surveyed reaches. Like the Santa Ana sucker, their numbers increased substantially following years of high rainfall and decreased precipitously during the extended drought. This is likely due to the species' similar habitat preference for generally faster flowing riffle habitat, which has declined in the surveyed reaches over the long-term monitoring. Like the Santa Ana sucker, this species would likely benefit from flushing flows to "reset" the system (e.g., clearing silt and sand embedded in the cobble substrate to make conditions favorable for spawning and foraging, clearing vegetation in the main channel to increase stream velocities and open up riffle and run habitat, etc.) (Psomas 2017a; BonTerra Psomas 2015, 2016a). Winter storm events in 2016–2017 were not high enough to provide these flushing flows. While habitat conditions slightly improved, it was not enough to make a substantial change in the current status of the system (Psomas 2018d, 2019b).

TABLE 7
POPULATION ESTIMATES FOR SANTA ANA SPECKLED DACE 2009–2018

Reach Number	2009 Santa Ana Speckled Dace Population Estimate	2010 Santa Ana Speckled Dace Population Estimate	2011 Santa Ana Speckled Dace Population Estimate	2012 Santa Ana Speckled Dace Population Estimate	2013 Santa Ana Speckled Dace Captured Per Reach	2014 Santa Ana Speckled Dace Captured Per Reach	2015 Santa Ana Speckled Dace Observed Per Reach[a]	2016 Santa Ana Speckled Dace Observed Per Reach	2017 Santa Ana Speckled Dace Observed Per Reach	2018 Santa Ana Speckled Dace Observed Per Reach	Median Santa Ana Speckled Dace Population Count All Years
Total Observed (All Reaches)	0	263	3,215	1,879	146	217	78	25	29	32	146
Average Number Observed Per Surveyed Reach	0	15	179	85	7	10	4	1	1	2	7
Median Number Observed Per Surveyed Reach	0	2	197	37	2	1	0	0	0	0	0
Number of Occupied Reaches/ Number of Reaches Surveyed (0%)	0/18 (0%)	10/18 (56%)	16/18 (89%)	15/22 (68%)	12/22 (55%)	11/22 (50%)	8/22 (36%)	7/22 (32%)	8/22 (36%)	6/20 (30%)	43%

[a] In all years except for 2015, the methodology used to sample fish was electrofishing. In 2015, only snorkel surveys were conducted. It should be noted that the target species was Santa Ana sucker, but other special status fish species incidentally observed were also counted. At these low population numbers, snorkel surveys have been found to have results that were similar to or better than electrofishing (Psomas 2017a); thus, it is expected that the 2015 number should be representative of the number of fish present that year.

2011 Focused Surveys for Santa Ana Speckled Dace

As discussed above for Santa Ana sucker, focused surveys were conducted in 2011 within the Reservoir Restoration Project area, which includes the area from the upper boundary of the HCP study area (Fall Creek) downstream to 1.0 mile downstream of Big Tujunga Dam (BonTerra Consulting 2011b). Survey methods included electrofishing and seining, depending on the location. Electrofishing was conducted in Big Tujunga Creek upstream of the Reservoir on August 15, 2011, and immediately downstream of the Dam on August 17, 2011. Native fishes were released unharmed at the point of capture. Non-native fishes were not returned to Big Tujunga Creek.

Four large seine hauls were conducted along the edges of the Reservoir, and one seine haul was conducted in the plunge pool immediately below the Dam. Seining along the edges of the Reservoir was accomplished using a small motorized boat to deploy the seine net, which was then hauled onto the shore. Captured non-native fishes and invertebrates were not returned to Big Tujunga Reservoir or Big Tujunga Creek. All fish observed during the survey were recorded in field notes.

<u>Results</u>

One Santa Ana speckled dace was captured in Big Tujunga Creek downstream of the Big Tujunga Dam plunge pool (BonTerra Consulting 2011b; see Exhibit 8). No Santa Ana speckled dace were observed in Big Tujunga Reservoir or upstream of the Reservoir along Big Tujunga Creek.

2019 Focused Surveys for the Reservoir Restoration Project

Focused surveys for the Reservoir Restoration Project were updated in Fall 2019 (Psomas 2019e). The survey area included Big Tujunga Creek extending from Big Tujunga Reservoir upstream to Fall Creek. The area downstream of Big Tujunga Creek was not surveyed because it has been sufficiently covered during the annual Santa Ana sucker long-term surveys.

Survey methods include electrofishing, seining, and use of an underwater camera, depending on the location. Native fishes would have been released unharmed at the point of capture. Non-native fishes would not have been returned to Big Tujunga Creek.

<u>Results</u>

No fish were observed during the survey upstream of Big Tujunga Reservoir.

2.4.1.3.4 <u>Species Occurrence in HCP Study Area</u>

Santa Ana speckled dace is expected to occur throughout Big Tujunga Creek between Big Tujunga Dam and Hansen Dam. Based on the results of ten consecutive years of long-term monitoring between Big Tujunga Dam and Delta Flats, the population size is expected to vary depending on habitat conditions (Psomas 2018b). Over the last two years, the population numbers have been the lowest recorded over the course of the nine-year monitoring but are expected to increase with favorable hydrologic conditions.

A total of nine hundred sixty-eight 25-meter reaches were surveyed during the Habitat Suitability Study (EDAW and SMEA 2009). Santa Ana speckled dace are not distributed evenly along the creek; some areas contain much higher densities than others. However, for the purposes of providing a rough estimate, it can be assumed that the 22 sampled reaches represent the habitat variation observed over the entire area. Using the minimum and maximum average number of Santa Ana speckled dace observed per reach over the long-term monitoring (Table 7), it is estimated that the number of Santa Ana speckled dace between Big Tujunga Dam and Hansen Dam ranges from 0 to 173,272 individuals. Using the minimum and maximum median number of Santa Ana speckled dace observed per reach over the long-term monitoring (Table 7), it is estimated that the number of Santa Ana speckled dace occurring between Big Tujunga Dam and Hansen Dam ranges from 0 to 190,696. Over the long-term monitoring period, the median occupation is 43 percent of reaches are occupied.

Santa Ana speckled dace is absent from Big Tujunga Creek upstream of Big Tujunga Reservoir within the HCP study area, based on the results of 2011 and 2019 focused surveys (BonTerra Consulting 2011b, Psomas 2019e).

2.4.2 COVERED HERPETOFAUNA SPECIES

2.4.2.1 ARROYO TOAD

The arroyo toad was federally listed as an Endangered species by the USFWS on December 16, 1994 and is considered a California Species of Special Concern (USFWS 1994b; CDFW 2017). At the time of listing, the arroyo toad was considered a subspecies of southwestern arroyo toad (*Bufo microscaphus*) until genetic studies (Gergus 1998) separated the arroyo toad (*B. californicus*) from the Arizona toad (*B. microscaphus*). Recent research (Frost et al. 2006) places both species in the genus *Anaxyrus*.

The arroyo toad is a small, olive green or gray to tan toad with warty skin and dark spots. It has a light-colored V-shaped stripe across the head between and including the eyelids, and a light spot on each sacral hump and in the middle of its back. It normally lacks a mid-dorsal stripe (i.e., a stripe down the center of its back). The underside of the arroyo toad is usually buff-colored and unspotted. The parotid glands are oval-shaped, widely separated, and pale toward the front; and the cranial crests are absent or weak. Reproductive adult toads typically range from 2.2 to 2.6 inches snout-to-vent length for males and 2.6 to 3.3 inches for females (USFWS 1999a). Its movement consists of hopping rather than walking (USFWS 1994b). Arroyo toads are nocturnal (i.e., active at night). Adults feed primarily on ants but will also consume beetles, spiders, larvae, caterpillars, and other invertebrates (USFWS 2009). Males become sexually mature in one to two years, and females become sexually mature in two to three years; arroyo toads can live up to five years (Sweet 1992, 1993).

Tadpoles are black in coloration at hatching and develop a tan coloration on the upper side; gold and dark crossbars on the tail; and an opaque, white venter on the underside before metamorphosing (Sweet 1992; USFWS 1999a). Tadpoles typically metamorphose at a length of 1.1 to 1.6 inches (USFWS 1999b). Juveniles have a white-gray-tan coloring with dark spots on the upper side and a white underside. The V-shaped line on the head is visible on juveniles, but the parotid glands are typically not yet visible (Sweet 1992; Sanders 1950). Juveniles usually grow to about 1.2 to 1.6 inches their first year (sometimes up to 2.0 inches) and then do not grow again until the following spring (Sweet 1992).

The arroyo toad population is currently distributed in coastal drainages and along the desert slopes of the Transverse and Peninsular Ranges from approximately 1,000 feet to 4,600 feet above msl; however, the species has been recorded from sea level to 8,000 feet above msl in Baja California (Patten and Myers 1992; Jennings and Hayes 1994; Welsh 1988; Beaman et al. 1995; USFWS 1999a). It occurs in intermittent washes/streams and perennial streams. In the northern portion of their range, they generally occur in third- to sixth-order[11] or greater streams; however, in the southern portion of their range, they can occur in first- and second-order streams

[11] Stream order is a relative size of streams. The smallest tributaries are referred to as first-order streams. Two first-order streams combine to create a second-order stream, and so on (Sweet 1992).

(USFWS 1999a; Griffin et. al. 1999; USFWS 2009). "Episodic flooding is critical to keeping the low stream terraces relatively vegetation free and soils friable enough for juveniles and adults to create burrows" (Jennings and Hayes 1994).

The most favorable breeding habitat for arroyo toad consists of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces. Outside the breeding season, arroyo toads are essentially terrestrial, using a variety of upland habitats including sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grasslands (Holland 1995; Griffin et. al. 1999; USFWS 2009). Adult toads burrow into sandy terraces where they shelter during the day when the surface is damp or during longer periods during the dry season (Sweet 1989). During the non-breeding season (August to January), arroyo toad will aestivate (a state of dormancy similar to hibernation) to prevent dehydration during hot or dry times of the year (Ramirez 2003).

Adult male arroyo toads will sometimes travel 1.2 to 1.9 miles along a stream course, often becoming more sedentary once reaching a large size. Females are more sedentary, typically maintaining an area of movement less than 330 feet. Adult and subadult arroyo toads can range widely into the uplands, commonly 0.3 mile with some movements up to 1.2 miles from the stream (USFWS 1999a).

During the breeding season, typically from February to July, males will make advertisement vocalizations above water from shallow areas along the creek margins. The advertisement call is a soft, high, whistling trill that lasts from 4 to 9 seconds in duration and is audible up to approximately 985 feet under ideal conditions (Gergus et al. 1997). Two parallel egg strings of 2,000 to 10,000 eggs are deposited in shallow water (i.e., usually less than 4 inches in depth with an average of 1.4 inches) on fine sediment with very low current (0.2 foot per second) and little or no emergent vegetation (Sweet 1992; USFWS 1999a). These eggs hatch four to six days later (Sweet 1992). Streams where arroyo toad occur must have water from approximately late March through mid–June to allow tadpoles to develop (Sweet 1989). The tadpole stage usually lasts about ten weeks (USFWS 2009). Tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms from just beneath the surface layer of fine sediments or within the interstices of gravel deposits; they do not forage on macroscopic vegetation (Sweet 1992; Jennings and Hayes 1994; USFWS 2009). After metamorphosis in June or July, the juveniles remain on the adjacent gravel bars or sandy stream terraces for 8 to 12 weeks (depending on site conditions and rainfall), where they forage for insects (Sweet 1992; USFWS 1994b).

The arroyo toad currently occurs in Monterey, Santa Barbara, Ventura, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and southwest Imperial Counties in California and in Baja California, Mexico (USFWS 1999a). At the time of its listing, the arroyo toad had been extirpated from approximately 75 percent of its former range in Southern California and northwestern Baja California, Mexico (USFWS 1994b). Threats to the species include the following: (1) short and long-term changes in river hydrology including construction of dams and water diversions; (2) alteration of riparian wetland habitat by agriculture and urbanization; (3) construction of roads; (4) site-specific damage by off-highway vehicle use; (5) development of campgrounds and other recreational use; (6) over-grazing; and (7) mining activities (USFWS 1994b). As described in the listing package, dams can have significant effects on water quality downstream through the disruption of natural hydrological and sediment transport processes that create stream terraces and pool habitat; unseasonal water releases that may affect breeding; sustained unnatural flows that encourage vegetation growth that confines and deepens the channel; reducing water temperatures below those needed for larval development; and providing water to sustain introduced aquatic predators (Sweet 1991, 1992; USFWS 1999a). Additionally, dams can disrupt upstream habitat through flooding (USFWS 2009). Water diversions can lead to the early drying of pools, restriction of the period needed for metamorphs to forage on damp gravel bars, and the loss of damp subsurface soil that can lead to adult mortality in the late summer and early fall (Sweet 1992). Introduced predatory fish and amphibians (e.g., largemouth bass, green sunfish, and bullfrogs), as well as predatory native fish (i.e., rainbow trout and arroyo chub) can prey on larvae or tadpoles of the arroyo toad (USFWS 1994b). Deep or persistent standing water in the summer and fall provide refuge and breeding habitat for non-native predators that otherwise could not persist during seasonal drying (USFWS 2011). These predators can have a significant impact on the breeding success and survival of arroyo toad populations and, if not controlled, could result in the extirpation of entire populations of the species (USFWS 2015d). Natural factors such as fire and extended drought also threaten the species. In years of drought, the females may not be able to obtain enough energy resources through foraging to develop eggs before the males stop calling, leading to reproductive failure for the year. During drought, pools may also dry before tadpoles have metamorphosed (USFWS 2009). Assuming adults live to be five years old, extended drought may lead to extirpation of a local subpopulation (USFWS 1999a). Due to isolation and small population sizes, almost all populations are at a great risk for extinction (USFWS 1994b).

2.4.2.1.1 Critical Habitat

On February 9, 2011, the USFWS published a final revised rule designating 98,366 acres of Critical Habitat for the arroyo toad in portions of Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties, California (USFWS 2011). The Final Revised Critical Habitat designation reflects an increase of 86,671 acres over the 2005 Critical Habitat designation.

The PBFs for the arroyo toad are those habitat components that are essential for the primary biological needs of foraging, breeding, growth of larvae (tadpoles) and juveniles, intra-specific communication, dispersal, migration, genetic exchange, and sheltering. Specific PBFs for the arroyo toad include those listed below (USFWS 2011).

1. Rivers or streams with a hydrologic regime that supplies water to provide space, food, and cover needed to sustain eggs, tadpoles, metamorphosing juveniles, and adult breeding toads. Breeding pools must persist a minimum of two months for the completion of larval development. Due to the dynamic nature of southern California riparian systems and flood regimes, the location of suitable breeding pools may vary from year to year. Specifically, the conditions necessary to allow for successful reproduction of arroyo toads are:
   - Breeding pools that are less than 6 inches deep
   - Areas of flowing water with current velocities less than 1.3 feet per second
   - Surface water that lasts for a minimum of two months during the breeding season (a sufficient wet period in the spring months to allow arroyo toad larvae to hatch, mature, and metamorphose)
2. Riparian and adjacent upland habitats, particularly low-gradient (typically less than 6 percent) stream segments and alluvial streamside terraces with sandy or fine gravel substrates that support the formation of shallow pools and sparsely vegetated sand and gravel bars for breeding and rearing of tadpoles and juveniles and adjacent valley bottomlands that include areas of loose soil where toads can burrow underground, to provide foraging and living areas for juvenile and adult arroyo toads
3. A natural flooding regime, or one sufficiently corresponding to natural that: (A) is characterized by intermittent or near-perennial flow that contributes to the persistence of shallow pools into at least mid-summer; (B) maintains areas of open, sparsely vegetated stream channels and terraces by periodically scouring riparian vegetation; and (C) also

modifies stream channels and terraces and redistributes sand and sediment, such that breeding pools and terrace habitats with scattered vegetation are maintained

4. Stream channels and adjacent upland habitats that allow for movement to breeding pools, foraging areas, overwintering sites, upstream and downstream dispersal, and connectivity to areas that contain suitable habitat

The Critical Habitat contains stream habitat that is considered to contain the physical and biological features necessary for the arroyo toad. Additionally, adjacent upland habitat up to 82 feet in elevation from the stream channel, or a distance of 4,921 feet from the stream channel (if the 82-foot elevation criteria had not been met at that distance), were also included. Areas that were highly degraded or that did not support physical or biological features necessary for the arroyo toad (e.g., developed areas) were not included.

The HCP study area is within designated Critical Habitat Unit 7 (Upper Los Angeles River Basin), which includes 1,113 acres in the Angeles National Forest and 77 acres of private lands (Exhibit 7). Unit 7 encompasses (1) approximately 8.0 miles of upper Big Tujunga Creek from immediately above Big Tujunga Reservoir upstream to 1.2 miles above the confluence with Alder Creek; (2) approximately 3.7 miles of Mill Creek from the Monte Cristo Creek confluence downstream to Big Tujunga Creek; and (3) 1.9 miles of Alder Creek from the Mule Fork confluence downstream to Big Tujunga Creek. Unit 7 supports an arroyo toad population that is considered important because it occurs at a relatively high elevation considered atypical for the species, and it is the only known population remaining in the coastal foothills of the San Gabriel Mountains. The physical and biological features essential to the conservation of the species in this unit may require special management considerations or protection to address threats from non-native predators such as crayfish, bullfrogs, and non-native plants such as giant reed (USFWS 2011).

The 2011 Revised Critical Habitat lists several types of potential impacts that would require consultation with the USFWS. Among these are:

> "Actions that alter channel morphology or geometry, including construction and operation of flood control and water diversion structures, such as dams and reservoirs that regulate stream flows and trap sediments, direct groundwater extraction, channelization, impoundment, road and bridge construction, development, mining, dredging, and destruction of riparian vegetation. These activities may lead to changes to the hydraulic functioning of the stream by altering the timing, duration, quantity and levels of water flows and may result in degradation or elimination of the arroyo toad and its habitat. These actions can also lead to increased sedimentation and degradation in water quality to levels that are beyond the tolerances of the arroyo toad and provide habitat for non-native species that prey on arroyo toads" (USFWS 2011).

2.4.2.1.2 Recovery Plan

The Recovery Plan for the Arroyo Southwestern Toad was completed in 1999. It states that the species will be eligible for downlisting from Endangered to Threatened when management plans on federally managed lands have been approved and implemented to provide for conserving, maintaining, and restoring the riparian and upland habitats used by arroyo toads for breeding, foraging, and wintering. Specifically, 20 self-sustaining metapopulations or subpopulations must be maintained at the following locations: Fort Hunter Ligett Army Reserve Training Center, Camp Pendleton, Los Padres National Forest, Angeles National Forest, San Bernardino National Forest, Cleveland National Forest, and the Jacumba Wilderness. Within the Angeles National Forest, a total of at least three subpopulations must be in the following locations: Castaic Creek Basin, Los Angeles River Basin (including Big Tujunga Creek and Alder Creek), and Little Rock Basin. Self-sustaining populations are those that have successful recruitment (i.e., inclusion of newly matured individuals into the breeding population) equal to 20 percent or more of the average number of breeding adults in seven of ten years of average to above average rainfall amounts with normal rainfall patterns. Self-sustaining populations require little to no direct human assistance (e.g., captive breeding or translocation of toads between sites). Further, to be eligible for delisting, 15 additional self-sustaining subpopulations must be on coastal plain, coastal slope, desert slope, and desert lands outside federal jurisdiction in San Bernardino, Riverside, Orange, and San Diego Counties; these areas can include known populations. None of the additional subpopulations are in Los Angeles County.

Measures listed in the Recovery Plan for the protection of the arroyo toad include the following (USFWS 1999a):

- Bullfrog reduction and eradication
- Exotic plant removal
- Habitat restoration and enhancement
- Cattle exclusion
- Road and off-highway vehicle trail closures or relocations
- Campground and recreation area closures or relocations
- Road crossing improvements and monitoring
- Upland habitat preservation
- Project changes to avoid breeding habitat or breeding season

The HCP study area is in the Northern Recovery Unit, Subregion 7 (Southern California Coastal, accounting Unit 1 San Gabriel—Ventura), which includes the Los Angeles River Basin (Big Tujunga Creek, Mill Creek, Alder Creek, and Arroyo Seco) and the Santa Clara River Basin (Sespe Creek, Piru Creek, Agua Blanca Creek, Castaic Creek, San Francisquito Wash, and Bouquet Canyon). The known locations in this unit are all located on federal lands. Management efforts have been successful in reducing the threats; continued monitoring and management is warranted (USFWS 1999a). To be considered for down-listing to Threatened, the Northern Recovery Unit must contain at least seven self-sustaining subpopulations or metapopulations, including at least two in the Angeles National Forest (Castaic Creek and Big Tujunga Creek, Mill Creek, Alder Creek). To be considered for delisting, one additional population should be protected in the Northern Recovery Unit; this may include tributaries in the upper Salinas River, Santa Maria River, Sisquoc River, or Santa Clara River (San Francisquito Creek or Bouquet Creek).

The Recovery Plan includes the following recovery actions:

1. Develop and implement management plans to minimize or eliminate impacts to arroyo toads and their habitats on federal lands and to reduce conflicts between the needs of species and the activities of agencies.
    - Minimize impacts on arroyo toad breeding habitat near campgrounds through use of interpretive signage, installing fencing, and seasonal closure of campgrounds.
    - Seasonal closure of roads and trails near arroyo toad breeding habitat.
    - Control mining and prospecting activities in drainages occupied by arroyo toads.
    - Seasonal closure of fishing areas or restrictions on recreational activities to minimize trampling of eggs, larvae, and juveniles.
    - Remove non-native vegetation.

- Replace inadequate stream crossings in arroyo toad habitat with appropriate crossings.
- Minimize impacts from grazing to prevent trampling of toads and degradation of their habitat.
- Identify breeding sites of aquatic predators (introduced fish and bullfrog) and implement the appropriate management actions to remove these species and prevent the introduction of introduced species to new areas.
- Work with Border Patrol to reduce their impacts (e.g., driving in creeks, building roads in stream terraces, building fences, and using spotlights and floodlights in arroyo toad habitat during the breeding season).
- Manage streamflows downstream from dams and diversions consistent with arroyo toad reproduction, survival, and the maintenance of arroyo toad habitat. Appropriate streamflows will be determined through a review of historic rainfall records and hydrologic data. Monitor the arroyo toad populations and the results of management actions and maintain or alter those actions as appropriate. This includes the following areas: Jameson Lake, Pyramid Lake, Castaic Lake, Lake Henshaw, Lake Sutherland, Lake Cuyamaca, El Capitan Reservoir, Loveland Reservoir, Barrett Lake, and Morena Reservoir.
- Work with non-federal land management agencies to reduce adverse effects on arroyo toads and their habitats by establishing conservation easements/agreements, develop multi-species HCPs, HCPs, land and watershed management plans, and acquiring lands. Agreements may include, but would not be limited to, the actions identified above.

2. Develop a comprehensive arroyo toad monitoring protocol consistent throughout the range of the species, conduct monitoring surveys every other year for 12 years, assess the results of monitoring, and modify management direction as necessary.
3. Identify and secure additional populations and suitable habitat.
4. Conduct research to determine ecological parameters associated with arroyo toad presence and population dynamics throughout its range. Research on human activities on arroyo toads will help to guide management actions and help to determine the best methods for reducing threats. Other research topics include the effects of exotic species, ways to reduce roadkill, whether arroyo toads are moving between drainages, the effects of various grazing regimes, effects of various recreational activities, the effects of fire, and genetic differences between populations.
5. Develop information and education programs including developing educational brochures and educational programs for users of public lands.

The Recovery Plan outlined steps to be taken through 2010 and was anticipated to cost approximately $3,337,000 for the first ten years of implementation. Neither Public Works nor LADWP are specifically named as Responsible Parties in the 1999 Recovery Plan. Responsible parties are those partnering agencies who may voluntarily participate in any aspect of implementation of tasks listed in the Recovery Plan. Responsible parties may willingly participate in project planning, assist with funding or staff time, or help with any other means of implementation.

The five-year review stated that in the Northern Recovery Unit (where the HCP study area is located), all populations currently receiving protection and management are located on federal lands. Threats at this time were considered low to moderate, and management efforts had been successful in reducing some impacts (USFWS 2009). For example, prior to 2005, the flow release schedule from Pyramid Lake called for enhanced summer flows to maintain the trout fishery. In 2005, the California Department of Water Resources began releasing water from Pyramid Lake into Piru Creek using a water regime that simulated the natural hydrology of the creek. The following breeding season, arroyo toad breeding improved dramatically (from 12 egg clutches observed in 2004 to 165 egg clutches observed in 2005) and also reduced the number of non-native predators (Sandburg 2006). USFWS (2009) states "if the current simulated natural flow regime is maintained, it appears that Pyramid Dam may no longer be a threat to the arroyo toad population and existing habitat in Piru Creek."

The five-year review states that criteria for downlisting the species have been met, but criteria for delisting has not been achieved (USFWS 2009). Management plans have been approved for USFS and military lands that contain protective measures for the arroyo toad. Twenty self-sustaining populations are on protected lands including seven in the Northern Recovery Unit (Big Tujunga Creek, Mill Creek and Alder Creek are listed as one of the populations); ten populations in the Southern Recovery Unit, and three in the Desert Recovery Unit. To be considered for delisting, 15 additional populations need to be secured throughout its range.

On March 27, 2014, the USFWS issued a proposed rule to downlist the arroyo toad from Endangered to Threatened; however, the proposed rule was withdrawn on December 23, 2015 (USFWS 2015d). The withdrawal was based on the conclusion that the types of threats to the arroyo toad remain the same as at the time of listing and are ongoing (i.e., urbanization, effects of dams and water diversions, introduced predators, and drought), and new threats have been identified (i.e., non-native invasive plant species and climate change). USFWS (2015d) states that the key risk factors for climate change impacts to arroyo toads are likely the interactions between: (1) reduced water levels limiting breeding and larval development or causing direct mortality, (2) reduction or loss of breeding and upland habitat, and (3) the relative inability of individuals to disperse longer distances in order to occupy more favorable habitat conditions (i.e., move up and down stream corridors or across river basins). The potential loss of breeding and foraging habitat due to climate change can work in combination with and exacerbate the effects of the other threats. Conservation efforts are ongoing in most populations to help manage and reduce impacts to arroyo toads from ongoing threats; however, the species has not yet responded to an extent that would allow a change in listing status. No long-term population trend data is currently available that demonstrates that arroyo toad populations have stabilized or are increasing. Therefore, the intent of the reclassification criteria in the Recovery Plan has not been met, and reclassification was determined not appropriate at this time (USFWS 2015d).

2.4.2.1.3 Project Surveys to Date

2009 Surveys of HCP Study Area

A combined focused survey for California red-legged frog, Sierra Madre yellow-legged frog, and arroyo toad was conducted from approximately 1.0 mile downstream of Big Tujunga Dam to Hansen Dam in 2009. Surveys were conducted by Senior Biologist Samuel Stewart and Biologist James Huelsman; Mr. Stewart was the Principal Investigator and was present during all surveys. To meet the red-legged frog protocol (USFWS 2005b), a total of eight surveys were conducted between January 1 and September 31, with at least one nocturnal survey conducted during the best egg survey period (i.e., between February 25 and April 30 for the southern California region); two surveys (one diurnal/one nocturnal) conducted during the non-breeding season (i.e., between July 1 and September 30). Although there is no current survey protocol for the Sierra Madre yellow-legged frog, three diurnal surveys were conducted in June and July when this species is expected to be active. A Sierra Madre yellow-legged frog reference population was checked on July 28, 2009, to confirm the species was active in the region at the time of the surveys; Sierra Madre yellow-legged frog was successfully detected by Mr. Stewart and Mr. Huelsman at the reference population in City Creek. All surveys included searches of potentially suitable habitat for the arroyo toad. The modification to the arroyo toad protocol included one additional nocturnal survey outside the breeding season and three fewer diurnal surveys.

Because surveys for these species were conducted concurrently, the timing of the surveys was scheduled to accommodate the activity patterns of all three species. Diurnal surveys were conducted from 10:00–11:00 AM to dusk, and nocturnal surveys were conducted from one hour after dusk to early morning hours. Surveys focused on the detection of frogs/toads by visual identification, listening for the advertising call of adult males, and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the stream. They also checked for foraging individuals in the adjacent riparian and upland areas. Egg masses and strings, and/or larvae observed during surveys, were identified to species in the field. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns for the red-legged frog and arroyo toad (the Sierra Madre yellow legged frog is diurnal so nocturnal survey conditions do not apply to that species). These conditions are nighttime temperatures greater than 50 degrees Fahrenheit and low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided.

Surveyors moved in an upstream direction with each complete survey conducted in three distinct segments. Segment 1, approximately 5.4 miles in length, extended from Hansen Dam Park Lake to the Angeles National Forest boundary. Segment 2, approximately 4.2 miles in length, extended from the Angeles National Forest boundary to Vogel Flat. Segment 3, approximately 3.5 miles in length, extended from Vogel Flat to the upper Big Tujunga Canyon Road bridge. These segments are outlined on Exhibit 8.

<u>Results</u>

None of the target species were observed in the survey area from 1.0 mile downstream of Big Tujunga Dam to Hansen Dam. It should be noted that the 2009 focused surveys were conducted the spring/summer immediately prior to the Station Fire, which occurred in August 2009.

2011 Focused Surveys

An initial site assessment was conducted by Samuel Stewart on March 17, 2011, to determine the extent of potentially suitable habitat for the arroyo toad within the Reservoir Restoration Project area. The site assessment determined that Big Tujunga Creek upstream from the Reservoir provided potentially suitable habitat for the arroyo toad.

Surveys were conducted in accordance with the arroyo toad protocol (USFWS 1999b). All suitable habitat between Big Tujunga Reservoir upstream to Fall Creek Campground was surveyed; this included the Reservoir Restoration Project impact area to 0.62 mile upstream of the impact area. Surveys for arroyo toad were conducted by Mr. Stewart and Biologists Jason Mintzer and Jonathan Aguayo; Mr. Stewart was the Principal Investigator and was present during all surveys. Six survey visits were conducted between April 20 and June 27, 2011, each including diurnal and nocturnal components completed within the same 24-hour period. At least one survey was conducted in April; one in May; and one in June per the protocol.

Diurnal surveys were conducted from approximately 3:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 1:00 AM. Surveys focused on detecting toads by visual identification, listening for the advertising call of adult males, and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the stream. They also searched for foraging individuals in the adjacent riparian and upland areas. Surveyors moved in a downstream direction during the diurnal surveys and in an upstream direction during the nocturnal surveys. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns for the arroyo toad. Generally, these conditions include nighttime temperatures greater than 50 degrees Fahrenheit at dusk and low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided.

Any arroyo toads detected during surveys were documented in field notes. The following data were collected for all arroyo toad observations: (1) time of initial observation, (2) meteorological conditions at time of initial observation (including temperature, relative humidity, wind speed, and barometric pressure), (3) GPS coordinates, (4) dorsal photographs, and (5) snout-to-vent length as measured utilizing calipers or by placing a scale adjacent during the dorsal photograph.

<u>Results</u>

One arroyo toad was observed along Big Tujunga Creek upstream of Big Tujunga Reservoir during the 2011 focused surveys (BonTerra Consulting 2011c). The same adult male[12] was observed during surveys conducted on May 10, May 31, and June 14, 2011. While this particular toad was observed vocalizing on May 10 and May 31, no evidence of successful breeding was detected in the survey area during these or subsequent visits. The three locations of this arroyo toad individual are presented on Exhibit 8.

2016 Focused Surveys

Surveys were conducted in accordance with the arroyo toad protocol (USFWS 1999b). All suitable habitat between Big Tujunga Dam downstream to 0.62 mile downstream of Big Tujunga Canyon Road bridge over Big Tujunga Creek was surveyed. Surveys for arroyo toad were conducted by Senior Biologist Brian Leatherman and Mr. Aguayo; Mr. Leatherman was the Principal Investigator and was present during all surveys. Six survey visits were conducted between April 28 and June 27, 2016, each including diurnal and nocturnal components completed within the same 24-hour period. At least one survey was conducted in April; one in May; and one in June per the protocol.

Diurnal surveys were conducted from approximately 2:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 11:00 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the stream. They also searched for foraging individuals in the adjacent riparian and upland areas. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns for the arroyo toad. Generally, these conditions include nighttime temperatures greater than 50 degrees Fahrenheit at dusk and low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided.

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12 Based on comparison of dorsal photographs taken during each survey, the adult male toad was determined to be the same individual repeatedly detected during each survey.

Results

No arroyo toads were detected between Big Tujunga Dam and 0.62 mile downstream of Big Tujunga Canyon Road bridge during the focused surveys.

2017 Focused Surveys

Surveys were conducted in accordance with the arroyo toad protocol (USFWS 1999b). All suitable habitat between Big Tujunga Reservoir upstream to Fall Creek Campground was surveyed; this included the Reservoir Restoration Project impact area to 0.62 mile upstream of the impact area. Surveys for arroyo toad were conducted by Mr. Leatherman, Mr. Aguayo, and Biologists Gregory Stratton and Richard Lewis; two Biologists conducted each survey. Six survey visits were conducted between April 20 and June 14, 2017, each including diurnal and nocturnal components completed within the same 24-hour period. At least one survey was conducted in April; one in May; and one in June per the protocol.

Diurnal surveys were conducted from approximately 3:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 11:00 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the stream. They also searched for foraging individuals in the adjacent riparian and upland areas. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns for the arroyo toad. Generally, these conditions include nighttime temperatures greater than 50 degrees Fahrenheit at dusk and low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided.

Results

One arroyo toad was observed along Big Tujunga Creek upstream of Big Tujunga Reservoir during the 2017 focused surveys (Psomas 2017b). The same adult male[13] was observed during surveys conducted on May 23, May 31, and June 7, 2017. While this particular toad was observed vocalizing on May 31 and June 7, no evidence of successful breeding was detected in the survey area during these or subsequent visits. The three locations of this arroyo toad individual are presented on Exhibit 8.

2018 Focused Surveys

Focused surveys for the Reservoir Restoration Project were updated in 2018. The survey area included Big Tujunga Creek, extending from Big Tujunga Reservoir upstream to Fall Creek and from Big Tujunga Dam downstream to 0.6 mile downstream of the Big Tujunga Canyon Road bridge.

The survey followed a modified survey protocol to cover California red-legged frog, Sierra Madre yellow-legged frog, and arroyo toad. Five surveys were conducted with one survey in April, two surveys in May, one survey in June, and one survey in July. Each survey included both a diurnal and a nocturnal component. Diurnal surveys were conducted in the afternoon hours to dusk, and nocturnal surveys were conducted from one hour after dusk through the evening hours. Surveys focused on the detection of frogs/toads by visual identification, listening for the advertising call of

13 Based on comparison of dorsal photographs taken during each survey, the adult male toad was determined to be the same individual repeatedly detected during each survey.

adult males, and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the stream. They also checked for foraging individuals in the adjacent riparian and upland areas. Egg masses and strings, and/or larvae observed during surveys, were identified to species in the field. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns for frogs/toads. These conditions were nighttime temperatures greater than 50 degrees Fahrenheit and low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided.

Results

One arroyo toad was observed along Big Tujunga Creek upstream of Big Tujunga Reservoir during the 2018 focused surveys (Psomas 2018c). The individual adult male was observed during the survey conducted on May 18, 2018 (Exhibit 8). This is similar to the 2017 arroyo toad survey results where only one adult male was documented. Based on comparison of dorsal photographs taken on 2017 of an adult male and of the 2018 individual observed, the adult male toad was determined to be the same individual. While this toad was observed vocalizing, no evidence of successful breeding was detected in the survey area.

No arroyo toads were detected between Big Tujunga Dam and 0.62 mile downstream of Big Tujunga Canyon Road bridge during the focused surveys.

2.4.2.1.4 Species Occurrence in HCP Study Area

The arroyo toad is expected to occur throughout the upper portion of the HCP study area (i.e., upstream of Big Tujunga Reservoir) in low numbers based on the results of 2011, 2017, and 2018 focused surveys (BonTerra Consulting 2011c; Psomas 2017b, 2018c). To date, only one individual has been detected in the HCP study area. However, the 2011 survey was conducted only a few years after the 2009 Station Fire, while the 2017 survey was conducted following several consecutive years of drought. While population numbers are currently very low, they could increase under multiple years of favorable conditions in the upper watershed. During surveys prior to the Arroyo [Southwestern] Toad Recovery Plan, arroyo toads were found along 6 stream miles of upper Big Tujunga Creek (upstream of Big Tujunga Reservoir), Mill Creek, and Alder Creek (USFWS 1999a).

The arroyo toad is absent from areas downstream of Big Tujunga Dam within the HCP study area based on the results of the 2009, 2016, and 2018 focused surveys (BonTerra Consulting 2010b; BonTerra Psomas 2016b; Psomas 2018c). Therefore, it is not expected to occur in the HCP study area downstream of the Dam. The Arroyo [Southwestern] Toad Recovery Plan states that arroyo toad has been extirpated from the area downstream of the Angeles National Forest boundary (i.e., the western portion of the HCP study area) (USFWS 1999a).

2.4.2.2 WESTERN POND TURTLE

The western pond turtle is a California Species of Special Concern and a USFS Sensitive Species. In 2012, the Center for Biological Diversity petitioned the USFWS to list 53 amphibian and reptile species; the western pond turtle was one of the species. In 2015, the USFWS published a finding that the listing of this species may be warranted and requested that information on this species be submitted to the USFWS for review (USFWS 2015a). Currently, the species status is “under review” (USFWS 2018b).

This species was known as the western pond turtle or Pacific pond turtle (*Clemmys marmorata*) for over a century. The taxonomy of this species has been revised several times in recent years based on various genetic studies. This species has been moved between the genus *Emys* and the genus *Actinemys*. Some nomenclature recognizes two subspecies (a northern and southern subspecies), while others do not. Nomenclature in this HCP follows the current CDFW List of Special Animals, which does not recognize subspecies and places the species in the genus *Emys* (Spinks and Shaffer 2005, 2009). It should be noted that a subsequent publication by these same researchers in 2014 indicated that splitting the species into subspecies may, in fact, be warranted (Spinks et al. 2014)

The western pond turtle is a relatively flat, dark turtle of moderate size, with a carapace (shell) length that rarely exceeds 10 inches (Spinks et al. 2003). They are cryptically colored brown, olive-brown, or dark brown (USGS 2006). The carapace is usually brown or blackish in color with a series of darker spots, lines, or dashes that radiate out from the center of each shield (Stebbins and McGinnis 2012). Their head and body have a mottled appearance (USGS 2006). Males tend to have thicker tails, while females have thinner tails. Males tend to have concave plastrons (shells), while females tend to have flat or slightly convex plastrons; the carapaces of females are also taller to allow room for eggs. The cloacal opening (opening for digestive, urinary, and reproductive tracts) is also further back in males than in females (USGS 2006). They typically reach sexual maturity when they are approximately 4 inches long and four to six years of age (USGS 2006).

The western pond turtle is the only native turtle species in coastal California. It is found in ponds, lakes, marshes, reservoirs, seasonal standing or slow-moving streams, canals, sloughs, vernal pools, and occasionally in brackish water (Germano and Bury 2001). Sufficient cover (e.g., vegetation, undercut banks) and basking sites are important components of suitable habitat (Spinks et al. 2003). Suitable basking sites include partially submerged logs, rocks, floating vegetation, and open mud banks (CDFW 2000). Adults are often observed basking on logs or other objects protruding out of the water or floating in the warmer surface water. They have both good hearing and eyesight and are easily disturbed; they are often heard splashing into the water to take cover before they are seen (USGS 2006). Western pond turtle are omnivorous; aquatic invertebrates are the mainstay of the adult diet; but carrion, small fish, frogs, and some plants are also consumed (USGS 2006).

This species breeds from April to May (Jennings and Hayes 1994), but the timing is highly variable depending on location and seasonal conditions. Females move from the water to adjacent upland habitats to lay eggs, usually sometime in late May to early July, although movement could occur as early as April or as late as August (Ernst et al. 1994). Nest site selection favors unshaded slopes that may be at least in part south-facing, likely to ensure that substrate temperatures will be high enough to incubate the eggs (Rathbun et al. 2002). The western pond turtle can nest in a variety of soil conditions, but the soil must be at least 4 inches deep and have relatively high internal humidity (CDFW 2000). Clutch size varies from 1 to 13 eggs, positively correlated with body size; they can sometimes double-clutch (have more than one nest per year) (Goodman 1997a, 1997b; Lovich and Meyer 2002; Holland 1991, 1994; Hays et al. 1999; Pires 2001). In southern California, most hatchlings emerge in the early fall, while some may over-winter in the nest (Holland 1994).

Adults in Southern California may remain active in the water year-round if conditions are suitable (enough water, warm temperatures) (USGS 2006). However, during the coldest months (October to April), this species will often seek upland refugia (i.e., shelter with appropriate temperature and moisture conditions) and enter a period of aestivation. Aestivation is a period of inactivity and decreased metabolic rate in response to seasonal temperature changes (similar to hibernation); it occurs more frequently in more temperate, high-elevation areas of the species' range (Holland

and Goodman 1996). Terrestrial refugia are typically covered with dense leaf litter produced by a thick overstory of woody vegetation, such as in dense riparian thickets of willows (Rathbun et al. 2002). Turtles may choose sites where they can bask in direct sunlight or may bury themselves deep into leaf litter and duff (Rathbun et al. 2002). Winter refugia are often found in the same upland habitats as nesting sites. Western pond turtles can also hibernate underwater in bottom mud (CDFW 2000).

Habitat destruction for urban (primarily flood control) and agricultural development has resulted in population declines throughout the western pond turtle's range (Spinks et al. 2003). Over 90 percent of the wetland habitats within the historic range of the western pond turtle throughout California have been lost (USFWS 1992, 1993a). Additionally, invasion of exotic pest species into habitats occupied by western pond turtles is another threat to the continued survival of the species. Invasive, non-native plant species such as tamarisk and giant reed have become established throughout Southern California, reducing plant diversity, altering stream morphology, and eliminating suitable basking sites (Lovich et al. 1994). The invasive bullfrog is a voracious predator that will eat any live animal it can swallow, and bullfrog predation of hatchling and young western pond turtles has been recorded (Holland 1994). The intensity of bullfrog predation is severe enough to eliminate recruitment in some western pond turtle populations in Southern California (Overtree and Collings 1997).

2.4.2.2.1 Critical Habitat

This species is not currently listed under the FESA; therefore, no critical habitat is designated for this species.

2.4.2.2.2 Recovery Plan

This species is not currently listed under the FESA; therefore, no recovery plan has been developed for this species.

2.4.2.2.3 Project Surveys to Date

2011 Focused Surveys

The survey methodology was based on pond turtle survey and census recommendations made by Holland (1991) and survey protocols developed by Reese and Welsh (1988) and Goodman (1999). Surveys incorporated both visual encounter and live trapping. Samuel Stewart conducted live trapping, which consisted of placing live-catch turtle traps at six trapping stations throughout the Reservoir. The first trapping session consisted of three trapping periods lasting approximately 24 hours each (traps were set on August 2, 3, and 4, 2011, and checked 24 hours later). The second trapping session consisted of two trapping periods lasting approximately 24 hours each (traps were set on August 8 and 9, 2011, and checked 24 hours later). Traps were planted and were checked and/or relocated using a kayak.

Mr. Stewart conducted visual encounter surveys for turtles during setting and checking of traps and while walking along Big Tujunga Creek upstream of the Reservoir to the upstream survey area limit.

Live-catch floating net mesh box traps were used for the survey effort. Net mesh box traps consist of a 24-inch by 18-inch by 8-inch framed box with 5/16-inch mesh and two 1-way funnel entrances. Floats were placed inside the trap to allow submergence of one trap entrance and flotation of approximately 4 inches of trap enclosure. Six net mesh box traps were firmly secured to booms, emergent trees, or other immovable objects in the Reservoir using nylon rope and baited with fresh fish trimmings. Thread herring and mackerel were placed in the traps as bait. Turtles attracted by the scent of the bait would enter the submerged entrance and surface within the enclosure to breathe.

Results

One western pond turtle was detected in Big Tujunga Reservoir during trapping (Exhibit 8). It was a single juvenile male western pond turtle (carapace length of 5 inches). GPS location, photographs, and carapace measurements were recorded prior to immediate release at the point of capture. No other western pond turtles were detected in Big Tujunga Reservoir or within Big Tujunga Creek upstream of the Big Tujunga Reservoir. During the trapping effort, one adult red-eared slider and 190 black bullhead were removed from Big Tujunga Reservoir.

2018 Focused Surveys

Focused surveys for the Reservoir Restoration Project were updated in 2018. The survey area included Big Tujunga Creek extending from Big Tujunga Reservoir upstream to Fall Creek, Big Tujunga Reservoir, and from Big Tujunga Dam downstream to 500 feet downstream of the Big Tujunga Canyon Road bridge. Surveys consisted of visual surveys throughout the survey area and a trapping program in Big Tujunga Reservoir and suitable areas downstream of Big Tujunga Dam in the survey area.

The survey methodology followed the USGS (2006) western pond turtle trapping protocol. Live trapping consisted of placing live-catch turtle traps at trapping stations throughout the Reservoir, plunge pool, and areas of the stream suitable for trapping. A mix of funnel traps and basking traps were used. Traps were left in place for a four-day period and were checked daily.

Results

No western pond turtles were captured in Big Tujunga Reservoir; two adult western pond turtles were captured in the plunge pool; and one adult western pond turtle was captured along Big Tujunga Creek downstream of the plunge pool (Exhibit 8). In 2018, the area along the creek upstream of the Reservoir was dry; no turtles were observed upstream of the Reservoir in 2018.

Incidental Observations

The western pond turtle was incidentally observed during the 2009 special status amphibian surveys approximately 2 miles and 8 miles downstream of Big Tujunga Dam. Additionally, it was incidentally observed downstream of Big Tujunga Dam during the arroyo toad focused surveys in 2016 and in Big Tujunga Creek upstream of Big Tujunga Reservoir during arroyo toad focused surveys in 2017. The locations of the western pond turtle observations are presented on Exhibit 8.

2.4.2.2.4 Species Occurrence in HCP Study Area

The western pond turtle is assumed to occur throughout the HCP study area. It has been observed in low numbers in Big Tujunga Creek upstream of Big Tujunga Reservoir, in Big Tujunga Reservoir, and downstream of Big Tujunga Dam.

2.4.3 COVERED BIRD SPECIES

2.4.3.1 LEAST BELL'S VIREO

Least Bell's vireo is a federal and State Endangered species. It is one of four subspecies of the Bell's vireo (*Vireo bellii*); this subspecies is the westernmost of the four subspecies, breeding entirely in southwestern California and northwestern Baja California, Mexico. Although not well known, the winter range of the least Bell's vireo is believed to be the west coast of Central America from southern Sonora, Mexico, south to northwestern Nicaragua, including the cape region of Baja California, Mexico (Brown 1993). Current efforts are underway to learn more about its winter distribution and migratory connections between wintering and breeding populations (Kus 2017). The four Bell's vireo subspecies are geographically isolated from each other during both the breeding and wintering seasons (USFWS 1998). The least Bell's vireo arrives in southern California from mid–March to early April and departs for its wintering grounds in August to mid–September.

The least Bell's vireo is a small, gray migratory songbird that is about 4.5 to 5 inches long. It has short, rounded wings and a short, straight bill for catching insects. Feathers are gray above and pale below; it has two white wing bars and a faint white eye ring. The least Bell's vireo is the grayest of the Bell's vireo subspecies; the other subspecies are more yellow in both their upper and underparts (Cornell 2017). "The least Bell's vireo is easily recognized on the breeding grounds by its distinctive song" (Coues 1903). Peterson (1961) described the song with the first phrase rising in inflection and the second phrase descending in inflection, sounding as if the bird is answering its own question. Males establish and defend territories through counter-singing, chasing, and sometimes physically confronting neighboring males (USFWS 1998). Territory size ranges widely from 0.5 to 7.5 acres; the driver of this variation has not yet been identified (USFWS 1998).

Least Bell's vireo consume a "wide variety of insects including bugs, beetles, grasshoppers, moths, and particularly caterpillars" (Chapin 1925; Bent 1950). They obtain prey through foliage gleaning (picking prey from leaves or bark) and through hovering (removing prey from vegetation surfaces while fluttering in the air) (Salata 1983; Miner 1989). Vireos will forage in all layers of the canopy but tend to concentrate their foraging in the lower to mid-strata from 9 to 18 feet in height (Miner 1989). Miner (1989) found that least Bell's vireo preferentially forage on black willow and arroyo willow, which, along with mule fat, also contain the highest least Bell's vireo prey densities. Vireos forage in both riparian and adjacent upland habitat (Salata 1983; Kus and Miner 1987). Kus and Miner (1989) found that vireos will forage from 9 to 183 feet into adjacent upland habitats.

The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) and prefers early-successional habitat. On its breeding grounds, it typically inhabits structurally diverse woodlands along watercourses. In California, least Bell's vireo habitat consists of southern willow scrub, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, and cottonwood bottomland forest (Holland 1986; Faber et al. 1989). Although least Bell's vireo typically nest in willow-dominated areas, plant species composition does not appear to be as important in nest site selection as habitat structure (USFWS 1998). On its wintering grounds, the least Bell's vireo is not limited to willow-dominated woodlands; it also uses mesquite scrub in arroyos and shrubby areas associated with palm groves and hedgerows in agricultural or rural residential areas (USFWS 1998).

As mentioned above, the least Bell's vireo generally nests in early-successional stages of riparian habitats. The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately 3 to 6 feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989). This structure is typically met by willows that are between four and ten years of age (RECON 1988; Franzreb 1989). As stands mature, the tall canopy tends to shade out the shrub layer, making the sites less suitable for nesting; however, least Bell's vireo will continue to use such areas if patches of understory exist (USFWS 1998). Vireo nest placement tends to occur in openings and along the riparian edge, where exposure to sunlight allows the development of shrubs (USFWS 1998). The riparian ecosystems required by the vireo are dynamic systems, and the scouring of vegetation during periodic floods is required to create the low, dense vegetation favored by the bird (USFWS 1986).

Males arrive on the breeding grounds about one week prior to females, and older birds arrive before first-year birds. Pair formation occurs within a few days and pairs build a nest together over the next four to five days. While the vireo usually places its nest in willows or mule fat, it also sometimes nests in California rose (*Rosa californica*), poison oak, California wild grape (*Vitis californica*), blue elderberry, Fremont cottonwood, western sycamore, and coast live oak. The cup-shaped nest is usually placed in the trunk of a tree or shrub within 3 feet of the ground. Egg laying begins a few days after nest completion. The typical clutch size for least Bell's vireo is four eggs, which are incubated for approximately 14 days. Both parents incubate the eggs and care for the young. The young remain in the nest for approximately 10 to 12 days. Adults continue to care for the young for at least two weeks post-fledging as the family groups forage over larger areas. The largest causes of least Bell's vireo nest failure are nest parasitism by brown-headed cowbird and egg predation; nests also fail due to vegetation clearing, trampling by humans and cattle, ant infestations, and rainstorms. Least Bell's vireo will make up to five nesting attempts per season, assuming adequate energy resources; typically a pair will successfully fledge young from one to two nests per season. The long-term annual average young produced per pair in a season is approximately 1.8 to 3.2 fledglings. Few nests are initiated after mid–July (USFWS 1998).

Least Bell's vireos can disperse long distances between drainages; more males than females disperse from their natal drainages (Kus, unpublished data in USFWS 1998). The least Bell's vireo often show a strong site fidelity, returning not just to the same drainage and the same territory, but even to the same tree where they previously nested. However, vireos may move locations due to habitat loss or lack of being able to attract a mate (USFWS 1998).

The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). At the time of its listing, the least Bell's vireo had been eliminated from 95 percent of its former range (USFWS 1986). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Cowbirds are nest parasites that lay their eggs in the nests of other birds and leave the host bird to raise their young, often to the detriment of the host's own young (USFWS 1998). Cowbirds' eggs are adapted to hatch more quickly; and the young also mature more quickly, demanding more of the parental host's attention. Loss of riparian habitat has been attributed to flood control and water development projects, agricultural development, livestock grazing, spread of invasive exotic plant species, degradation of habitat by off-road vehicles, and urban development.

The historical range of the least Bell's vireo extended from Red Bluff in Tehama County south through the Sacramento—San Joaquin Valleys and Sierra Nevada foothills, and in the Coast Ranges from Santa Clara County south to San Fernando in Baja California, Mexico. Populations were also found in the Owens Valley, Death Valley, and scattered oases and canyons throughout the Mojave Desert (USFWS 1998). Historical accounts indicated that least Bell's vireos "were present in considerable numbers wherever suitable habitat occurred" (USFWS 1998). At the time of listing, the statewide population had been reduced to 300 breeding pairs, with the majority in San Diego County; none of the populations were greater than five breeding pairs, and populations in the Sacramento and San Joaquin Valleys (once the center of its range) had been completely extirpated (RECON 1989; USFWS 1986, 1998). With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). Vireos have also expanded their range into areas where they were formerly extirpated.

At the time of listing, six territorial males were observed in two locations in Los Angeles County (USFWS 1986). Numbers of least Bell's vireo have continued to increase since that time. In Los Angeles County, it is now known to occur at several other locations such as the San Fernando (Van Norman) Dam, the San Gabriel River at Fish Canyon and Van Tassel Canyon, the Sepulveda Basin Wildlife Area, and the Castaic Lagoon Recreation Area (CDFW 2017). The two largest populations in the county are at Hansen Dam in the northeastern corner of the San Fernando Valley where 44 least Bell's vireo territories were present in 2009 (Griffith Wildlife Biology 2009) and on the Santa Clara River from Interstate 5 downstream to the Las Brisas Bridge, where 56 least Bell's vireo territories were present in 2007 (Bloom Biological, Inc. 2007).

2.4.3.1.1 Critical Habitat

On February 2, 1994, the USFWS issued their Final Critical Habitat for the least Bell's vireo, identifying approximately 37,560 acres as Critical Habitat in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties (USFWS 1994a). Specifically, the Critical Habitat for least Bell's vireo includes: Santa Ynez River (Santa Barbara County); Santa Clara River (Ventura and Los Angeles Counties); Santa Ana River (San Bernardino and Riverside Counties); Santa Margarita River, San Luis Rey River, Sweetwater River, San Diego River, Tijuana River, Coyote Creek, and Jamul-Dulzura Creeks (San Diego County) (USFWS 1994a). The HCP study area is not located in designated Critical Habitat for this species.

The PBFs for the least Bell's vireo are those habitat components that are essential for the species: (1) space for individual and population growth and for normal behavior; (2) food, water, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring; and (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution of a species. These habitat features can be described as riparian woodland vegetation that generally contains both canopy and shrub layers and includes some associated upland habitats. Vireos meet their survival and reproductive needs (food, cover, nest sites, nestling and fledgling protection) within the riparian zone in most areas; they also forage in adjacent upland habitats (USFWS 1994a). It should be noted that the Critical Habitat designation does not list more specific numbered PBFs as they do in more recent designations for other species.

Activities that could cause destruction or adverse modification of least Bell's vireo habitat include the following: (1) removal or destruction of riparian vegetation; (2) thinning of riparian growth, especially near ground level; (3) removal or destruction of adjacent upland habitats used for foraging; and (4) increases in human-associated or human-induced disturbances. Specific actions that could adversely affect least Bell's vireo Critical Habitat include stream channelization, water impoundment or extraction, water diversion, intensive recreation, and development (USFWS 1994a).

2.4.3.1.2 Recovery Plan

The Draft Recovery Plan for the least Bell's vireo was completed in 1998; however, a Final Recovery Plan has not been completed to date. The Draft Recovery Plan states that the species will be eligible for down-listing from Endangered to Threatened when the following criteria have been met for a period of five years:

1. Stable or increasing least Bell's vireo populations/metapopulations, each consisting of several hundred or more breeding pairs, are protected and managed at the following sites: Tijuana River; Dulzura Creek, Jamul Creek, and Otay River; Sweetwater River; San Diego River; San Luis Rey River; Camp Pendleton/Santa Margarita River; Santa Ana River; Orange County and Los Angeles County metapopulation; Santa Clara River; Santa Ynez River; and an Anza Borrego Desert metapopulation.

2. Stable or increasing least Bell's vireo populations/metapopulations, each consisting of several hundred or more breeding pairs, are protected and managed at the following sites: Salinas River; a San Joaquin Valley metapopulation; and a Sacramento Valley metapopulation.
3. Threats are reduced or eliminated so that least Bell's vireo populations/metapopulations listed above are capable of persisting without significant human intervention, or perpetual endowments are secured for cowbird trapping and exotic plant control in riparian habitat occupied by least Bell's vireo.

The Draft Recovery Plan lists management actions for riparian habitat necessary in the historic range of the least Bell's vireo, a requirement for annual monitoring and range-wide surveys, and research activities needed to monitor and guide the recovery effort (USFWS 1998).

The Draft Recovery Plan includes the following recovery actions:

1. Protect and manage riparian and adjacent upland habitats within the least Bell's vireo historic range. Existing and restorable habitat should be protected through conservations agreements, HCPs, multiple species conservation plans, land acquisition and management, conservation easements, and interagency consultations under Section 7 of the Endangered Species Act.
    - Develop management plans for the 14 populations/metapopulation units.
    - Prepare management plans for least Bell's vireo habitats identified in delisting criteria 2 (i.e., historic areas of their range).
    - Establish a protocol for monitoring least Bell's vireo populations and habitats.
    - Conduct annual monitoring of the 14 population/metapopulation units.
    - Conduct cowbird removal.
    - Develop alternative means of controlling cowbird parasitism. This involves modifying certain land uses (dairies, livestock pens, equestrian centers, and other cowbird foraging areas) within and adjacent to floodplains.
    - Control non-native plant species. The Draft Recovery Plan specifically lists giant reed, tamarisk, castor bean, and cocklebur. The Five-year Review also lists perennial pepperweed (*Lepidium latifolium*) (USFWS 2006).
    - Establish perpetual endowments for brown-headed cowbird control and/or exotic plant control in least Bell's vireo habitat.
2. Conduct research
    - Identify additional and potential least Bell's vireo breeding habitat within its historical range.
        - Conduct a Statewide inventory of riparian habitat.
        - Conduct thorough range-wide surveys. Surveys should be conducted at least every five years and every three years, if funding is available.
    - Investigate the status of wintering habitat and identify current or potential threats.
        - Establish a cooperative agreement with Mexico to obtain information on vireo wintering grounds in Baja California, Mexico.

- Collect demographic data on least Bell's vireos.
  - Continue color-banding least Bell's vireos and collect data for demographic and dispersal analyses.
  - Determine the relationships between population density and reproductive characteristics.
  - Determine the relationships between population density and dispersal.
- Investigate the relationship between habitat characteristics and least Bell's vireo behaviors and access to nearby resources.
- Develop biocontrol methods for *Arundo* and other non-native plant species.

3. Develop and evaluate least Bell's vireo habitat restoration techniques.
   - Implement long-term monitoring of restoration sites and their use by least Bell's vireos and other riparian species.
   - Develop less costly methods of creating sites with the vegetation composition and structure required by nesting least Bell's vireos.
   - Evaluate restoration efforts and effectiveness of methods used.
   - Conduct habitat restoration.
4. Reintroduce least Bell's vireos to unoccupied habitat in their historical range through translocation.
5. Evaluate progress of recovery, effectiveness of management and recovery actions, and revise management plans.
6. Provide public information and education.

The Draft Recovery Plan lists Orange County/Los Angeles County as one of the important population/ metapopulation units. While the drainages in these counties have been directly or indirectly affected by urbanization, they provide important "stepping stones" for the vireo population as it expands north to reoccupy its historic range. The Draft Recovery Plan lists the following important drainages in Los Angeles County: Big Tujunga Wash/Hansen Dam, Los Angeles River, Santa Fe Dam, San Francisquito, San Gabriel River drainage/Fish Canyon, Big Santa Anita Debris Basin, Santa Clara River drainage/Castaic Creek, Van Norman Dam, and Whittier Narrows (USFWS 1998). Major threats in this unit include impoundments, channelization, and removal of stream bank vegetation. Management actions in this unit should focus on maintaining suitable habitat in the middle and lower elevations, particularly closely spaced habitat patches (USFWS 1998).

The Draft Recovery Plan outlined steps to be taken through 2003 and was anticipated to cost approximately $1,515,000 plus additional costs to be determined for the first five years of implementation. Both Public Works and LADWP are specifically named as potential Responsible or Associated Parties in preparation of the Orange County/Los Angeles County management unit plan. Responsible parties are those partnering agencies who may voluntarily participate in any aspect of implementation of tasks listed in the Draft Recovery Plan. Responsible parties may willingly participate in project planning, assist with funding or staff time, or help with any other means of implementation.

As of its Five-year Review in 2006, the least Bell's vireo has increased tenfold to 2,968 territories since its listing in 1986 (USFWS 2006). The Five-year Review found that the overall population trend had been positive; however, only a few populations had met the target of "several hundred or more breeding pairs" (USFWS 2006). Since its listing in 1986, the amount of riparian habitat loss has been reduced; and, to some extent, restoration efforts have increased vireo habitat (USFWS 2006). Population increases have been driven by habitat protection, habitat quality improvement by the removal of invasive exotic plant species, and consistent cowbird control (USFWS 2006).

In 2005, the first breeding pair of least Bell's vireos in the San Joaquin Valley since the listing of the vireo successfully bred at the San Joaquin National Wildlife Refuge in Stanislaus County; the same male returned to breed in 2006 (USFWS 2006). A few vireos have also been detected in Salinas, San Joaquin, and Sacramento Valleys in recent years. While delisting criteria 2 has not been met, the vireo appear to be expanding into their historic range (USFWS 2006).

Continued cowbird control and exotic plant removal in riparian areas are considered necessary for the foreseeable future to continue this positive population trend (USFWS 2006). However, some researchers have suggested that cowbird trapping should not be considered a long-term management technique because it would require perpetual human-intervention. Kus and Whitfield (2005) and Peer et al. (2005) suggest that removing brown-headed cowbirds from the vireo's environment reduces selection pressure that may allow the vireo to evolve nest parasitism defenses. Such defenses have been observed in the eastern subspecies of Bell's vireo (*V. b. bellii*), which has co-occurred with brown-headed cowbirds over a longer evolutionary time (Parker 1999). Sharp and Kus (2006) found that high microhabitat cover around vireo nests reduces the rate of cowbird parasitism; they suggest that the threat of nest parasitism on vireos can be managed through habitat management actions.

In summary, the Five-year Review found that the least Bell's vireo was no longer in threat of extinction throughout all or a significant portion of its range and recommended a down-listing to Threatened status (USFWS 2006). However, as of preparation of this HCP (2020), the least Bell's vireo has not been petitioned for down-listing.

2.4.3.1.3 <u>Project Surveys to Date</u>

2009 Focused Surveys of the HCP Study Area

Senior Biologist Brian Daniels, Samuel Stewart, and Biologist Andrea Edwards conducted a habitat assessment of the area between Big Tujunga Dam and Hansen Dam in April 2009. The purpose of the habitat assessment was to identify potential habitat for the least Bell's vireo and southwestern willow flycatcher and to determine the number of survey polygons required to survey all potential habitat within the downstream HCP study area. Potential habitat for the least Bell's vireo included all riparian scrub and riparian woodland habitats; habitat areas dominated by alluvial scrub vegetation or unvegetated wash were excluded. The properties belonging to the Angeles National Golf Club, located just upstream of Foothill Boulevard and I-210, were excluded due to access issues.

Other 2009 focused surveys for the least Bell's vireo related to other projects overlapped with the survey area at four locations: (1) Hansen Dam surveys for the USACE; (2) Haines Canyon Main Channel Outlet (downstream to Angeles National Golf Club property) for Public Works' Flood Maintenance Division;[14] (3) Plunge Pool below Tujunga Dam (downstream to Big Tujunga Canyon Road bridge) for Public Works' Water Resources Division;[15] and (4) Big Tujunga Wash Mitigation Area for Public Works' Water Resources Division. The overlapping survey areas were surveyed by only one entity, and the results were combined and summarized below.

[14] Flood Maintenance Division is now referred to as Stormwater Maintenance Division
[15] Water Resources Division is now referred to as Stormwater Engineering Division

The USFWS survey protocol for the least Bell's vireo requires that at least eight surveys be conducted from April 10 to July 31 with ten-day intervals between each site visit. Surveys were conducted by Mr. Daniels (TE-821401-3), James Pike (TE-832946-3), Mike San Miguel (TE-831910-3), Jon Feenstra (TE-128462), Lindsay Messett (TE-067064-1), and Kimberly Oldehoeft.

The Biologists systematically surveyed the riparian habitats by walking slowly, using meandering transects through the riparian habitat in the survey area. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. "Pishing" sounds were used to elicit responses from any least Bell's vireos present. All surveys were conducted under optimal weather conditions (i.e., between 55° and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. The Biologists recorded all bird species detected during the survey.

It should be noted that the 2009 focused surveys were conducted the spring/summer immediately prior to the Station Fire, which occurred in August 2009.

Results

A total of 44 locations occupied by the least Bell's vireo, consisting of 39 pairs and 4 single males, were observed in the Hansen Dam area surveyed for USACE (Griffith Wildlife Biology 2009). An additional single male was observed between Hansen Dam and I-210; however, it did not establish a territory in this area (BonTerra Consulting 2010a).

No least Bell's vireos were observed along the Haines Canyon Main Channel Outlet (soft-bottom channel reach from outlet downstream to Angeles National Golf Club property) (BonTerra Consulting 2009b).

No least Bell's vireos were observed at the Big Tujunga Wash Mitigation Area (south bank of Big Tujunga Wash downstream of the I-210) (ECORP Consulting 2009).

No least Bell's vireos were observed between I-210 upstream to Big Tujunga Dam (BonTerra Consulting 2010a; EDAW/AECOM 2009).

2012 Focused Surveys

Burned riparian habitat was still recovering from the 2009 Station Fire during spring/summer 2011 and was not mature enough to provide suitable habitat for this species; therefore, no focused surveys were conducted in 2011. However, by spring 2012, habitat had grown to a size to be considered marginally suitable for the species; therefore, focused surveys were conducted in the Reservoir Restoration Project area (i.e., a limited portion of the HCP study area within or adjacent to impact areas for this project). The survey area included approximately 2.0 river miles along Big Tujunga Creek upstream of Big Tujunga Reservoir, and approximately 1.5 river miles from the Big Tujunga Dam to 0.6 mile downstream of the Big Tujunga Canyon Road bridge over the creek.

The USFWS protocol for the least Bell's vireo requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). Focused surveys were conducted by Mr. Leatherman (TE-827493-6) and Senior Biologist Amber Oneal Heredia (TE-148554-2).

The Biologists systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. “Pishing” sounds were used to elicit responses from any least Bell’s vireos present. All surveys were conducted under optimal weather conditions (i.e., between 55°and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. All wildlife species incidentally observed or detected were recorded.

Results

No least Bell’s vireos were observed during the 2012 focused surveys.

2016 Focused Surveys

Focused surveys for the Reservoir Restoration Project were updated in 2016. The survey area included all riparian habitat along Big Tujunga Creek extending approximately 1,200 feet upstream of Big Tujunga Reservoir and from Big Tujunga Dam to 500 feet downstream of the Big Tujunga Canyon Road bridge.

The USFWS protocol for the least Bell’s vireo requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). Focused surveys were conducted by Mr. Daniels (TE-821401-5), Ms. Messett (TE-067064-2), and Mr. Aguayo.

The Biologists systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. As the least Bell’s vireo survey protocol does not require the playback of least Bell’s vireo vocalizations, recorded least Bell’s vireo vocalizations were not used during the surveys. “Pishing” sounds were used to elicit responses from any least Bell’s vireos present. All surveys were conducted under optimal weather conditions (i.e., between 55°and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. All wildlife species incidentally observed or detected were recorded.

Results

No least Bell’s vireos were observed during the 2016 focused surveys.

2018 Focused Surveys

Focused surveys for the Reservoir Restoration Project were updated in 2018. The survey area included all riparian habitat along Big Tujunga Creek extending from Big Tujunga Reservoir upstream to Fall Creek and from Big Tujunga Dam to 500 feet downstream of the Big Tujunga Canyon Road bridge.

The USFWS protocol for the least Bell’s vireo requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). Focused surveys were conducted by Ms. Messett (TE-067064-3) and Mr. Aguayo.

The Biologists systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. As the least Bell’s vireo survey protocol does not require the playback of least Bell’s vireo vocalizations, recorded least Bell’s vireo vocalizations were not used during the surveys. “Pishing” sounds were used to elicit responses from any least Bell’s vireos present. All surveys were conducted under optimal weather conditions (i.e., between 55° and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. All wildlife species incidentally observed or detected were recorded.

Results

No least Bell's vireos were observed during the 2018 focused surveys.

2018 Focused Surveys at Hansen Dam

Focused surveys of Hansen Dam were conducted by USGS in spring/summer 2018. The survey area was approximately 2.5 miles long and extended from Hansen Dam upstream along Big Tujunga Creek (Pottinger and Kus 2019).

The surveys followed a modified protocol that included four surveys for least Bell's vireo between April 25 and July 17, 2018. Surveys were conducted by Biologists from USGS.

Observers walked slowly through or adjacent to suitable riparian habitat, listening and searching for least Bell's vireos, systematically playing a recording of a least Bell's vireo song to elicit a territorial response. Surveys typically began at sunrise and were completed by early afternoon, depending on wind and weather conditions. For each least Bell's vireo encountered, observers recorded age (adult or juvenile), sex, breeding status (paired or undetermined), and whether the bird was banded.

Results

A total of 77 territorial male least Bell's vireo were detected in 2018; 54 males were confirmed as paired and 23 males were of unknown status. No banded birds were detected. Least Bell's vireos were found in four different habitat types with 76 percent of vireos occurring in mixed willow riparian habitat (dominated by one or more willow species); 20 percent of vireos detected in riparian scrub (dry or sandy habitat dominated by sandbar willow or mule fat with few other woody species); 3 percent occurring in upland scrub (coastal sage scrub adjacent to riparian habitat), and 1 percent occurring in non-native habitat (non-native species such as giant reed or tamarisk).

Incidental Observations

During the 2017 focused surveys for arroyo toad along Big Tujunga Creek upstream of the Reservoir, a male least Bell's vireo was incidentally observed on multiple survey visits (Exhibit 8). A pair of least Bell's vireos was observed on June 14, 2017, feeding one of two fledglings, with the second one begging for food. This location is the first detection of least Bell's vireo near the Reservoir Restoration Project study area.

During the August 2017 vegetation mapping, seven least Bell's vireos were observed in the vicinity of Hansen Dam; and one least Bell's vireo territory was observed upstream of Big Tujunga Reservoir (the same location that was detected during the 2017 arroyo toad surveys) (Exhibit 8).

A least Bell's vireo territory was also incidentally observed on May 9, 2018, by Ms. Messett while taking photos of habitat from the Big Tujunga Canyon Road bridge approximately 6 miles downstream of Big Tujunga Dam (Exhibit 8). A pair of least Bell's vireos was incidentally observed on June 1, 2018, by Ms. Messett while taking photos of habitat near the Oro Vista Avenue crossing of Big Tujunga Creek (Exhibit 8). As neither of these observations were within an area being surveyed in 2018, it is unknown whether the territories persisted throughout the season.

2.4.3.1.4 Species Occurrence in HCP Study Area

Least Bell's vireo is expected to occur in high numbers throughout the Hansen Dam portion of the HCP study area. Although it was not observed along Big Tujunga Creek between I-210 and Big Tujunga Dam during the 2009 focused surveys, least Bell's vireo is expected to occur in suitable habitat along this portion of Big Tujunga Creek, with higher numbers expected in the downstream areas closer to Hansen Dam. While no focused surveys have been conducted since 2009, the least Bell's vireo is expected to have expanded into the upstream area because the regional population has increased. The 2018 incidental observations of least Bell's vireo downstream of the Big Tujunga Canyon Road bridge and near Oro Vista Avenue confirm that the species is present in some numbers along Big Tujunga Creek between Hansen Dam and Big Tujunga Dam. It should be noted that the 2017 Creek Fire burned large areas of willow riparian forest; therefore, least Bell's vireos that previously nested at Hansen Reservoir may have moved upstream along Big Tujunga Creek to find suitable nesting habitat.

Least Bell's vireo is also expected to occur in low numbers in suitable habitat along Big Tujunga Creek upstream of Big Tujunga Reservoir. The density of vireos is expected to be lower in the upper portions of the HCP study area because least Bell's vireos typically occur at lower elevations. Currently only one territory has been recorded to date in the upper portion of the HCP study area; however, this number could increase if the least Bell's vireo regional population continues to increase and expand into areas of suitable habitat.

2.4.3.2 SOUTHWESTERN WILLOW FLYCATCHER

Southwestern willow flycatcher is a federally and State listed Endangered species. It is one of four subspecies of the willow flycatcher (*Empidonax traillii*) (Sedgwick 2000); the breeding range of the southwestern willow flycatcher includes southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, and extreme northwestern Mexico (i.e., Baja California del Norte, Sonora, and Chihuahua) (USFWS 2002). The winter range of the southwestern willow flycatcher includes the tropical regions of southern Mexico, Central America, and northern South America (Sogge et al. 2010). Its migration is 2,000 to 5,000 miles round-trip each year depending on the specific breeding and wintering locations of the individual (USFWS 2002). Efforts are underway to learn more about its winter distribution and migratory connections between wintering and breeding populations (USFWS 2002).

The southwestern willow flycatcher arrives in southern California in mid-May and departs for its wintering grounds in late July to mid-September. The spring migration of southwestern willow flycatcher is earlier than that of the northern subspecies of willow flycatchers (Unitt 1984; USFWS 1993b). As a result, the presence of more abundant subspecies that migrate through the range of the southwestern willow flycatcher during its breeding season complicates surveys for nesting southwestern willow flycatchers. Similarly, the other subspecies may pass through southern California during their fall migration in July and August while the southwestern willow flycatcher is still breeding; therefore, there is only a short period from June 15 to July 20 when the presence of a willow flycatcher in southern California can be determined to be southwestern subspecies of the willow flycatcher (USFWS 2002).

The willow flycatcher is a drab, brownish-olive songbird that is about 5.75 inches long (USFWS 1995a). While it is one of the larger *Empidonax* flycatchers, it has a slender look overall due to its long, thin wings and tail (Cornell 2017). Willow flycatchers are brownish-olive overall with a slight yellow wash to the belly. They have two whitish wingbars, a white throat that contrasts with the brownish-olive breast, and an eyering that is usually faint or absent (Cornell 2017). The bill is broad with a dark upper mandible and a light lower mandible (USFWS 1995a). The southwestern willow flycatcher is generally paler than other willow flycatcher subspecies and also differs in morphology, e.g., wing formula, bill length, and wing-to-tail ratio (Unitt 1987; 1997; Browning 1993); however, these differences are difficult to distinguish and are so subtle that they should not be used to characterize birds observed in the field (USFWS 2002; Sogge et. al. 2010). Because willow flycatcher subspecies cannot be reliably differentiated in the field, they are identified to subspecies based on their breeding location with regard to the range of each subspecies. The willow flycatcher's song is a sneezy ''fitz-bew'' interspersed with ''whitt,'' "wheeo," and rolling “brrrt” notes (USFWS 2002). Males establish and defend territories through counter-singing, chasing, and sometimes physically confronting neighboring males. Although males are the primary singers, females will also occasionally sing (USFWS 2002). During migration, migrant birds will often sing from tall perches the same way that breeding birds do (Johnson and Sogge 1997; Sogge et al. 1997).

Southwestern willow flycatchers are generalist insectivores; common food items include bugs (*Hemiptera*), wasps and bees (*Hymenoptera*), flies (*Diptera*), dragonflies (*Odonata*), leafhoppers/ spittlebugs (*Homoptera*), beetles (*Coleoptera*), and butterflies/moths and caterpillars (*Lepidoptera*) (Beal 1912; McCabe 1991; Sogge et al. 2010). Willow flycatchers forage primarily by sallying from a perch to perform aerial hawking (short flights to catch insects in flight and return to the perch) and gleaning (picking prey from the leaves or bark) (Sogge et al. 2010). They forage along the external edges or internal openings within a habitat patch or at the top of the upper canopy (Sogge et al. 2010).

The southwestern willow flycatcher occurs in dense riparian habitat along rivers, streams, and other wetlands. Shrubs or trees used for nesting range from 6 feet to 98 feet in height; lower stature thickets tend to occur at higher elevation sites, while taller stature thickets occur at middle and lower elevations (USFWS 2002). Typically, southwestern willow flycatchers nest in thickets of trees and shrubs 13 to 23 feet or greater in height, with a dense understory and a high percentage of canopy cover (USFWS 1995a). Nest sites are typically composed of a riparian patch with dense vegetation in the interior, or an aggregate of dense patches interspersed with openings. The dense patches are often interspersed with small openings, open water, or small areas of shorter/sparse vegetation that create a mosaic of habitat that is not uniformly dense (USFWS 2002). In almost all cases, slow-moving or still surface water and/or saturated soil is present during wet or non-drought years (UFSWS 2002). Where flycatchers occur along moving streams, those streams tend to be of relatively low gradient (i.e., slow-moving with few or widely spaced riffles). However, hydrological conditions in the southwest can be highly variable both within a season and between years; water availability at a site may range from flooded to dry over the course of a breeding season or year to year (Sogge et al. 2010). Plant species composition of low to mid-elevation sites range from monotypic stands to mixtures of broadleaf trees and shrubs including willows, cottonwoods, coast live oak, ash (*Fraxinus* sp.), alder (*Alnus* sp.), blackberry (*Rubus* sp.), and nettle (*Urtica* sp.) (USFWS 2002). They can also nest in riparian habitats dominated by a mix of native and introduced species, such as Russian olive (*Elaeagnus angustifolia*) and tamarisk or in monotypic stands of these introduced species; however, southwestern willow flycatchers rarely nest in giant reed (USFWS 2002). Overall, nest site selection appears to be driven more by plant structure than species composition (Sogge et al. 2010).

Breeding territory size typically ranges from 0.25 acre to 5.7 acres, with most in the range of 0.5 to 1.2 acres (Sogge 1995; Whitfield and Enos 1996; Skaggs 1996; Sogge et al. 1997). Based on a range-wide review, a patch has an average of 2.7 acres of dense riparian vegetation for each flycatcher territory (USFWS 2002). Southwestern willow flycatchers are generally not found nesting in confined floodplains where only a single narrow strip of riparian vegetation less than approximately 33 feet wide develops, although they may use such vegetation if it extends out from larger patches, and during migration (Sogge and Tibbitts 1994; Sogge and Marshall 2000; Stoleson and Finch 2000). Current larger populations (i.e., ten or more territories) consist of approximately 61.5 acres; smaller patches with a nearest neighbor distance of less than 1.0 mile function effectively as one population (USFWS 2002).

Because riparian vegetation typically occurs in floodplain areas that are prone to periodic disturbance, suitable habitats will be ephemeral and their distribution dynamic in nature. Suitable habitat patches may become unsuitable through maturation or disturbance (though this may be only temporary, and patches may cycle back into suitability). The southwestern willow flycatcher's riparian habitats are dependent on hydrological events such as scouring floods, sediment deposition, periodic inundation, and groundwater recharge for them to become established, develop, be maintained, and ultimately to be recycled through disturbance (USFWS 2002).

During migration, southwestern willow flycatchers may occur in non-riparian habitats and/or be found in riparian habitats unsuitable for breeding (e.g., the vegetation structure is too short or sparse, or the patch is too small). Such migration stopover areas (i.e., food-rich areas where migrants replenish energy reserves), even though not used for breeding, may be critically important resources affecting productivity and survival (USFWS 2002). If stopover sites are lacking, migrating birds could fail to find sufficient food and perish, or flycatchers forced to spend more time in poor-quality stopover habitats could arrive on the breeding grounds late and/or in poor physical condition, both of which could reduce reproductive fitness (Moore et al. 1993). On its wintering grounds, southwestern willow flycatcher habitat is described as woodland edges or patches of trees/shrubs bordering wetlands, slow-moving, or standing water (USFWS 2002).

The southwestern willow flycatcher is present on its breeding grounds by mid–May. It builds nests and lays eggs by late May or early June and fledges young by early to mid–July (Willard 1912; Ligon 1961; Brown 1988; Whitfield 1990; Sogge and Tibbitts 1992; Sogge et al. 1993; Muiznieks et al. 1994). Variation in these dates has been observed and may be related to altitude, latitude, and renesting (Carothers and Johnson 1975; Brown 1988; Muiznieks et al. 1994). The nest is usually constructed at the fork in a tree between 6.5 to 23 feet above the ground in a shrub or small tree with dense vegetation surrounding it (USFWS 2002). The nest is cup-shaped and constructed of fiber, bark, and grass with feathers around the rim; grass or other silky plant material lining the inside of the nest; and 1 to 6 inches of plant material hanging from the bottom of the nest (Harrison 1979).

Male southwestern willow flycatchers arrive on the breeding grounds a week or two prior to females and establish territories by interacting aggressively with other flycatchers; second-year birds arrive around the same time as females (USFWS 2002). Most males are monogamous, but about 5 to 20 percent are polygynous with two females in their territory (Whitfield and Enos 1996; Sferra et al. 1997; Paradzick et al. 2000; McKernan and Braden 2001). Additionally, territorial males may mate with females in other territories (i.e., engage in extra-pair copulations) (Pearson 2002; E. Paxton unpubl. Data in USFWS 2002). Additionally, non-territorial adult "floaters" may also be present (Sogge et al. 2010). Females build the nest in four to seven days with little to no assistance from the male. The female then lays one egg per day for three to four days. Usually the female does most of the incubation, which begins when the last egg is laid and lasts for 12 to 13 days; all eggs typically hatch within 24 to 48 hours of each other (USFWS 2002; Sogge et al. 2010). The female does most of the initial care for the nestlings, the male also brings food to the nestlings as their demand for food increases. Only the female broods (i.e., sits on the eggs/nestlings) the nest; female attendance at the nest decreases as nestlings age, with less than 10 percent nest attendance once the young are seven days old (Arizona Game and Fish unpublished data in USFWS 2002). Nestlings fledge 12 to 15 days after hatching. Fledglings stay in the general nest area 14 to 15 days after fledging, sometimes longer; both parents feed the fledglings (USFWS 2002). Southwestern willow flycatchers rarely make a second nest attempt if the first nest is successful; however, they will attempt to renest up to four times if the nest fails (Smith et al. 2002). Predation can be the leading cause of nest failure in some years (Whitfield and Enos 1996; Paradzick et al. 1999). The average number of fledglings per female has been estimated as 1.6 to 2.0; the average number of fledglings per female over her lifetime was 3.3 (Paxton et al. 2007).

Southwestern willow flycatchers generally return to former breeding areas; however, both males and females move within and between sites, with males showing a higher site fidelity than females

(Netter et al. 1998). Within drainage movements are more common than between drainage movements (Kenwood and Paxton 2001). The typical distances that southwestern willow flycatchers move range from 1.2 to 18 miles, but distances as great as 136 miles have been documented (Kenwood and Paxton 2001). Netter et al. (1998) reported between year movement distances ranging from 0.25 to 118 miles, with a mean of 8.7 miles. The USGS assessed all movement data and determined that establishing breeding sites within 18 to 25 miles of each other to allow for dispersal between sites within and between years would increase the overall metapopulation stability (USFWS 2013b).

In California, the southwestern willow flycatcher breeds along the coast north to the Santa Ynez River in Santa Barbara County and north in the interior to about Independence in Inyo County from sea level to 8,500 feet above msl (USFWS 2002; Unitt 1987). Like its habitat, it occurs in small, isolated, widely dispersed patches of habitat within arid surrounding landscapes; its habitat has always been dynamic and unstable in space and time due to natural disturbance and regeneration events such as flood, fire, and drought (USFWS 2002). Its current range is similar to its historic range, but there is a lower quantity of suitable habitat (USFWS 2002). In California, the southwestern willow flycatcher was once considered common in all lower elevation riparian areas in the southern third of the state including the Los Angeles Basin, Riverside/San Bernardino area, and San Diego County (Wheelock 1912; Willett 1912; Grinnell and Miller 1944; Unitt 1984, 1987). The primary cause of the southwestern willow flycatcher's decline is the loss and modification of riparian habitat (USFWS 2002). Riparian habitat suitable for this species is uncommon, isolated, and widely dispersed (USFWS 2002). With the increase in urbanization and agricultural development, these systems have declined or have been further degraded by reduction in water flow, interruption of the natural hydrogeological events or cycles, physical modifications to streams, removal of riparian vegetation, invasion by non-native invasive plant species, livestock grazing, and recreation (USFWS 2002). Additionally, agriculture and certain other types of development can increase foraging habitat for brown-headed cowbirds in proximity to southwestern willow flycatcher breeding habitat (USFWS 2002). Brown-headed cowbird parasitism is no longer considered one of the primary rangewide threats to southwestern willow flycatchers; however, parasitism increases with increasing abundance of cowbirds and negatively impacts some breeding populations (Sogge et al. 2010). The southwestern willow flycatcher's habitat rarity and small, isolated populations make the remaining numbers of southwestern willow flycatcher increasingly susceptible to local extirpation through stochastic events such as floods, fire, brood parasitism, predation, depredation, and land development (USFWS 1995a). Flycatcher habitat and their populations are threatened further with additional stressors such as introductions of tamarisk leaf beetle (*Diorahbda carninulata*), which defoliates tamarisk, and shot hole borer beetle (*Euwallacea* sp.)/Fusarium (*Fusarium euwallaceae*), a beetle/fungi complex that causes tree die-off (USFWS 2017b). All of these threats to the flycatcher and its habitat vary in severity over the southwest; and, at any given location, multiple stressors are likely to be at work, with cumulative and synergistic effects (USFWS 2017b). Habitats in which willow flycatchers overwinter have also decreased dramatically in the last 100 years (Koronkiewicz et al. 1998); furthermore, pesticides and agri-chemicals are still widely used in some places that the willow flycatchers migrate through and winter in, thereby exposing them to environmental contaminants for much of the year (Koronkiewicz et al. 1998; Lynn and Whitfield 2000).

At the time of listing, a total of 70 pairs and 8 single southwestern willow flycatchers were known from California, and 300 to 500 pairs occurred throughout the range (USFWS 1995a). The only two stable populations in California were located along the South Fork of the Kern River at the Kern River Preserve and along the Santa Margarita River on Camp Pendleton; all other populations consisted of six individuals or less (USFWS 1995a). The southwestern willow flycatcher population has not shown the same recovery as the least Bell's vireo in response to riparian habitat restoration and cowbird control (Kus 2011).

2.4.3.2.1 Critical Habitat

On January 3, 2013, the USFWS published a Revised Final Critical Habitat for the southwestern willow flycatcher (USFWS 2013b). This final rule designated 208,973 acres (1,227 stream miles) in 24 Management Units on a combination of federal, State, tribal, and private lands in California, Nevada, Utah, Arizona, and New Mexico. In California, Critical Habitat was designated in Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura Counties. The lower portion of the HCP study area is within the 2013 Revised Critical Habitat for the southwestern willow flycatcher.

The PBFs for the southwestern willow flycatcher are those physical or biological features that are essential to the conservation of the species and may require special management considerations. Specific PBFs for the southwestern willow flycatcher include those listed below (USFWS 2013b).

1. Riparian vegetation. Riparian habitat along a dynamic river or lakeside, in a natural or man-made successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs and some combination of:
    - Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 6 to 98 feet. Lower-stature thickets (6 to 13 feet tall) are found at higher-elevation riparian forests, and tall-stature thickets are found at middle- and lower-elevation riparian forests
    - Areas of dense riparian foliage at least from the ground level up to approximately 13 feet above ground or dense foliage only at the shrub or tree level as a low, dense canopy
    - Sites for nesting that contain a dense (about 50 to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground)
    - Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.25 acre or as large as 175 acres
2. Insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include: flying ants, wasps, and bees (*Hymenoptera*); dragonflies (*Odonata*); flies (*Diptera*); true bugs (*Hemiptera*); beetles (*Coleoptera*); butterflies, moths, and caterpillars (*Lepidoptera*); and spittlebugs (*Homoptera*)

It is important to recognize that the PBFs such as riparian vegetation with trees and shrubs of a certain type and insect prey populations are present throughout the river segments selected; but the specific quality of riparian habitat for nesting (which involves elements such as specific configuration of riparian foliage, sites for nesting, and interspersion of small openings), migration, foraging, and shelter will not remain constant in condition or location over time due to succession (plant germination and growth) and the dynamic environment in which they exist (subject to natural and anthropogenic disturbances such as flooding, fires, drought, and other changes in hydrology) (USFWS 2013b). Special Management Actions that may need to be maintained for essential features of southwestern willow flycatcher habitat include:

1. *Restore adequate water-related elements to improve and expand the quality, quantity, and distribution of riparian habitat.* Special management may: increase efficiency of groundwater management; use urban water outfall and irrigation delivery and tail waters for vegetation improvement; maintain, improve, provide, or reestablish in-stream flows to expand the quality, distribution, and abundance of riparian vegetation; increase the width

between levees to expand the active channel during overbank flooding; and manage regulated river flows to more closely resemble the natural hydrologic regime.

2. *Retain riparian vegetation in the floodplain*. Special management may include the following actions: avoid clearing channels for flood flow conveyance or plowing of floodplains, and implement projects to minimize clearing of vegetation (including exotic vegetation) to help ensure that desired native and exotic vegetation persist until an effective riparian vegetation improvement plan can be implemented.
3. *Manage biotic elements and processes*. Special management may include the following actions: manage livestock grazing to increase flycatcher habitat quality and quantity by determining appropriate areas, seasons, and use consistent within the natural historical norm and tolerances; reconfigure grazing units, improve fencing, and improve monitoring and documentation of grazing practices; manage wild and feral hoofed mammals (ungulates, e.g., elk, horses, burros) to increase flycatcher habitat quality and quantity; and manage keystone species such as beaver (*Castor canadensis*) to restore desired processes to increase habitat quality and quantity.
4. *Protect riparian areas from recreational impacts*. Special management may include actions such as managing trails, campsites, off-road vehicles, and fires to prevent habitat development and degradation in flycatcher habitat.
5. *Manage exotic plant species*, such as tamarisk or Russian olive by reducing conditions that allow exotics to be successful and restoring or reestablishing conditions that allow native plants to thrive. Throughout the range of the flycatcher, the success of exotic plants within river floodplains is largely a symptom of land and water management (for example, groundwater withdrawal, surface water diversion, dam operation, and unmanaged grazing) that has created conditions favorable to exotic plants over native plants. Special management may include the following actions: eliminate or reduce dewatering stressors such as surface water diversion and groundwater pumping to increase stream flow and groundwater elevations; reduce salinity levels by modifying agricultural practices and restoring natural hydrologic regimes and flushing flood flows; in regulated streams, restore more natural hydrologic regimes that favor germination and growth of native plant species. Improve timing of water drawdown in lake bottoms to coincide with the seed dispersal and germination of native species and restore ungulate herbivory to intensities and levels under which native riparian species are more competitive.
6. *Manage fire to maintain and enhance habitat quality and quantity*. Special management may include the following actions: suppress fires that occur; reduce risk of fire by restoring elevated groundwater levels, base flows, flooding, and natural hydrologic regimes in order to prevent drying of riparian areas and more flammable exotic plant species from developing; and reduce risk of recreational fires.
7. *Evaluate and conduct exotic plant species removal and native plant species management on a site-by-site basis*. If habitat assessments reveal a sustained increase in exotic plant abundance, conduct an evaluation of the underlying causes and conduct vegetation improvement under measures described in the Recovery Plan. Remove exotics only if: underlying causes for dominance have been addressed; evidence shows that exotic species will be replaced by vegetation of higher functional value; and the action is part of an overall vegetation improvement plan. Native riparian vegetation improvement plans should include: a staggered approach to create mosaics of different aged successional tree and shrub stands; consideration of whether the sites are presently occupied by nesting flycatchers; and management of stressors that can improve the germination, growth, and maintenance of preferred vegetation.
8. *Manage or reduce the occurrence, spread, and effects of biocontrol agents on flycatcher habitat*. Exotic biocontrol tamarisk leaf beetle insects (leaf beetles) were brought into and

released in many locations throughout the western United States. This specific USDA program was terminated in 2010, largely because these insects are moving farther and thriving in the southwestern United States (within the flycatcher's breeding range) where it was initially believed they would not persist. It would be beneficial to prevent purposeful or accidental intra- or interstate transport of leaf beetles to locations that would increase the likelihood of beetles dispersing to flycatcher habitat.

The Critical Habitat contains stream habitat that is considered to contain the physical and biological features necessary for the southwestern willow flycatcher (i.e., nest sites, foraging habitat, streams, elevated groundwater tables, moist soils, flying insects, and other alluvial floodplain habitats). The dynamic processes of riparian vegetation succession (loss and regrowth) and river hydrology allow for stream segments to provide both current and future areas for flycatcher habitat to grow. Riparian vegetation in these segments is expected to naturally expand and contract from flooding, inundation, drought, and the resulting changes in the extent and location of floodplains and river channels. Therefore, while one or more of the physical or biological features are currently present, over time these habitat features will fluctuate in quality or location throughout these stream segments (USFWS 2013b).

A total of 378 stream miles (39,205 acres) of Critical Habitat have been designated in California. California has three Recovery Units: Coastal California Recovery Unit, Basin and Mojave Recovery Unit, and Lower Colorado Recovery Unit. The HCP study area is within the Coastal California Recovery Unit, which extends from just north of Point Conception south to the Mexican border; it includes the Santa Ynez, Santa Clara, Santa Ana, and San Diego Management Units. The HCP study area is within the Santa Clara Management Unit, which includes the Santa Clara River, Ventura River, Piru Creek, Castaic Creek, Big Tujunga Canyon, and San Gabriel River. The Recovery Plan describes a goal of 25 flycatcher territories in the Santa Clara Management Unit (USFWS 2002). No large populations are in this Management Unit; "flycatcher territories have been detected in small numbers and sporadically over a broad area in this Management Unit" (USFWS 2013b). The Critical Habitat states that Big Tujunga Canyon was not known to be occupied at the time of listing and had no territories detected from 1991 to 2010 (USFWS 2013b). The 3 miles of Critical Habitat designated along Big Tujunga Canyon have been designated "because they are anticipated to provide habitat for metapopulation stability, gene connectivity through this portion of the flycatcher's range, protection against catastrophic population loss, and population growth and colonization potential" (USFWS 2013b).

The 2013 Revised Critical Habitat lists several types of potential impacts that would require consultation with the USFWS. These include the following: (1) actions that would remove, thin, or destroy riparian flycatcher habitat without implementation of an effective riparian habitat management plan resulting in the development of riparian vegetation of equal or better flycatcher quality in abundance and extent; (2) actions that would appreciably diminish habitat value or quality through direct or indirect effects (e.g., watershed and soil degradation, diminishing river surface and subsurface flow, altering flow regimes, introducing exotic plants or wildlife, habitat fragmentation); (3) actions that would negatively alter the surface or subsurface river flow (e.g., water diversion, groundwater pumping, dam construction and operation, any activity that negatively changes the frequency, magnitude, duration, timing, or abundance of surface flow and/or subsurface groundwater elevation); (4) actions that permanently destroy or alter flycatcher habitat; and (5) actions that result in alteration of flycatcher habitat from improper livestock or ungulate management (USFWS 2013b).

2.4.3.2.2 Recovery Plan

The Recovery Plan for the southwestern willow flycatcher was completed in 2002 (USFWS 2002). It states that the species will be eligible for down-listing from Endangered to Threatened when either of the following criteria have been met for a period of five years:

1. Increase the total known population to 1,950 territories (equating to approximately 3,900 individuals) for a period of five years, geographically distributed to allow for functioning as a metapopulation, so that the flycatcher is no longer in danger of extinction. Each Management Unit must hold at least 80 percent of its minimum population target, and each Recovery Unit must meet its goal; if one Management Unit is short of its population target, another Management Unit in the same Recovery Unit must make up the difference so that the overall Recovery Unit meets its goal. The Recovery Goal for the Coastal California Recovery Unit is 275 territories (186 territories were known at the time the Recovery Plan was prepared in 2002).
2. Increase the total known population to 1,500 territories (equating to approximately 3,000 individuals) for a period of three years, geographically distributed to allow for functioning as a metapopulation, so that the flycatcher is no longer in danger of extinction. Each Management Unit must hold at least 50 percent of its minimum population target, and each Recovery Unit must meet 75 percent of its goal; if one Recovery Unit is short of its population target, another Recovery Unit must make up the difference so that the overall population of 1,500 territories is met. In this scenario, the habitats supporting these flycatchers must be provided sufficient protection from threats to assure maintenance of these habitats over time. Protection must be assured into the foreseeable future through development and implementation of conservation management agreements.

The Recovery Plan states that the species will be eligible for delisting from Endangered and Threatened species list when the following criteria have been met for a period of five years:

1. Increase the total known population to 1,950 territories (equating to approximately 3,900 individuals), geographically distributed to allow for functioning as a metapopulation, so that the flycatcher is no longer in danger of extinction.
2. Habitats supporting these flycatchers must be provided sufficient protection from threats to assure maintenance of these habitats over time. Protection must be assured into the foreseeable future through development and implementation of conservation management agreements. All areas within all Management Units that are critical to metapopulation stability have demonstrated their effectiveness for a period of five years.

The Recovery Plan lists management actions for riparian habitat necessary in the historic range of the southwestern willow flycatcher, a requirement for annual monitoring and range-wide surveys, and research activities needed to monitor and guide the recovery effort (USFWS 2002).

The Recovery Plan includes the following recovery actions:

1. Increase and improve currently suitable and potentially suitable habitat by securing and enhancing habitat on federal lands, lands affected by federal actions, and cooperative non-federal and tribal lands. Develop management plans to reduce threats and promote processes that secure, restore, and enhance currently suitable and potentially suitable habitat. Manage physical elements and processes to reduce threats and promote processes that secure, restore, and enhance currently suitable and potentially suitable habitat.

- Restore the diversity of fluvial processes by identifying dams where modification of dam operating rules would benefit the flycatcher by taking advantage of system flexibility and water surpluses/flood flows; determine feasibility of simulating the natural hydrograph to restore and enhance riparian systems; determine the feasibility of managing reservoir levels to establish and maintain lake fringe and inflow habitat; determine feasibility of using water surpluses/flood flows to increase or add water to marsh areas between levees and on floodplains; determine feasibility of keeping daily ramping rates and daily fluctuations for dam releases as gradual as possible to prevent bank erosion and loss of riparian vegetation, except when mimicking flood flows; determine the feasibility of augmenting sediment in sediment-depleted systems. Implement and monitor actions that are identified as feasible.
- Restore adequate hydrogeomorphic elements to expand habitat, favor native over exotic plants, and reduce fire potential. Increase water availability through (1) increasing the efficiency of groundwater management; (2) using urban wastewater outfall and rural irrigation delivery and tail waters for habitat restoration; and (3) providing/ reestablishing in-stream flows to expand habitat. Expand the active channel area to support suitable habitat by increasing the width of levees and using available flows to mimic overbank flow. Reactivate floodplains to expand native riparian forests. Restore more natural channel geometry (width, depth, bank profiles) where return of the natural hydrograph will be insufficient to improve habitat.
- Manage fire to maintain and enhance habitat quality and quantity by developing fire risk management plans; suppressing fires; restoring groundwater base flows and flooding; reducing incidence of flammable exotics; and reduce recreational fires.
- Manage biotic elements and processing, such as herbivory, within evolved tolerance ranges of native riparian plant species by managing livestock grazing to increase habitat quality and quantity; managing wild ungulates; and managing keystone species (e.g., beaver).
- Manage exotic plant species by developing exotic species management plans; coordinating exotic species management efforts; restoring native ecosystem conditions that favor native plants by eliminating physical stresses (e.g., high salinity, reduced stream flows), creating or restoring a natural hydrograph that restores the natural flood disturbance regime; restoring ungulate herbivory to intensities and types where native plant species are more competitive; retaining native riparian vegetation in floodplains or channels; retaining exotic species at sites dominated by native plants unless there is a trend of steady increase of exotics and, if needed, increase seasonal flooding to increase habitat quality of these patches; removing exotics if underlying causes of exotics have been addressed, exotics are expected to be replaced by vegetation with higher functional values, and the action is part of an overall restoration plan keeping some suitable flycatcher habitat available throughout the restoration period; and release habitat-targeted biocontrol agents only outside the occupied breeding range of the flycatcher.
- Providing areas protected from recreation by reducing impacts from recreationists; confining camping areas; restoring habitat impacted by recreation; placing designated shooting recreation areas away from riparian areas; minimizing attractants to scavengers, predators, and brown-headed cowbirds; and providing on-site monitors where recreation conflicts exist.

- Work with private landowners, State agencies, municipalities, and non-governmental organizations to conserve and enhance habitat on non-federal lands to (1) evaluate and provide range-wide prioritization of non-federal lands; (2) achieve protection of occupied habitats; (3) provide technical assistance to conserve and enhance occupied habitat on non-federal lands; and (4) pursue joint ventures toward flycatcher conservation.
- Work with tribes to develop conservation plans and strategies to realize the potential for conservation and recovery on tribal lands.

2. Increase metapopulation stability by increasing the size, number, and distribution of populations and habitat in each Recovery Unit. This should be accomplished through conserving and managing all existing breeding sites; securing, maintaining, and enhancing the largest populations; developing new habitat near extant populations using habitat acquisition/conservation priorities; enhancing connectivity to currently isolated occupied sites; facilitating establishment of new large populations where none exist through habitat restoration; and increasing population sizes and small occupied sites.
3. Improve demographic parameters by increasing reproductive success by managing brown-headed cowbird parasitism after collection of baseline data that shows high rates of parasitism. This can be accomplished by increasing the amount and quality of riparian habitat to increase habitat patch size and local flycatcher population sizes thereby minimizing levels and impacts of cowbird parasitism; developing and implementing cowbird management programs; and implementing landscape-level objectives for cowbird management. Reproductive success can also be improved by reducing direct impacts that topple or destroy nests. Assessments of habitat quality should be reassessed if cowbird control and/or other measures increase reproductive output but not the number of breeding flycatchers.
4. Minimize threats to migrating or wintering habitat. Riparian habitat that serves as essential migration and stopover habitat in the United States should be identified for the purpose of protection; migration and stopover habitat should be restored, protected, and expanded. The United States should pursue international partnerships to identify and preserve migration and wintering habitat and identify and minimize threats to the species during migration and wintering.
5. Facilitate and institute effective survey and monitoring programs by adopting a standardized protocol, instituting appropriate monitoring of all reaches within Management Units, and integrating survey data at state and range-wide levels. Additionally, the effects of management and restoration practices should be monitored to improve their effectiveness; surveys to determine dispersal movements and colonization events should be conducted; and survey efforts should be expanded in wintering habitats.
6. Conduct research to:
   a. Determine habitat characteristics that influence occupancy and reproductive success (e.g., plant species/structure, habitat area, effect of conspecifics on site occupancy, use versus availability of exotics, long-term ecological productivity in native versus exotic habitat, physical microclimate variables, and effects of environmental toxins)
   b. Investigate dam and reservoir management strategies to maximize downstream and delta habitat
   c. Investigate surface and groundwater management strategies to determine thresholds of habitat suitability and to maximize habitat quality

   d. Investigate grazing systems, strategies, and intensities for riparian recovery and maintenance, including direct effects of grazing on flycatcher nests, and effects of native ungulates on riparian habitat recovery
   e. Monitor cowbird parasitism and investigate control, including testing the efficacy of cowbird control programs
   f. Determine the most successful techniques for creating or restoring riparian habitat
   g. Refine methods for determining distribution, population status, and trends including collection of demographic and dispersal information, limiting factor analysis, population viability analysis, trends in population sizes and refine protocols to determine flycatcher distribution
   h. Conduct genetic analysis to determine current and historic distribution of the subspecies
   i. Determine migration and wintering habitat distribution/habitat selection and threats during these times, including investigation of environmental toxins and effects on the flycatcher's prey base
   j. Determine other approaches to increasing reproductive success (other than cowbird control)
   k. Investigate reducing or eliminating fire hazards such as through fuel reduction techniques and use of prescribed fire
7. Provide public education and outreach by holding annual subgroup meetings, maintaining an updated website, preparing brochures for the public to educate them about landscaping with native plants, recreational impacts (including fire hazards), and cowbird control; posting and maintaining protective signage at breeding locations; exchanging information with foreign governments and public; conducting symposiums and workshops; and conducting survey training.
8. Assure implementation of laws, policies, and agreements that benefit the flycatcher; providing training to resource managers in conservation benefits, integrating recovery efforts with those of other species; and communicate with tribes.
9. Track recovery progress by annually reviewing survey and monitoring data, current flycatcher and other pertinent research, updating population viability analysis and recommendations for surveys and monitoring strategies, and updating the recovery plan every five years.

The Recovery Plan divides the southwestern willow flycatcher's range into six Recovery Units based on large watershed and hydrologic units and further divides the Recovery Units into Management Units based on watershed or major drainages. The HCP study area is in the Coastal California Recovery Unit and the Santa Clara Management Unit; other Management Units in Coastal California are Santa Ynez, Santa Ana, and San Diego. Within the Santa Clara River Management Unit, the following areas have been identified as areas where recovery efforts should be focused due to their substantial recovery value: Santa Clara River from Bouquet Canyon Road to the Pacific Ocean; Ventura River from Matilija Hot Springs to the Pacific Ocean; Piru Creek from its headwaters to the Santa Clara River; San Francisquito Creek from 3 miles upstream of Drinkwater Reservoir to the Reservoir; Soledad Canyon from Soledad Campground to Agua Dulce; Big Tujunga Creek; and San Gabriel River from San Gabriel Reservoir to Santa Fe Flood Control Basin.

The Recovery Plan outlined steps to be taken through 2020 and was anticipated to cost approximately $127,466,000 plus additional costs to be determined. Neither Public Works nor LADWP are specifically named as Responsible or Associated Parties. Responsible parties are those partnering agencies who may voluntarily participate in any aspect of implementation of tasks listed in the Recovery Plan. Responsible parties may willingly participate in project planning, provide assistance with funding or staff time, or help with any other means of implementation.

At the time of its five-year review, the range-wide population of southwestern willow flycatcher was estimated at 1,299 territories at 288 sites, which is less than the 1,500 territories needed for downlisting and 1,950 territories needed for delisting (Durst et al. 2008; USFWS 2014a). The Coastal California Recovery Unit was estimated to contain 120 territories at 73 sites; the goal for this Recovery Unit is 275 territories (Durst et al. 2008). The Santa Clara Management Unit was estimated to contain 8 territories, while its recovery goal is 25 territories (Durst et al. 2008). The increase in the overall population was primarily in the Gila and Rio Grande Recovery Units; populations showed little change or declines in numbers for the Lower Colorado, Basin and Range, Upper Colorado River, and Coastal California Recovery Units (USFWS 2014a). The five-year review concluded that the flycatcher should remain classified as Endangered primarily because of ongoing threats from land and water management; population declines in large portions of the rangewide distribution; the anticipated future adverse effects to its habitat and population from the tamarisk leaf beetle; and potential impacts associated with the effects of climate change (USFWS 2014a).

The USFWS recently completed another five-year review of the southwestern willow flycatcher in response to a petition for delisting that claimed that it was not a valid subspecies. The petition was based on a paper published by Zink (2015) asserting that there was no genetic, morphological, or ecological differentiation between the southwestern subspecies and other willow flycatcher subspecies. A rebuttal paper was published by Theimer et al. (2016) providing additional analysis and commentary on the methods used by Zink (2015). The USFWS found that Zink (2015) and the petition to delist did not represent the best available scientific information and was not sufficient to negate recognition of the southwestern subspecies (USFWS 2017b).

The rangewide estimate of territories in 2012 was 1,629 territories (Durst personal communication 2014 cited in USFWS 2017b); the raw rangewide estimate for 2014 and 2015 were 1,074 and 1,037 territories, respectively (USFWS 2017b). The growth in the population since the flycatcher was listed has primarily been in Arizona and New Mexico and has not been observed throughout the range of the species. The recovery goals for distribution and abundance have not been met; while some Recovery Units remain robust, the Lower Colorado, Basin and Range, Upper Colorado, and Coastal California Recovery Units have declined (USFWS 2017b). The USFWS (2017b) found that the southwestern willow flycatcher continues to meet the definition of an Endangered species and is in danger of extinction throughout its range; as a result, a reclassification to a Threatened species or delisting is not warranted at this time.

2.4.3.2.3 Project Surveys to Date

2009 Focused Surveys of the HCP Study Area

Mr. Daniels, Mr. Stewart, and Ms. Edwards conducted a habitat assessment of the area between Big Tujunga Dam and Hansen Dam in April 2009. The purpose of the habitat assessment was to identify potential habitat for the least Bell's vireo and southwestern willow flycatcher and to determine the number of survey polygons required to survey all potential habitat within the downstream HCP study area. Potential habitat for the southwestern willow flycatcher included all riparian scrub and riparian woodland habitats of suitable size and stature; habitat areas dominated by alluvial scrub vegetation or unvegetated wash were excluded. The properties belonging to the Angeles National Golf Club, located just upstream of Foothill Boulevard and I-210, were excluded due to access issues.

Other 2009 focused surveys for the southwestern willow flycatcher related to other projects overlapped with the survey area at four locations: (1) Hansen Dam surveys for the USACE; (2) Haines Canyon Main Channel Outlet (downstream to Angeles National Golf Club property) for Public Works' Flood Maintenance Division;[16] (3) Plunge Pool below Tujunga Dam (downstream to Big Tujunga Canyon Road bridge) for Public Works' Water Resources Division;[17] and (4) Big Tujunga Mitigation Bank for Public Works' Water Resources Division. The overlapping survey areas were surveyed by only one entity, and the results were combined and summarized below.

The USFWS survey protocol for the southwestern willow flycatcher required that at least five surveys be conducted from May 15 to July 17 with five-day intervals between each site visit. Surveys must be conducted in specific time windows with the first survey conducted between May 15 and May 31; the second survey conducted between June 1 and 21; and the third through fifth surveys conducted from June 22 through July 17. Surveys were conducted by Mr. Daniels (TE-821401-3), Mr. Pike (TE-832946-3), Mr. San Miguel (TE-831910-3), and Mr. Feenstra (TE-128462).

The Biologists systematically surveyed the riparian habitats by walking slowly, using meandering transects, through the riparian habitat in the survey area. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from potentially territorial southwestern willow flycatchers. If no southwestern willow flycatchers were detected after the initial playing of the vocalizations, the surveyor replayed the recording at least once, but often multiple times. "Pishing" sounds were used to elicit a response from any southwestern willow flycatchers present. All surveys were conducted under optimal weather conditions (i.e., between 55° and 95 degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. The Biologists recorded all bird species detected during the survey.

It should be noted that the 2009 focused surveys were conducted the spring/summer immediately prior to the Station Fire, which occurred in August 2009.

Results

On June 13, 2009, a singing male willow flycatcher was observed "patrolling" the willows on the north side of Hansen Lake within the Hansen Dam survey area; it was tentatively identified as a southwestern willow flycatcher by Kimball Garrett (Ornithological Collections Manager at the Los Angeles County Natural History Museum). Most important for identification purposes was the behavior of the bird and its vocalizations. It constantly moved back and forth along the same stretch of riparian habitat near the shoreline of the northern edge of Hansen Lake vocalizing frequently. This "patrolling" behavior is not typical of migrant willow flycatchers in Southern California. Song and calls such as "whit" and "brrrit" are regularly heard from migrants, but the "brree-uh" call made by this bird is rarely heard from migrants in Southern California. A standard band provided by the Bird Banding Laboratory of the USGS was present on the left leg of this willow flycatcher. Based on the behavior and calls, supported by the perceived plumage characteristics (pale and grayish coloration suggestive of the southwestern subspecies), the individual was identified as a southwestern willow flycatcher. The individual willow flycatcher continued at this location and was studied by other observers through June 22, 2009; it was not observed after that date. The southwestern willow flycatcher was observed and documented by Mr. Daniels during his June 22, 2009, survey (Exhibit 8). The individual was not observed after that date. The surveyors conducting the Hansen Dam surveys for the USACE reported this individual as a willow flycatcher of undetermined subspecies (Griffith Wildlife Biology 2009).

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[16] Flood Maintenance Division is now referred to as Stormwater Maintenance Division
[17] Water Resources Division is now referred to as Stormwater Engineering Division

No southwestern willow flycatchers were observed along the Haines Canyon Main Channel Outlet (soft-bottom channel reach from outlet downstream to Angeles National Golf Club property) (BonTerra Consulting 2009b).

No southwestern willow flycatchers were observed at the Big Tujunga Wash Mitigation Area (south bank of Big Tujunga Wash downstream of the I-210) (ECORP Consulting 2009).

No southwestern willow flycatchers were observed between I-210 upstream to Big Tujunga Dam (BonTerra Consulting 2010a).

2012 Focused Surveys

Burned riparian habitat was still recovering from the 2009 Station Fire during spring/summer 2011 and was not mature enough to provide suitable habitat for this species; therefore, no focused surveys were conducted in 2011. However, by spring 2012, habitat had grown to a size to be considered marginally suitable for the species; therefore, focused surveys were conducted in the Reservoir Restoration Project study area (i.e., a limited portion of the HCP study area within or adjacent to impact areas for this project). The survey area included approximately 2.0 river miles along Big Tujunga Creek upstream of Big Tujunga Reservoir, and approximately 1.5 river miles from the Big Tujunga Dam to 0.6 mile downstream of the Big Tujunga Canyon Road bridge over the creek.

The USFWS survey protocol for the southwestern willow flycatcher required that at least five surveys be conducted from May 15 to July 17 with five-day intervals between each site visit. Surveys must be conducted in specific time windows with the first survey conducted between May 15 and May 31, the second and third surveys conducted between June 1 and 24, and the fourth and fifth surveys conducted from June 25 through July 17. Focused surveys were conducted by Mr. Leatherman (TE-827493-6) accompanied by Biologist James Huelsman or Adam DeLuna.

The Biologists systematically surveyed the riparian habitats by walking slowly and methodically along the margins and using meandering transects through the riparian habitat in the survey area. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from potentially territorial southwestern willow flycatchers. If no southwestern willow flycatchers were detected after the initial playing of the vocalizations, the surveyor replayed the recording at least once but often multiple times. “Pishing” sounds were used to elicit a response from any southwestern willow flycatchers present. All surveys were conducted under optimal weather conditions (i.e., between 55° and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. All wildlife species incidentally observed or detected were recorded.

<u>Results</u>

One willow flycatcher (*Empidonax traillii* ssp.) of unknown subspecies was observed during the May 16, 2012, focused survey; however, it was observed on only one survey date and therefore was presumed to have been a migrant (location data not recorded). No southwestern willow flycatchers were observed breeding in the survey area during the 2012 focused surveys.

2016 Focused Surveys

Focused surveys for the Reservoir Restoration Project were updated in 2016. The survey area included all riparian habitat along Big Tujunga Creek extending approximately 1,200 feet upstream of Big Tujunga Reservoir and from Big Tujunga Dam to 500 feet downstream of the Big Tujunga Canyon Road bridge.

The USFWS survey protocol for the southwestern willow flycatcher required that at least five surveys be conducted from May 15 to July 17 with five-day intervals between each site visit. Surveys must be conducted in specific time windows with the first survey conducted between May 15 and May 31, the second and third surveys conducted between June 1 and 24, and the fourth and fifth surveys conducted from June 25 through July 17. Focused surveys were conducted by Mr. Daniels (TE-821401-5), accompanied by Mr. Aguayo.

The Biologists systematically surveyed the riparian habitats by walking slowly and methodically along its margins and using meandering transects through the riparian habitat in the survey area. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from potentially territorial southwestern willow flycatchers. If no southwestern willow flycatchers were detected after the initial playing of the vocalizations, the surveyor replayed the recording at least once but often multiple times. “Pishing” sounds were used to elicit a response from any southwestern willow flycatchers present. All surveys were conducted under optimal weather conditions (i.e., between 55° and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. All wildlife species incidentally observed or detected were recorded.

<u>Results</u>

Two willow flycatchers were observed on May 16, 2016; and one willow flycatcher was observed on May 26, 2016. The individuals were singing birds that occurred in willow-dominated riparian habitat; however, they were not observed on subsequent surveys and, therefore, were determined to have been migrants (location data not recorded). No southwestern willow flycatchers were observed breeding in the survey area during the 2016 focused surveys.

2018 Focused Surveys

Focused surveys for the Reservoir Restoration Project were also updated in 2018. The survey area included all riparian habitat along Big Tujunga Creek extending from Big Tujunga Reservoir upstream to Fall Creek and from Big Tujunga Dam to 500 feet downstream of the Big Tujunga Canyon Road bridge.

The USFWS survey protocol for the southwestern willow flycatcher required that at least five surveys be conducted from May 15 to July 17 with five-day intervals between each site visit. Surveys must be conducted in specific time windows with the first survey conducted between May 15 and May 31, the second and third surveys conducted between June 1 and 24, and the fourth and fifth surveys conducted from June 25 through July 17. Focused surveys were conducted by Ms. Messett (TE-067064-3) accompanied by Mr. Aguayo.

The Biologists systematically surveyed the riparian habitats by walking slowly and methodically along its margins using meandering transects through the riparian habitat in the survey area. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from potentially territorial southwestern willow flycatchers. If no southwestern willow flycatchers were detected after the initial playing of the vocalizations, the surveyor replayed the recording at least once but often multiple times. “Pishing” sounds were used to elicit a response from any southwestern willow flycatchers present. All surveys were conducted under optimal weather conditions (i.e., between 55° and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. All wildlife species incidentally observed or detected were recorded.

Results

Four willow flycatchers were observed on May 15, 2018; and two willow flycatchers were observed on June 5, 2018 (Exhibit 8); however, they were not observed on subsequent surveys and, therefore, were determined to have been migrants. No southwestern willow flycatchers were observed breeding in the survey area during the 2018 focused surveys.

2018 Focused Surveys at Hansen Dam

Focused surveys of Hansen Dam were conducted by USGS in spring/summer 2018. The survey area was approximately 2.5 miles long and extended from Hansen Dam upstream along Big Tujunga Creek (Pottinger and Kus 2019).

The surveys followed a modified protocol that included three surveys for southwestern willow flycatcher between May 22 and July 17, 2018. Surveys were conducted by Biologists from USGS.

Observers walked slowly through or adjacent to suitable riparian habitat, listening and searching for willow flycatchers, systematically playing a recording of a southwestern willow flycatcher song to elicit a territorial response. Surveys typically began at sunrise and were completed by early afternoon, depending on wind and weather conditions. For each willow flycatcher encountered, observers recorded age (adult or juvenile), sex, breeding status (paired or undetermined), and whether the bird was banded.

Results

No breeding southwestern willow flycatchers were detected. One willow flycatcher of unknown subspecies was detected on May 23, 2018. The transient willow flycatcher occupied riparian scrub habitat comprised of 5 to 50 percent native plant cover.

Incidental Observations

During the August 2017 vegetation mapping, a willow flycatcher of indeterminate subspecies was incidentally observed (based on visual and aural identification) by Ms. Messett and Ms. Rudalevige (Exhibit 8). As described above, the willow flycatcher is a migratory species with multiple recognized subspecies that cannot be identified to subspecies except by where they breed. In August, multiple subspecies are moving through southern California on the way to their wintering grounds; therefore, it is unknown which subspecies of willow flycatcher was observed.

2.4.3.2.4 Species Occurrence in HCP Study Area

Southwestern willow flycatcher is not currently known to occur for breeding in the HCP study area; however, it is expected to use Big Tujunga Creek during migration and it could breed in the HCP study area in the future. The multiple observations of migrant willow flycatchers during multiple years of focused surveys and the 2012 observation of southwestern willow flycatcher at Hansen Dam indicate that the species has potential to occur in the HCP study area in the future.

2.4.3.3 WESTERN YELLOW-BILLED CUCKOO

Western yellow-billed cuckoo (Distinct Population Segment [DPS]) is a federally and State listed Endangered species. The USFWS concluded that the western population was discrete from the eastern population based on geographic separation during the breeding season, morphological differences, and behavioral differences (USFWS 2014b). The western yellow-billed cuckoo generally occurs west of the crest of the Rocky Mountains, specifically in southwest British Columbia in Canada; Washington, Idaho, western Montana, Oregon, California, Nevada, southwestern Wyoming, Utah, western Colorado, Arizona, western New Mexico, and Texas in the U.S; and Baja California Sur, Sonora, Sinaloa, western Chihuahua, and northwestern Durango in Mexico (USFWS 2014b). It winters in South America east of the Andes, primarily south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina (Ehrlich et al. 1992; AOS 1998; Johnson et al. 2008). The western yellow-billed cuckoo arrives in southern California between late May and early July, with most arriving in mid-June; it departs for its wintering grounds from mid-September to mid-October (Halterman et al. 2015). The peak of breeding activity lasts about one month and is typically in July; but in some years it can begin as early as May and can end as late as September (Laymon et al. 1997; Halterman 1991, 2009; McNeil et al. 2013; Halterman et al. 2015).

The western yellow-billed cuckoo is a medium-sized bird that is about 12 inches in length. It has a slender, elongated body with a long tail and a long, slightly decurved bill with a mostly black upper mandible and a yellow to orange lower mandible with a black tip (USFWS 2014b; Halterman et al. 2015). The plumage is greyish-brown on the upper parts with a bright white throat, chest, and underparts; a flash of rufous (reddish brown) is visible in flight due to the coloration of primary flight feathers; and the underside of the tail is boldly patterned with white spots against a black background at the end of the central retrices (tail feathers) (USFWS 2014b; Halterman et al. 2015). Although females are slightly larger than males, the sexes are indistinguishable in the field (Hughes 1999; Pyle 1997; Halterman 2009). The yellow-billed cuckoo is a “secretive and hard-to-detect bird” (USFWS 2014b); the majority of yellow-billed cuckoo detections are from birds that are heard but never seen (Halterman et al. 2001; Halterman 2009; McNeil et al. 2013). Both sexes of the cuckoo give a distinctive “kowlp” call interspersed with a variable number of “kuk” notes (Halterman et al. 2015). They have a low unsolicited calling rate, averaging about one call per hour, making them difficult to detect (Halterman 2009). A soft “coo” call is also given by adults to nestlings; it is currently thought to be given primarily by females (Halterman 2009; Halterman et al. 2015). It also gives a soft wooden knocking call “kuk-kuk-kuk” that is often used as a warning call near a nest or fledglings but can be heard any time a cuckoo is disturbed (Hughes 1999; Halterman et al. 2015). Individual home ranges during the breeding season average over 100 acres, and home ranges up to 500 acres have been recorded (Laymon and Halterman 1987; Halterman 2009; Sechrist et al. 2009; McNeil et al. 2010; McNeil et al. 2011; McNeil et al. 2012).

Western yellow-billed cuckoos are insect specialists but also prey on small vertebrates. They primarily consume large, nutritious insect prey such as sphinx moth larvae (*Pachysphinx occidentalis*), katydids (*Tettigoniidae*), and grasshoppers (*Caelifera* sp.); a large proportion of their diet also includes tree frogs (*Hyla* sp. and *Pseudacris* sp.) (Laymon et al. 1997). Minor prey include beetles (*Coleoptera* sp.), dragonflies (*Odonata* sp.), praying mantis (*Mantidae* sp.), flies (*Diptera* sp.), spiders (*Araneae* sp.), butterflies (*Lepidoptera* sp.), caddis flies (*Trichoptera* sp.), crickets (*Gryllidae* sp.), and cicadas (*Cicadidae*) (Laymon et al. 1997; Hughes 1999). Healthy, moist sites produce more suitable insects than desiccated riparian sites (USFWS 2014c). The arrival of yellow-billed cuckoo and the timing of nesting are geared to take advantage of any short-term abundance of prey. In years of high insect abundance, western yellow-billed cuckoos lay larger clutches, a larger percentage of eggs produce fledged young, and they breed multiple times (two to three nesting attempts rather than one) (Laymon et al. 1997). Pairs may forgo breeding in years with inadequate food supply (Veit and Peterson 1993). When foraging, western yellow-billed cuckoos generally employ a ‘‘sit and wait’’ foraging strategy, watching the foliage for movement of potential prey (Hughes 1999). Western yellow-billed cuckoos generally forage within the tree canopy (Laymon and Halterman 1985).

The western yellow-billed cuckoo requires large tracts of riparian forest or woodland habitat along low-gradient rivers and streams in open riverine valleys that provide wide floodplain conditions (USFWS 2014c). The optimal size of habitat patches for the species is generally greater than 200 acres in extent and has dense canopy closure and high foliage volume of willows and cottonwoods (Laymon and Halterman 1989). Habitat between 100 acres and 200 acres, although considered suitable, are not consistently used by the species (Laymon and Halterman 1989). Habitat patches from 50 to 100 acres in size are considered marginal habitat; sites less than 37 acres are considered unsuitable habitat (Laymon and Halterman 1989). The species does not use narrow, steep-walled canyons (USFWS 2014c). Sites with strips of habitat less than 325 feet in width are rarely occupied for nesting (USFWS 2014c). Stopover and foraging sites can be similar to breeding sites but can be smaller in size (sometimes less than 10 acres in extent), narrower in width, and lack understory vegetation when compared to nesting sites (Laymon and Halterman 1989; USFWS 2014c). Minimum patch size for cuckoo occupancy is 12.4 acres; no cuckoos have been detected attempting to nest in patches this size or smaller in California or Arizona (Halterman et al. 2001; Johnson et al. 2010). They have also not been found nesting in narrow, linear habitat that is less than 33 to 66 feet wide (Halterman et al. 2015).

Optimal breeding habitat contains willow-dominated groves with dense canopy closure and well-foliaged branches for nest building with nearby foraging areas consisting of a mixture of cottonwoods and willows with a high volume of healthy foliage (USFWS 2014c). Sites can be relatively dense, contiguous stands, or irregularly shaped mosaics of dense vegetation with open areas (USFWS 2014c). In California, habitat often consists of willows mixed with Fremont cottonwood (Halterman et al. 2015). Nest trees range from 10 feet to 98 feet in height and are an average of 35 feet in height. Nests are built from 4 feet to 73 feet above the ground and are placed on well-foliaged branches closer to the tip of the branch than the trunk of the tree (Hughes 1999). Nests are typically well-concealed in dense vegetation (Halterman 2002; Laymon et al. 1997; McNeil et al. 2013). Canopy cover directly above the nest is generally dense, ranging from 64 to 94 percent with an average of 89 percent (Laymon et al. 1997; Halterman 2001, 2002, 2003, 2004, 2005, 2006). Hydrologic conditions can vary from dry in some years to inundated in others (USFWS 2014c). Humid conditions created by surface and subsurface moisture appear to be important habitat parameters for selection of nest sites (USFWS 2014c). Multiple studies have found that cuckoo preferred nesting sites in younger riparian habitat which, when compared to mature woodlands, provided high productivity of invertebrate prey and reduced predator abundance (Laymon 1998; McNeil et al. 2013; Carstensen et al. 2015; Stanek and Stanek 2012; Johnson et al. 2008). The dynamic transitional process of vegetation recruitment and maturity must be maintained to keep riparian habitat viable for this species over the long-term (USFWS 2014b). Wintering habitat consists of woody vegetation bordering fresh water in the lowlands (up to 4,921 feet above msl) including dense scrub, deciduous broadleaf forest, gallery forest, secondary forest, subhumid and scrub forest, and arid and semiarid forest edges (Hughes 1999).

Both adults build the nest, incubate the eggs, and brood and feed the young (Halterman et al. 2015). In approximately 30 percent of nests, unrelated helper males attend the nest (USFWS 2013a). Nest building may take as little as a half a day, with additional material added to the nest as incubation proceeds (Halterman 2009). Yellow-billed cuckoos build an open cup nest with a loose, saucer-shaped stick construction. Typical clutch size varies from two to five eggs depending on the available food supply (USFWS 2013a). Eggs are incubated from 11 to 12 days; males incubate the eggs at night, and both sexes alternate incubation and nestling care during the day (USFWS 2013a; Halterman 2009; Payne 2005). The young hatch asynchronously, with the older chick near fledging when the youngest has just hatched (Hughes 1999). Young fledge five to seven days after hatching (USFWS 2013a). Fledglings continue to be dependent on adults for approximately 14 to 21 days (and possibly up to 32 days) after fledging; males appear to be the primary caregivers after the young fledge (Halterman 2009). Yellow-billed cuckoos regularly nest twice during a breeding season (double brood); and, during years of exceptionally abundant food, can successfully nest three times in a season (triple brood) (USFWS 2013a). While the male tends to the first nest, the female can initiate a second nest either with the same mate or with a new male (Laymon et al. 1997; Halterman 2009). Nest success is high when compared to other open cup nesting birds, with nest success ranging from 70 to 100 percent of nests fledging at least one young (Laymon et al. 1997; Laymon and Williams 2002; Halterman 2001; McNeil et al. 2012; Halterman 2002, 2003, 2004, 2005, 2006).

Little is known about population substructure, dispersal of young and post-breeding adults, juvenile and adult site fidelity, or factors influencing breeding site detection and selection (Halterman et al. 2015). The available data show that adults and nestlings return to the same or nearby nesting sites in successive years (Laymon 1998). However, dramatic fluctuations in breeding pairs at long-term study sites indicate that year-to-year movement between potential breeding areas also occurs (USFWS 2013a). It is likely that cuckoos return to sites of previous successful breeding; but, if the conditions are not suitable that year, they move to other potential breeding sites. Banded birds have been recaptured/resighted 80 feet to 50 miles from their banding location (Halterman 2009; McNeil et al. 2013).

Western yellow-billed cuckoos historically bred throughout riparian systems in western North America from southern British Columbia, Canada, to northwestern Mexico (Hughes 1999). In the past 90 years, the species' range in the western United States has contracted; the northern limit of breeding along the west coast is now in the Sacramento Valley, while the breeding limit in the western interior states is in southeastern Idaho (USFWS 2013a). Within the three states with the highest historical numbers of yellow-billed cuckoo, past riparian habitat losses are estimated to be 90 to 95 percent in Arizona, 90 percent in New Mexico, and 90 to 99 percent in California (Ohmart 1994; USDOI 1994; Noss et al. 1995; Greco 2008). The primary factors threatening the western yellow-billed cuckoo are the loss and degradation of habitat for the species from altered watercourse hydrology and natural stream processes, livestock overgrazing, encroachment from agriculture, and conversion of native habitat to predominantly non-native vegetation. Additional threats to the species include the effects of climate change, pesticides, wildfire, and small and widely separated habitat patches (USFWS 2014b). Compared to conditions historically, the areas currently used for nesting by the western yellow-billed cuckoo are very limited and disjunct. The breeding population is small, with 680 to 1,025 nesting pairs (350 to 495 pairs in the United States and 330 to 530 nesting pairs in Mexico), and with no site exceeding 60 nesting pairs. Estimating numbers is problematic because an individual can nest in more than one location in a single year, possibly causing overestimates of the number of nesting pairs (USFWS 2014c).

In California prior to the 1930s, the species was widely distributed in suitable river bottom habitat and was locally common (Grinnell and Miller 1944). The first state-wide survey was conducted in 1977 and located 121 to 163 pairs of yellow-billed cuckoos. The second state-wide survey was conducted in 1986 and 1987 and estimated 32 to 42 pairs of yellow-billed cuckoos. The third state-wide survey was conducted in 1999 and 2000 and estimated 39 to 43 pairs of yellow-billed cuckoos. During this survey cuckoos were absent from many isolated locations where they had previously bred (e.g., Prado Basin in Riverside County, Mojave and Amargosa Rivers in San Bernardino County, and the Owens Valley in Inyo County), indicating a contraction of the breeding range to core areas (USFWS 2013a). Core areas in California include (1) the Sacramento River between Colusa and Red Bluff, (2) the South Fork of the Kern River upstream of Lake Isabella, and (3) lower Colorado River (Laymon and Halterman 1987). The current nesting population in California, based on surveys conducted in 2010, likely does not exceed 40 to 50 pairs found in only the three core locations.

This species formerly nested in the Los Angeles, San Gabriel, and the Santa Clara River systems (Allen and Garrett 1996). Breeding persisted until at least 1952 in the San Gabriel River near El Monte (Long 1993; Garrett and Dunn 1981). No nesting of this species has been documented in Los Angeles County since the late 1950s, although breeding is still "conceivable" in remnant riparian habitat along the Santa Clara River (Allen and Garrett 1996). In recent years, yellow-billed cuckoos occur in Los Angeles County and elsewhere in the Southern California Coastal Region only as rare migrants (Lehman 2015; Unitt 2004; Hamilton and Willick 1996; Garrett and

Dunn 1981; Webster et al. 1980). Although no recent breeding observations have been confirmed in the Southern California Coastal Region by the USFWS and/or CDFW, multiple observations of yellow-billed cuckoos have been reported at some locations with suitable breeding habitat, including the lower Santa Clara River in Ventura County, the Whittier Narrows area in Los Angeles County, Prado Basin in Riverside and San Bernardino Counties, San Joaquin Marsh in Orange County, and San Luis Rey River near Oceanside in San Diego County. These observations generally consist of single birds and sometimes occur at times that suggest summering individuals rather than migrants (Daniels pers comm 2018; McCaskie and Garrett 2013, 2014, 2015, 2016).

2.4.3.3.1 Critical Habitat

On February 27, 2020, the USFWS published a rule proposing Revised Critical Habitat for the western DPS of the yellow-billed cuckoo ((USFWS 2020a). The revised rule more accurately describes habitat used by the western yellow-billed cuckoo for breeding, especially in the monsoonal-type habitats in the Southwest. This revised rule proposes approximately 495,665 acres in Arizona, California, Colorado, Idaho, New Mexico, Texas, and Utah. In California, Critical Habitat includes Sacramento River (Colusa, Glenn, Butte, and Tehama Counties), South Fork Kern River Valley (Kern County), and in two areas along the Colorado River (Imperial, Riverside, and San Bernardino Counties in California; Yuma, La Paz, and Mohave Counties in Arizona) (USFWS 2020a). The proposed rule has not yet been finalized by the USFWS. The HCP study area is not located within the proposed Critical Habitat area for this species.

The PBFs for the western yellow-billed cuckoo are those habitat components that are essential for the species: (1) space for individual and population growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing (or development) of offspring; and (5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species. Specific primary constituent elements for the western yellow-billed cuckoo include those listed below (USFWS 2020a).

1. *Riparian woodlands, mesquite woodlands (mesquite-thorn-forest), and Madrean evergreen woodland drainages.*
    a. Rangewide breeding habitat is composed of woodlands within floodplains or in upland areas or terraces, often greater than 325 feet in width and 200 acres or more in extent with an overstory and understory vegetation component in contiguous, or nearly contiguous, patches adjacent to intermittent or perennial water courses. The slope of the watercourse is generally less than 3 percent but may be greater in some instances. Nesting sites within the habitat are above average canopy closure (greater than 70 percent), and have a cooler, more humid environment than the surrounding riparian and upland habitats.
    b. Southwestern breeding habitat is composed of more arid riparian woodlands (including mesquite bosques), desert scrub and desert grassland drainages with a tree component, and Madrean evergreen woodlands (oak and other tree species) in perennial, intermittent, and ephemeral drainages. These more arid riparian woodland drainages also bisect other habitat types, including Madrean evergreen woodlands, native and non-native desert grassland, and desert scrub. More than one habitat type within and adjacent to the drainage may contribute toward nesting habitat. Southwest breeding habitat is more water-limited; contains a greater proportion of xeroriparian and non-riparian plant species; and is often narrower, more open, patchier, or sparser than elsewhere in the DPS and may persist only as narrow bands or scattered patches along the bankline or as small in-channel islands. The habitat contains a tree or large-shrub component with a variable

overstory canopy and understory component that is sometimes less than 200 acres. Riparian trees (including xenoriparian) in these ecosystems may even be more sparsely distributed and less prevalent than non-riparian trees. Adjacent habitat may include managed (mowed) non-native vegetation or terraces of mesquite or other drought-tolerant species within the floodplain. In narrow or arid ephemeral drainages, breeding habitat commonly contains a mix of non-riparian vegetation found in the base habitat as well as riparian (including xenoriparian) trees.

2. *Adequate prey base.* Presence of a prey base consisting of large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies, moth larvae, spiders), lizards, and frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas.
3. *Hydrologic processes in natural or altered systems, that provide for maintaining or regenerating breeding habitat.*
    a. Rangewide breeding habitat hydrologic processes (including the Southwest): Hydrologic processes (either natural or managed) in river and reservoir systems that encourage sediment movement and deposits and promote riparian tree seedling germination and plant growth, maintenance, health, and vigor (e.g., lower gradient streams and broad floodplains, elevated subsurface groundwater table, and perennial rivers and streams). In some areas where habitat is being restored, such as on terraced slopes above the floodplain, this may include managed irrigated systems that may not naturally flood due to their elevation above the floodplain.
    b. Southwest breeding habitat hydrologic processes: In southwestern breeding habitat, elevated summer humidity and runoff resulting from seasonal water management practices or weather patterns and precipitation (typically from North American Monsoon or other tropical weather events) provide suitable conditions for prey species production and vegetation regeneration and growth. Elevated humidity is especially important to southeastern Arizona, where cuckoos breed in intermittent and ephemeral drainages.

The following special management considerations for the western yellow-billed cuckoo include those listed below (USFWS 2014c).

1. *Hydrological elements and processes can be managed to benefit riparian systems.* Stream flows can be restored by managing dams to mimic the natural hydrology to the greatest extent possible and to support the health and regeneration of native riparian shrub and tree vegetation. Reservoirs can be managed to reduce prolonged flooding of riparian habitat in the flood control drawdown zone, which kills or damages native riparian vegetation. Restoration of natural hydrological regimes or management of systems so that they mimic natural regimes that favor germination and growth of native plant species are important. Improving timing of water drawdown in reservoirs to coincide with the seed dispersal and germination of native species can be effective in restoring native riparian vegetation. Reducing water diversions and groundwater pumping that degrade riparian systems can benefit the western yellow-billed cuckoo and its habitat. Reduction of bank stabilization features, including riprap, levees, or other structures, that limit natural fluvial processes can promote maturation of the native riparian vegetation and prevent regular habitat regeneration. Clearing channels for flood flow conveyance or plowing of floodplains can be avoided. Projects can be managed to minimize clearing of native vegetation to help ensure that desired native species persist.

2. *Biotic elements and processes can be managed to benefit riparian systems.* Managed grazing areas, season, and use in riparian zones can increase western yellow-billed cuckoo habitat quality and quantity. Specifically, managing grazing so that native riparian trees and shrubs will regenerate on a regular basis is especially beneficial.
3. *Limiting extractive uses, such as gravel mining and woodcutting, in the vicinity of western yellow-billed cuckoo habitat is an important management tool.* Clearing of riparian habitat for agriculture, industrial and residential development, and road building and maintenance is detrimental to the species and should be moved from the floodplain management zone to the greatest extent possible.
4. *Removal of non-native vegetation in areas where natural regeneration of native riparian species may be a valuable management tool.* On some sites, replacement of non-native vegetation with native riparian tree species through active restoration plantings can speed up the habitat recovery process and more quickly benefit the western yellow-billed cuckoo.
5. *Fire can be managed to maintain and enhance habitat quality and quantity.* Fires in the riparian zone can be suppressed and the risk of wildfire can be reduced by restoring groundwater, base flows, flooding, and natural hydrological regimes. Reduction of fires caused by recreational activities and the reduction of fuel buildup and prevention of introduction of flammable exotic species can also be beneficial.
6. *Avoiding application of pesticides*. Avoiding application of pesticides that would limit the abundance of large insects and their larva on or in the vicinity of riparian areas at any time of year would help to maintain an adequate prey base for the western yellow-billed cuckoo.

Activities that could cause destruction or adverse modification of western yellow-billed cuckoo habitat include the following: (1) removing, thinning, or destroying riparian vegetation; (2) degradation of riparian vegetation such as through diminished or altered river flow regimes (e.g., water diversion or impoundment; ground water pumping; dam construction and operation; or any other activity which negatively changes the frequency, magnitude, duration, timing, or abundance of surface flow); spraying of pesticides that would reduce insect prey populations within or adjacent to riparian habitat; introduction of non-native plants, animals, or insects; or habitat degradation from recreation activities; (3) discharge of fill material, draining, ditching, tiling, pond construction, and stream channelization due to roads, construction of bridges, impoundments, discharge pipes, storm water detention basins, dikes, levees, and others; (4) overgrazing of livestock or ungulate (e.g., horses, burros) management; (5) new road construction and right-of-way designation; (6) activities associated with cleaning up Superfund sites, erosion control activities, flood control activities, and communication towers; and (7) activities that would affect waters of the United States under Section 404 of the Clean Water Act (e.g., placement of fill into wetlands) (USFWS 2014c).

2.4.3.3.2 Recovery Plan

A recovery plan has not yet been prepared for this species.

The USFWS recently considered a 2017 petition to delist the western yellow-billed cuckoo (USFWS 2018a). The petition claimed that there was an error in the DPS analysis and presented information about additional habitat use by the species. The USFWS' 90-day finding states that the petition did not provide substantial evidence that there was an error with the DPS analysis; however, the USFWS revisited the DPS analysis during the consideration of additional habitat use information that was provided (USFWS 2018a). The USFWS concluded that delisting the western yellow-billed cuckoo is not warranted at this time (USFWS 2020b).

2.4.3.3.3 Project Surveys to Date

2018 Focused Surveys for the Reservoir Restoration Project

Focused surveys for the Reservoir Restoration Project were conducted for the first time in 2018. Habitat in the vicinity of the Reservoir Restoration Project is considered only marginally suitable because of its limited width/extent; however, in consideration of the connection to downstream habitat along the entire length of Big Tujunga Creek, observations of yellow-billed cuckoo in smaller habitat patches in Arizona (Stanek pers comm 2018), and guidance in the USFWS protocol recommending surveys in habitat patches bigger than 12 acres if they are in proximity to another habitat patch of similar size (Halterman et al. 2015), surveys were conducted to formally determine the presence/absence of this species. The survey area included all riparian habitat from Big Tujunga Dam to 500 feet downstream of the Big Tujunga Canyon Road bridge. The area upstream of the Big Tujunga Reservoir (from the Reservoir to Fall Creek) was not surveyed because riparian habitat within 500 feet upstream of the sediment removal impact area was composed of riparian herb/scrub habitat that was too small in stature to be considered suitable for breeding in 2018.

The USFWS survey protocol for western yellow-billed cuckoo requires a minimum of four surveys be conducted in three time periods that span the peak of breeding activity for the western populations of this species: (1) one survey is required from June 15 to June 30 (migrating yellow-billed cuckoos are passing through, but breeding birds are also arriving); (2) two surveys are required from July 1 to July 31 (individual cuckoos encountered are mostly breeders but are occasionally migrants, wandering individuals, or young of the year); and (3) one survey is required from August 1 to August 15 (most breeding yellow-billed cuckoos have finished breeding activities and are departing). Each survey needs to be conducted 12 to 15 days apart. Focused surveys were conducted by Ms. Messett (TE-067064-3).

The Biologist systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. Per USFWS survey protocol for the species, the Biologist played recorded contact or “kowlp” calls of western yellow-billed cuckoo five times at one-minute intervals at each calling station (or point) established in the survey area. Compact speakers capable of broadcasting recorded bird calls in excess of 70 decibels were used during all surveys. Upon arriving at each calling point, the Biologist listened and watched for cuckoos for one minute prior to playing the broadcast contact calls. Calling points were established approximately every 328 feet in riparian habitat that provided potentially suitable or marginally suitable habitat for the western yellow-billed cuckoo. All surveys were conducted under optimal weather conditions (i.e., between 55° and 95°degrees Fahrenheit with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak. All wildlife species incidentally observed or detected were recorded.

Results

No western yellow-billed cuckoo were observed during the 2018 focused surveys.

2.4.3.3.4 Species Occurrence in HCP Study Area

In the analysis of potential habitat for western yellow-billed cuckoo, polygons of various types of riparian forest and riparian scrub within 985 feet (300 meters) of each other were merged to determine how many patches met the minimum size for occupancy. The result was that four polygons of potentially suitable habitat are in the HCP study area (downstream to upstream):

519.25 acres, 25.34 acres, 118.60 acres, and 60.65 acres (Exhibit 9).[18] The largest polygon that would be considered most suitable for the species is located at the lower end of the HCP study area near Hansen Dam. Habitat along the majority of Big Tujunga Creek would be considered marginally suitable and would not be expected to be consistently occupied because of its limited width/extent. Western yellow-billed cuckoo is not currently known to occur for breeding in the HCP study area; however, it is expected to use Big Tujunga Creek during migration and it could breed in the HCP study area in the future.

18 This analysis was done using vegetation polygons mapped in the HCP study area in August 2017, prior to the December 2017 Creek Fire. Approximately 292 acres of riparian forest/scrub habitat burned in the Creek Fire but is expected to recover within a few years.

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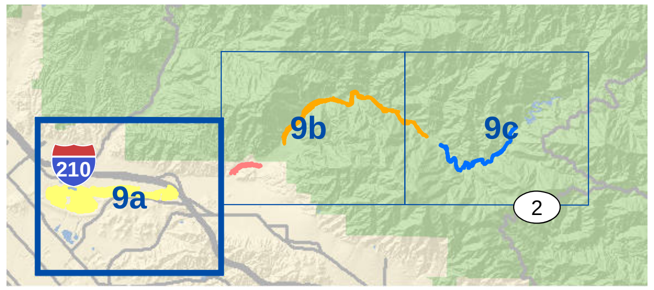

HCP Study Area

Action Area

Polygon 1 (519.25 acres)

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W E
S

2,000 1,000 0 2,000
Feet

Potential Habitat for Western Yellow-billed Cuckoo

Exhibit 9a

Big Tujunga Dam HCP

PSOMAS

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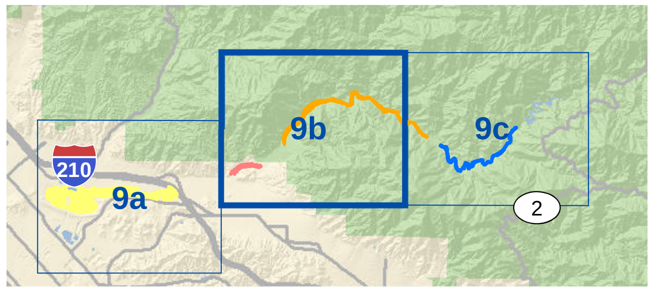

HCP Study Area
Action Area
Polygon 2 (25.34 acres)
Polygon 3 (118.60 acres)

N W E S

2,000 1,000 0 2,000 Feet

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Potential Habitat for Western Yellow-billed Cuckoo

Exhibit 9b

Big Tujunga Dam HCP

PSOMAS

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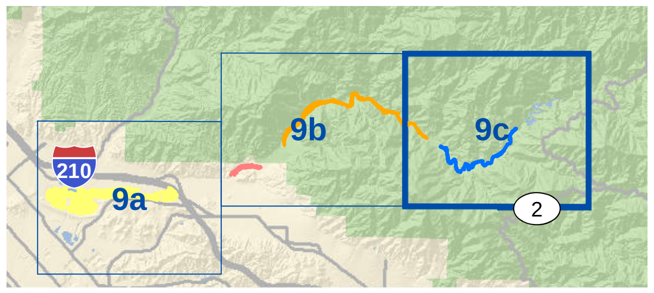

HCP Study Area
Action Area
Polygon 3 (118.60 acres)
Polygon 4 (60.65 acres)

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W E
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2,000 1,000 0 2,000
Feet

Potential Habitat for Western Yellow-billed Cuckoo

Exhibit 9c

Big Tujunga Dam HCP

PSOMAS

(Rev: 10/19/2020 MMD) R:\Projects\DPW\3DPW150105 (prev 3DPW028201)\Graphics\HCP\

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3.0 Covered Activities

This section will describe activities that would be covered by the HCP, including flood control operations, water conservation operations, routine and periodic maintenance projects (including the pending Reservoir Restoration Project), and the Spillway Improvement Project. The purpose of this HCP is to provide an ITP for the operation and maintenance of Big Tujunga Dam.

Big Tujunga Dam has an 82.3-square-mile tributary drainage area. Its design capacity is 6,240 acre-feet (af). The historical average rainfall for Big Tujunga Dam is approximately 26.05 inches per year. During an average rainfall year, 22 to 30 inches of rainfall are received at the on-site Big Tujunga Dam rain gage. A dry year is considered to be a storm season with less than 22 inches of rainfall, while a wet year is considered to be a storm season with more than 30 inches of rainfall. In a Mediterranean climate, the average is not the most commonly occurring rainfall; rather it is the average of the wet and dry years. Following the rainfall definitions above, there have been 47 dry years, 18 average years, and 27 wet years at the Dam over the last 92 years (Zargaryan 2020). Generally, annual storm season inflows range from approximately 2,700 af to over 20,000 af. In a wet year, flows can exceed 130,000 af.

Public Works, on behalf of the LACFCD, currently operates the Dam in accordance with the guidelines described below. These operational guidelines have been established based on nearly a century of operational experience. A majority of flood control releases are made during the storm season (October 15 to April 15); however, water conservation releases may also be made during the storm season to recharge the San Fernando Groundwater Basin. The purpose of flood control operations is to protect life and property (including downstream Tujunga Wash infrastructure) by attenuating potentially destructive storm flows. Decisions about flood control releases are made based upon available Reservoir capacity and inflows to the Dam. During the non-storm season (April 16 to October 14), a majority of releases are for water conservation purposes; however, flood control operations may occur in association with storm events during this period. The amount of water available for water conservation releases typically depends on the amount of rainfall that occurs during the storm season. Generally, water conservation releases are made in coordination with the availability of downstream spreading grounds to make sure the water is captured and allowed to percolate into local aquifers rather than traveling all the way to the ocean. Water conservation operations are typically more flexible than flood control operations because they normally occur when no significant storms are forecast and there is a minimal chance that the Reservoir capacity will be exceeded, which allows for the timing and rate of release to be adjusted. Conversely, flood control releases generally occur prior to, during, or shortly after a storm event, where the timing and rate of releases are determined based on attenuating flows and providing flood protection. Typically, an average of 4,000 af of storm water flows into and passes through the Dam each year based on average daily inflows and outflows at the Dam.

All operation and maintenance activities and their applicable conservation measures/avoidance and minimization measures are summarized at the end of this section.

3.1 FLOOD CONTROL OPERATIONS

During flood control operations, the Dam is operated to attenuate large inflows and maintain sufficient capacity in downstream rivers and flood control channels while preventing uncontrolled spillway flows. Flood control operations generally occur during the storm season (October 15 through April 15); however, these operations can occur at any time of year depending upon storm events. Flood control releases prior to, during, and following storm events are varied and depend upon weather forecasts, available storage capacity of the Dam, and inflows received in the Reservoir.

During flood control operations, the following guidelines are generally followed:

- Water is ponded to a minimum pool elevation of 2,225 feet[19] to protect the valves.
- When the water level is rising from minimum pool at elevation 2,225 feet[20] to 2,230 feet, water is ponded in preparation for flood control operations.
- When the water level is rising from 2,230 feet to 2,260 feet, water is released at a rate of 50 percent of the inflow up to 500 cfs.
- When the water level is rising from 2,260 feet to 2,290 feet, water is released at the rate of inflow or up to 500 cfs, whichever is less.
- Maximum releases are limited to 500 cfs because streamflows over 600 cfs would overtop the Oro Vista Avenue[21] crossing located downstream.
- When the Reservoir is anticipated to go to spillway, one or more valves may be opened to 100 percent capacity, which would allow a peak release of 2,970 cfs.[22]
- When the Reservoir reaches the spillway (i.e., 2,290 feet), the outlet works[23] are closed when the maximum release cannot be controlled.
- When the water level is falling, from 2,290 feet to 2,260 feet, water is released at 110 percent of the inflow; releases are typically limited to 500 cfs to avoid overtopping the Oro Vista Avenue crossing located downstream.
- When the water level is falling, from 2,260 feet to minimum pool, attenuated water is released at rates necessary to maintain flood control capacity at the Dam and for water conservation, depending on the capacity available in the downstream spreading ground facilities.
- The slide gate is currently below the sediment level and cannot be operated for flood control purposes until after the Reservoir Restoration Project is completed.
- These guidelines may be adjusted (i.e., rate of releases or elevation when the rate is adjusted[24]) as needed, depending on the frequency of storms and downstream capacity within the river.

During storm events, operation of the Dam is generally consistent with the natural flow conditions, with the exception that the peak flows from the storm are partially captured and attenuated within the Reservoir. While smaller storm events transmit some sediment downstream, much of the sediment settles out within the Reservoir. During moderate and major storm events, the higher flow rates and velocities through the Reservoir and outlet works carry more sediment with the water flows and less sediment settles in the Reservoir; this is closer to the natural sediment balance with the sediment moving with the water naturally through the system. Following the

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19 The elevation of minimum pool may change in the future (e.g., following sediment removal). Revisions to the elevations included in the operating procedures would be presented to the HCP Working Group as needed throughout the permit duration.

20 The elevation of minimum pool may change in the future (e.g., following sediment removal). Revisions to the elevations included in the operating procedures would be presented to the HCP Working Group as needed throughout the permit duration.

21 Future modification of the Oro Vista Avenue crossing may allow for larger releases in the future. If that occurs, an amendment to the HCP may be necessary to update the operational guidelines.

22 Valve 1 has an outflow of 565 cfs; Valve 2 has an outflow of 1,270 cfs; Valve 3 has an outflow of 880 cfs; Valve A1 has an outflow of 255 cfs; the sluice gate is not included. This totals 2,970 cfs.

23 Outlet works include one 42-inch fixed-cone valve, one 66-inch fixed-cone valve, one 54-inch fixed-cone valve, one 24-inch jet flow valve, and one 5-foot by 5-foot slide gate.

24 When large storms are imminent or when repeated storm events are predicted, water releases may be greater than described in the operational guidelines. Also, if emergency maintenance is needed (e.g., repair to clear a rockslide), valves may be closed to stop water releases during the emergency maintenance.

Reservoir Restoration Project, the slide gate and valves would be used to encourage water to carry sediment downstream to further mimic the natural sediment balance of the system.[25]

3.2 WATER CONSERVATION OPERATIONS

During water conservation releases, previously captured storm flows and accumulated recession flows (i.e., the runoff following storm events) are released for groundwater recharge at facilities located downstream. These operations occur year-round (i.e., during both the storm season and non-storm season); however, water conservation releases may not be made during the storm season if water is being held for the supplemental releases. Water conservation releases typically range from 100 to 400 cfs. Frequency and duration of these releases depend on the magnitude of past storms, flow rate of residual flows, and available capacity at downstream spreading grounds for percolation into local aquifers. Dam releases that occur below minimum pool (i.e., 2,225 feet[26]) are made for dewatering purposes only and are not considered flood control or water conservation releases.

Historically, accumulated attenuation flows (i.e., captured runoff during storm events) are released for water conservation purposes whenever possible. These flows are typically released following storms as soon as capacity becomes available in the downstream spreading ground facilities. Spreading ground facilities may remain full for extended periods following larger storm events because they are also utilized for capturing runoff from the uncontrolled tributaries downstream of the Dam.[27]

Factors affecting the amount of water that can be released during water conservation releases are numerous and include the frequency and intensity of rainfall/runoff events; water conservation release schedule; Dam, Reservoir, and appurtenant structure[28] maintenance projects (including routine and emergency projects); minimum pool requirements that are dependent upon Reservoir sediment levels; storm seasons with little rainfall and high temperatures; condition of the watershed (e.g., percent burned, vegetation moisture, saturation conditions); and amount of recession flows.

While the LACFCD owns the Dam, the City of Los Angeles (LADWP) has exclusive ownership and right[29] to all water flowing in and beneath the Los Angeles River from its sources to the southern boundary of the City, which includes flows from Big Tujunga Creek. Water conservation releases are typically made at a flow rate that ensures the water will make it to downstream spreading ground facilities where it will recharge the groundwater aquifer and will not be fully lost to in-stream percolation or evaporation. Based on operational experience, these releases must be at a rate of 100 cfs or greater to reach Hansen Spreading Grounds.

Water conservation and other non-flood control releases (described below) that occur during the Santa Ana sucker spawning season (i.e., March 1 to July 31) would be “ramped,” and a maximum

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25 The sediment management referred to here is flow-assisted sediment transport, where sediment moves with water flows; this is not the same as sluicing. Sluicing is mechanically-assisted movement of sediment (e.g., bulldozers are used to push sediment into the water). Sluicing is not proposed in the operations discussed herein.

26 The elevation of minimum pool may change in the future (e.g., following sediment removal).

27 Note that only half of the watershed is upstream and subject to control by the Dam; the other half is located below the Dam and is not controlled by the Dam.

28 An appurtenant structure is a structure critical to the safe functioning of the Dam, such as the spillway.

29 California recognizes water rights granted to pueblos (settlements) under the Spanish and Mexican governments. Under the doctrine, pueblos organized under the laws of Mexico or Spain have a water right to all streams and rivers flowing through the City and to all groundwater aquifers underlying the City. In addition, the pueblo's claim expands with the needs of the City and may be used to supply the needs of areas that are later annexed to the City. Los Angeles and San Diego are the only original pueblos to exercise their pueblo water rights in the courts.

flow rate of 250 cfs[30] would be used to minimize impacts on downstream habitat. Ramping is the method of increasing or decreasing the flow rate of water releases in a step-wise manner (using valve operations) over several hours or multiple days until the desired flow rate is achieved. This results in a gradual, rather than an abrupt, change in downstream flows. Tables 8 and 9 give examples of how flows could be "ramped up" and "ramped down" over a two-day period. The step-wise increases during ramping up/down would vary depending on how much water is needed to be released over a particular time period. However, the maximum step-wise increase during ramping would be limited to a 100 cfs change over four hours. These measures were developed collaboratively with the SASWG during the Big Tujunga Dam Rehabilitation Project and have been followed voluntarily by Public Works since they were established in approximately 2009.

TABLE 8
EXAMPLE OF RAMPING UP FLOWS

Day	Time	Release Rate (cfs)
Day 1	8:00 AM	10
Day 1	3:00 PM	25
Day 2	8:00 AM	50
cfs: cubic feet per second		

TABLE 9
EXAMPLE OF RAMPING DOWN FLOWS

Day	Time	Release Rate (cfs)
Day 1	8:00 AM	50
Day 1	3:00 PM	25
Day 2	8:00 AM	10
cfs: cubic feet per second		

30 250 cfs is the flow rate allowed for the Seven Oaks Dam on the Santa Ana River during the non-storm season (USACE 2014).

3.3 SUPPLEMENTAL RELEASES

Since completion of the Big Tujunga Dam Rehabilitation Project in 2011, supplemental releases (i.e., above-natural downstream flows released using available water stored in the Reservoir) have been made voluntarily to enhance downstream habitat conditions for the Santa Ana sucker during the non-storm season. A total of 1,500 af of water above minimum pool elevation has been, and would continue to be, allocated for supplemental releases each year, assuming water is available based on rainfall conditions of the year. Water stored for these releases comes from storm-attenuated water captured during the storm season. Releases during the non-storm season typically match inflow plus the supplemental releases; inflows are typically 5 to 30 cfs, with higher inflows occurring in the spring and lower inflows occurring in the late summer/fall. In addition, natural seepage from the Dam (typically 1 to 2 cfs)[31] also occurs. Supplemental releases can be made only when enough water is available in the Reservoir. The minimum pool (i.e., water elevation necessary to prevent sediment impacts to outlet valves) cannot be lowered to provide flows for supplemental releases. Table 10 shows the volume of water required in order to make sustained supplemental releases at each flow rate. Low-flow supplemental releases (i.e., from 1 to 5 cfs) are not ramped.

TABLE 10
VOLUME OF WATER REQUIRED TO MAKE SUSTAINED SUPPLEMENTAL RELEASES AT EACH FLOW RATE

Volume Required Above Minimum Pool (af)	Flow Rate (cfs)[a]
361	1
1,083	3
1,500	4.2

af: acre-feet; cfs: cubic feet per second

[a] Note: These rates are in addition to releases of recession flows (inflow to the Reservoir) and natural seepage associated with the Dam.

Based on historical records, these sustained flow rate targets are considered achievable in normal to wet years; however, due to the natural variation in the quantity and timing of runoff, supplemental flows cannot be guaranteed. Minimum rates for supplemental releases are shown in Table 11. During dry years, and/or due to the timing of rainfall and recession flows, water for supplemental releases may not be available. Public Works will make reasonable efforts to manage the water level in the Reservoir during the storm season to provide 1,500 af for the supplemental releases; however, despite best management efforts, rainfall may not be adequate to provide the entire 1,500 af for supplemental releases. Storing water for supplemental releases may reduce the amount of water available for water conservation releases. Additionally, required infrequent long-term, large-scale maintenance activities (estimated to occur once every ten years) may periodically prevent the ability to store water at the facility for supplemental releases.

[31] Note that seepage is a function of Reservoir elevation; if the Reservoir is below minimum pool, such as in a dewatered condition for a maintenance project, then seepage would be 0.1 to 1 cfs.

TABLE 11
MINIMUM SUPPLEMENTAL RELEASE RATES

Annual Rainfall[a]	Flow Rate (cfs)[b]
Normal to Wet	4.2
Dry	1–3

cfs: cubic feet per second

[a] Normal: 22 to 30 inches of rainfall; Wet: More than 30 inches of rainfall; Dry: Less than 22 inches of rainfall

[b] These rates are in addition to releases of recession flows (inflow to the Reservoir) and natural seepage associated with the Dam.

The supplemental release strategy is discussed at the SASWG meeting each spring. Public Works presents the estimated rainfall to date, the estimated recession flows and volume of water in the Reservoir available for supplemental releases for habitat enhancement. The SASWG discusses current rainfall and habitat conditions and recommends a release strategy, including the type of release (i.e., sustained release or pulsed release), flow rate, duration of release, and timing. With concurrence from Public Works and LADWP, the recommended flow strategy is implemented to the extent practicable within the flood control and water conservation constraints at the Dam and downstream facilities. In general, the volume of water available in the Reservoir determines the supplemental release rate for the non-storm season. The option would be to "pulse" supplemental releases rather than providing flows at a sustained rate. Pulses of higher flow rates for short periods of time may beneficially refresh pools and enhance water quality downstream. Adaptive Management will be used to determine the recommended flow regime for supplemental releases each year based on the biological and hydrologic data discussed.

At a sustained release rate using the minimum rates shown in Table 11, the Reservoir would be near minimum pool elevation at the beginning of the storm season (i.e., October 15). At that time, supplemental releases would stop and the Reservoir would generally be ready for flood control operations to commence.

3.4 MAINTENANCE PROJECTS

Dam and Reservoir maintenance is necessary to continue to operate the Dam and to keep the facility safe and functional. Maintenance activities may involve raising, lowering, or emptying the Reservoir and/or plunge pool, and/or temporarily stopping flow through the valves to perform the required work. Even if the valves are closed for some duration, seepage from the Dam continues to provide 1- to 2-cfs[32] flows to downstream areas. Also, the total flow within Big Tujunga Creek downstream of the Dam comes from both Dam releases and from tributaries downstream of the Dam; approximately half of the watershed is downstream of the Dam.

Typical maintenance projects are described below and are grouped based on their frequency of occurrence and the duration of the maintenance projects. Some maintenance projects can be completed in less than an hour (e.g., valve testing) while others require work throughout the non-storm season over multiple years (e.g., sediment removal). When the Reservoir level must be adjusted to accomplish required maintenance, efforts are made to conduct multiple maintenance projects at the same time for efficiency. When the Reservoir level must be adjusted to perform maintenance activities during the non-storm season, releases would be ramped as they are with water conservation releases during the Santa Ana sucker breeding season. During some maintenance projects that require lowering the Reservoir or limiting releases, supplemental

[32] Note that seepage is a function of Reservoir elevation; if the Reservoir is below minimum pool, such as in a dewatered condition for a maintenance project, then seepage would be 0.1 to 1 cfs.

releases (described in Section 3.3) may not be available for the duration of the maintenance project.

Some large-scale maintenance activities require the complete dewatering of the facility with only bypass flows (i.e., natural flows) available. For each of these projects (described below in Section 3.4.4), LACFCD (Public Works) will obtain the following required permits: a CDFW Streambed Alteration Agreement, a USACE 404 Permit, and a RWQCB 401 Water Quality Certification. Dewatering of the facility will include ramping of flows, standard Best Management Practices (BMPs), and monitoring to minimize downstream water quality impacts.

Some maintenance activities (e.g., small valve maintenance, stream gage repair, or channel repair) and Dam safety inspections require a temporary reduction or suspension of releases from the Dam to facilitate these activities. If work within the streambed is necessary, LACFCD (Public Works) will obtain any required regulatory permits (e.g., USACE Section 404 permit, CDFW Streambed Alteration Agreement, and RWQCB 401 Water Quality Certification), will utilize BMPs, and will bypass flows around the work area.

In the unlikely event of a Dam safety incident, lowering the water surface elevation may be required to reduce consequences of failure, to reduce forces on the Dam, or to facilitate incident-related inspections and repairs. Such activities are typically performed under the direction of the California Department of Water Resources - Division of Safety of Dams (DSOD). Due to the urgency of the safety concern, ramping of releases and restricted maximum flow rates may not occur. Since the Dam was constructed, this has occurred only one time after a seismic evaluation completed in 1976 determined that a restricted elevation was required until a seismic retrofit could be completed.

3.4.1 INSPECTIONS/TESTING

The Dam undergoes regular inspections and testing to ensure it is functioning safely and properly. These include facility inspections, Dam safety inspections, valve and slide gate safety, and Reservoir topographical surveys.

3.4.1.1 FACILITY INSPECTIONS

Public Works conducts routine inspections of the Dam and appurtenant structures; this involves visual inspection while walking down on the upstream/downstream face of the Dam structure and abutments or using a boat to patrol the Reservoir. These inspections are usually completed monthly and take a few hours.

Occasionally, emergency safety inspections (unscheduled) may require lowering the Reservoir elevation to view features on the upstream face of the Dam or Reservoir area. When this is required, a release is initiated to lower the Reservoir; and the Reservoir may be held at a certain elevation to allow the inspection. If the inspection requires review of a feature on the downstream face/area of the Dam, outflow may be temporarily stopped to allow safe access for the inspection. When inspections occur as part of routine operations, they are not expected to interfere with the availability of water for supplemental releases; however, if an emergency safety inspection is necessary, it could affect the availability of water for supplemental releases (described in Section 3.3) because the timing cannot be planned. In rare instances, the inspection may involve viewing an intake structure, which may require a complete drawdown (dewatering) to view the structure. Since the Dam was constructed, this has not occurred.

3.4.1.2 DAM SAFETY INSPECTIONS

The DSOD visits the Dam at least once per year to conduct a State inspection; however, the DSOD may also show up at any time to inspect the Dam. The inspection may or may not require the valves to be temporarily opened and closed, during which it is possible that water will be released. This inspection is typically completed in a few hours.

Public Works also conducts safety inspections of the Dam facilities as needed when an anomaly is noted by safety monitoring equipment. Safety inspections are always completed following an earthquake. To conduct these inspections, valves may be temporarily opened and closed, during which it is possible that water will be released. Dam safety inspections may require lowering the Reservoir elevation to view Dam features. These inspections are typically completed in a few hours; however, depending on the type of anomaly noted, the Reservoir elevation may need to remain lowered for a few days while Public Works observes the system to make sure it is functioning properly. Following the inspection, the speed at which the Reservoir returns to the previous elevation would depend on inflow.

Any noted deficiencies must be addressed and could require water releases to draw down the Reservoir to facilitate the inspection or repair. If a major problem is noted, the Reservoir may need to be completely dewatered, which would take approximately four days, depending on the depth of the Reservoir at the time dewatering begins. As mentioned above, since the Dam was constructed, this has not occurred.

3.4.1.3 VALVE AND SLIDE GATE TESTING

The DSOD requires that the valves and slide gates at the Dam be tested twice yearly; the DSOD may or may not attend. The testing generally involves fully cycling the valve or gate to ensure that it operates and that the Dam can be dewatered in an emergency if needed. The valve tests are typically scheduled every April/May and October/November because this coincides with the transition from the storm season to the non-storm season and from the non-storm season to the storm season. Valve and slide gate testing involves opening and closing each valve/gate, one at a time, which takes from 12 to 30 minutes per valve/gate. Valve and slide gate testing may also require a temporary closure of the Reservoir outflow. Testing is accomplished in one day and generally takes no more than three hours to cycle all valves/gates on the Dam.

Historically, valve tests involved operating the valve so it is open 100 percent, which could release up to 1,270 cfs of water (i.e., only if the Dam is at spillway elevation); however, since the Big Tujunga Dam Rehabilitation Project in 2011, Public Works has voluntarily limited valve tests to a maximum of 250 cfs at the valve works. When releasing 250 cfs from the valve works, the actual flows in the wash downstream of the facility are substantially less than this due to attenuation by the plunge pool. In order to fully test the valves, Public Works may increase their valve test flows back up to 100 percent of valve opening but will limit the duration that each valve is open to a maximum of 15 minutes. The last time the valves were opened to their maximum (for a flood control release) was in January 2017.

3.4.1.4 RESERVOIR TOPOGRAPHICAL SURVEYS

Bathymetric and/or aerial surveys of the Reservoir may be conducted to determine sediment accumulation within the Reservoir. Bathymetric surveys involve launching a boat with sonar equipment to survey the topographic contours of the bottom of the Reservoir. Aerial surveys may require lowering the level of the Reservoir to expose areas in the upstream portions of the Reservoir. This survey is completed in one day and has typically been required only once every several years; however, in the years following a fire in the watershed upstream of the Dam or to better define sediment accumulation, these surveys may be performed every year.

3.4.2 REGULAR SHORT-TERM, SMALL-SCALE MAINTENANCE

Regular short-term small-scale maintenance activities occur annually or multiple times per year and are limited in extent and duration. These activities include boat launch maintenance and trash booming and removal. These activities would not interfere with the availability of water for supplemental releases.

3.4.2.1 BOAT LAUNCH MAINTENANCE

The Dam currently has a boat ramp with a boat located on site for Reservoir inspections and facility maintenance (Exhibit 10). The boat ramp is earthen and periodically requires re-grading to maintain its condition as an access ramp for a truck and trailer to remove or deploy a boat. Also, a series of cables and a floating dock for docking the boat at the Dam will be installed as part of the Reservoir Restoration Project. The cables and dock would be inspected routinely and may require maintenance. Water releases to draw down the Reservoir may be required to gain access to the cables and dock or to repair the boat launch ramp. Maintenance would typically be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, draw down could be required in an emergency repair situation. These maintenance activities are typically completed in one day.

3.4.2.2 TRASH BOOMING AND REMOVAL

A trash boom is installed within the Reservoir immediately upstream of the Dam. The trash boom is used to prevent accumulation of floating vegetation and debris from impacting the upstream face of the Dam and impacting the intake structures. Public Works personnel will use the boat to collect the material and remove the debris to a location either on the peninsula or the boat launch ramp so that it may be removed and disposed of properly (Exhibit 10). The removal of the debris is labor intensive and can involve use of an onshore crane to lift material out of the Reservoir. Trash removal typically takes one day to complete and occurs more frequently during the storm season, though it may also occur during the non-storm season. The frequency of trash removal is highly dependent upon the amount of runoff received during the storm season, especially after the occurrence of fire, and may occur multiple times during the year. The Reservoir may be lowered or held steady to aid in the trash booming activities.

3.4.3 INFREQUENT SHORT-TERM, SMALL-SCALE MAINTENANCE

Infrequent short-term, small-scale maintenance activities occur once every several years and are limited in extent and duration. These activities include repair or painting of trash racks/penstocks; repair, replacement, or installation of leakage points, piezometers,[33] or other instrumentation or gages; repair of downstream stream gages; repair of downstream stream channels; repair of the downstream access road; repair of gunite and erosion protection measures; and geotechnical exploration. Maintenance would typically be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, draw down could be required in an emergency repair situation.

[33] Piezometers are monitoring wells installed for tracking groundwater elevations in the vicinity of the Dam.

3.4.3.1 REPAIR OR PAINTING OF TRASH RACKS/PENSTOCKS

The Dam has three main intake penstocks and two risers with trash racks.[34] Penstocks 1 and 3 are located in Riser 1, and Penstock 2 is located in Riser 2. The trash racks consist of steel cages that restrict the amount of debris that enters a penstock to prevent clogging of the penstock and damage of the valves. The trash racks are inspected annually to determine whether they have sustained damage during the storm season. Repair of trash racks may require drawing the Reservoir down to an elevation that exposes the trash racks to allow for repair work to occur. Flow through the affected penstock will be temporarily stopped to allow for repair work. This work is generally required only once every several years and can usually be completed within one week.

3.4.3.2 REPAIR, REPLACEMENT, OR INSTALLATION OF LEAKAGE POINTS, PIEZOMETERS, OR OTHER INSTRUMENTATION AND GAGES

The Dam has an extensive arrangement of Dam safety monitoring sensors and gage boards located within the Dam and at the downstream footprint of the Dam. The sensors and gage boards provide instantaneous readings that are monitored by Dam Section staff and reported to the DSOD. If an instrument (sensor and/or gage board) needs to be repaired or replaced, or other instruments/gages need to be installed, the Reservoir may need to be lowered to allow the installation of an instrument. Some instruments are located at the base of the Dam, and the well or leakage point may have artesian flow;[35] lowering the Reservoir lessens that pressure and would allow the instrument to be serviced or installed properly. Depending on the location of the instrument, workers may be required to rappel down the Dam face on ropes; therefore, the flow through the penstocks may be temporarily stopped to provide for their safety during the work. Some other repairs and replacement associated with the sensors and gage boards would include, but would not be limited to, maintenance of the steps and handrails next to these instruments. Typically, repair, replacement, installation, or maintenance of instruments/gages is required only once every several years and can be completed within one week.

3.4.3.3 REPAIR OF GUNITE AND EROSION PROTECTION MEASURES

The slopes adjacent to the Dam are protected from erosion with gunite, which may occasionally require repair. Depending on the location of the repairs, workers may be required to rappel down the cliff faces adjacent to the Dam on ropes; therefore, the flow through the valves may be temporarily stopped to provide for their safety during the work. Typically, repair of gunite can be completed within one week and is anticipated to be necessary only once every ten years.

If erosion is located on the abutments upstream of the Dam, the Reservoir may need to be lowered to an elevation that can allow the repair to occur. Typically, repair of gunite can be completed within one week and is anticipated to be necessary only once every ten years.

3.4.3.4 REPAIR OF DOWNSTREAM STREAM GAGES

A series of stream gages is located along Big Tujunga Creek downstream of the Dam (Exhibit 10). The stream gages are installed on gunite (concrete sprayed over the substrate to form a concrete pad). Maintenance primarily involves vacuuming debris out of the station's vault. If a stream gage or gage board requires maintenance, Dam valves may need to be closed temporarily to minimize flows during the work to provide for the safety of crews working downstream of the Dam. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is

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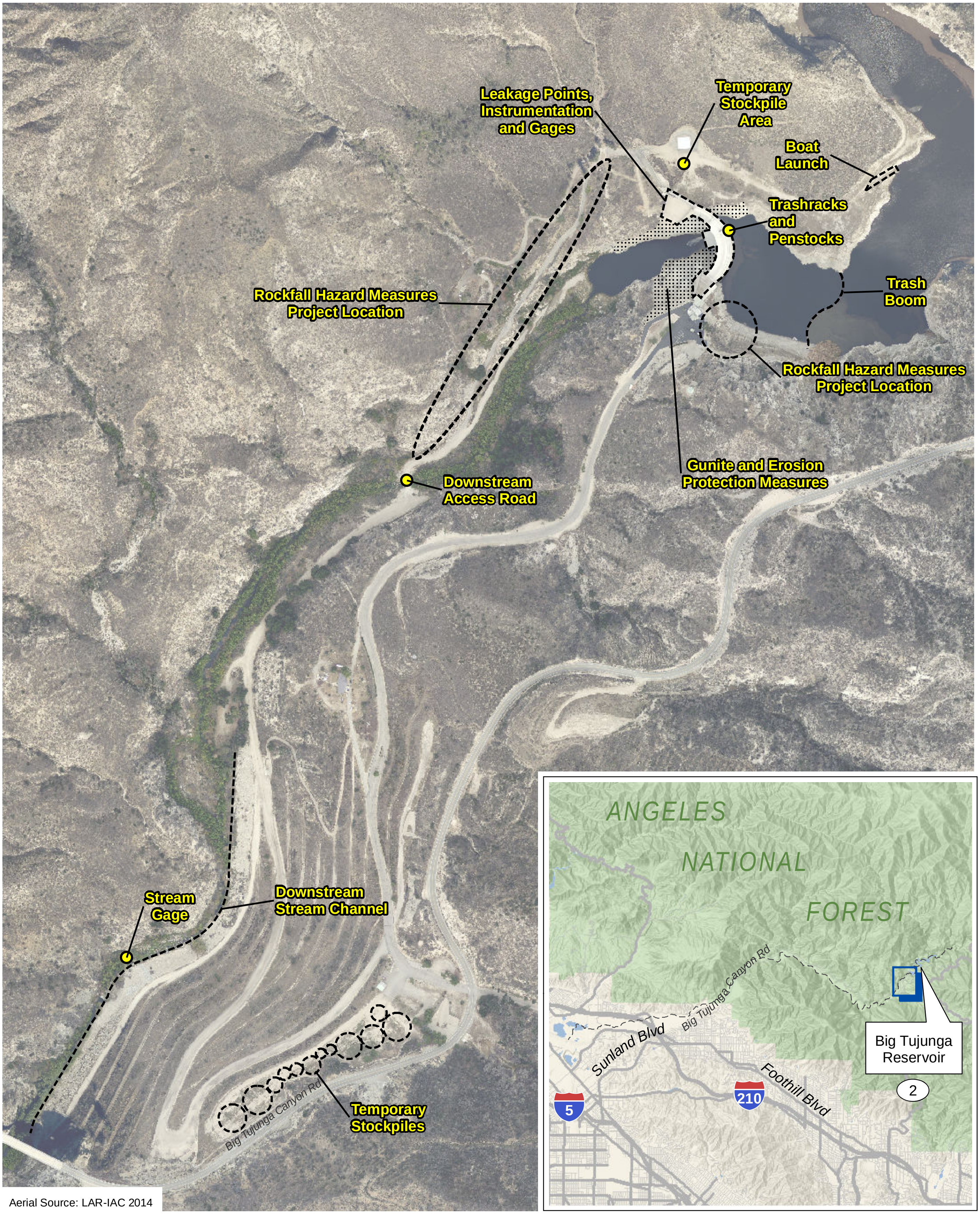
34 Penstocks are pipelines that allow Reservoir flow through the Dam. Risers/trash racks are the intake structures located at the upstream end of the penstocks.

35 Artesian flow is water that flows to the surface without pumping due to the pressure of confining the water between impermeable surfaces.



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Small-Scale Maintenance Project Locations

Exhibit 10

Big Tujunga Dam HCP

N W E S

550 275 0 550 Feet

PSOMAS

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below minimum pool) and inflow from other downstream tributaries would continue to occur. If necessary for the repairs, stream flow would be diverted around the work area using BMPs. This type of repair would typically take approximately one week and is anticipated to be necessary only once every ten years.

3.4.3.5 REPAIR OF DOWNSTREAM STREAM CHANNELS

The stream channel and inlets downstream of the Dam must be kept clear. Repair of the channel may include removal of debris and repair of slopes (Exhibit 10). To repair slopes, fill material that has eroded from the levee is placed in eroded areas and compacted to restore the original slope and stability of the levee. This work would require regulatory permitting from CDFW, USACE, and RWQCB. During this work, Dam valves may need to be closed temporarily to minimize flows to provide for the safety of crews working downstream of the Dam. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. If necessary for the repairs, stream flow would be diverted around the work area using BMPs or a diversion plan that has been submitted and approved by the resource agencies, as anticipated to be required by regulatory permits. This type of repair is estimated to take approximately one month and is anticipated to be necessary only once every several years.

3.4.3.6 REPAIR OF THE DOWNSTREAM ACCESS ROAD

Downstream of the Dam an access road crosses Big Tujunga Creek to allow vehicle traffic to access the western abutment of the Dam and the plunge pool area (Exhibit 10). If the road washes out or if a landslide blocks the road, the road may need to be repaired. If road replacement is necessary, the road/stream crossing design would continue to allow passage of aquatic species. Dam valves may need to be closed temporarily to minimize flows to provide for the safety of crews working downstream of the Dam. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. If necessary for the repairs, stream flow would be diverted around the work area using BMPs or a diversion plan that has been submitted and approved by the resource agencies, as anticipated to be required by regulatory permits. This type of repair is estimated to take approximately one month and is anticipated to be necessary only once every ten years.

An access road also runs from the eastern abutment of the Dam to the boat launch ramp; an access road from the helipad peninsula leads to the upstream portion of the Reservoir; and an access ramp descends to the Reservoir bottom. To repair these roads upstream of the Dam, the Reservoir may need to be lowered to allow for grading of the roads. This type of repair would typically take approximately one week and is anticipated to be necessary only once every ten years. Minor re-grading of the access roads may occur every year, but these re-grading/repairs occur without any need to adjust the level of the Reservoir.

3.4.3.7 ROCKFALL HAZARD MEASURES FOR ACCESS ROADS

On the north access road (west of the Dam and on the north side of the creek) and south access road (east of the Dam and on the south side of the Reservoir), several instances of falling rock have occurred. Rockfall curtains would be constructed along the cliffs above the access roads to protect the roads from falling rock. Construction of the rockfall curtains would be a one-time activity that is anticipated to occur over the course of approximately one month. The rockfall curtains may require maintenance in the future, which would be expected once every several years and is estimated to take approximately 2 to 3 weeks.

3.4.3.8 GEOTECHNICAL EXPLORATION

Geotechnical exploration may be warranted when an earthquake occurs and the Dam safety monitoring equipment shows abnormal readings that may need to be verified, or if a landslide occurs on an abutment. It may involve a Geologist investigating and mapping the abutment features to determine any anomalies (minor exploration), or it may require use of a drill rig to drill holes in the vicinity of the Dam, either upstream or downstream (extensive exploration). Dam valves may need to be closed temporarily to allow a drill rig to drill downstream of the Dam or to allow a Geologist to safely investigate the area. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. Geotechnical exploration can take up to a few weeks and is anticipated to occur, at most, once every ten years. The last geotechnical exploration occurred in 2005 prior to the Big Tujunga Dam Rehabilitation Project.

3.4.4 INFREQUENT LONG-TERM, LARGE-SCALE MAINTENANCE

Infrequent long-term, large-scale maintenance activities occur once every several years and are larger in extent and duration than those described above. These activities include sediment removal, subsurface grouting, concrete repair, and the Spillway Modification Project.

3.4.4.1 SEDIMENT REMOVAL

In order to preserve the Reservoir's capacity to retain storm and debris flows and in order to maintain the outlet works (i.e., valves, gates, and spillway) free of sediment and debris so they can function properly, sediment must be removed from the Reservoir periodically. In preparation for sediment removal projects, soil samples would be collected (by means of drilling) to characterize soil that is to be removed. Sediment-removal projects may require approximately five years of working throughout the non-storm season (work does not occur during the storm season). Once started for the season, sediment removal would continue until the onset of winter storms; the more non-storm months that are worked, the more quickly the sediment removal project can be completed. Sediment removal projects are anticipated to occur approximately once every ten years (following completion of the prior sediment removal).

As of the latest survey conducted in September 2017, Big Tujunga Reservoir contains approximately 2.1 million cubic yards (mcy) of sediment, but future storms could rapidly increase the amount of sediment held behind the Dam because the watershed is recovering from the 2009 Station Fire. The pending Reservoir Restoration Project, with deposition of sediment into Maple Canyon SPS, is a maintenance activity necessary to continue to operate the Dam and ensure its safety and function. The purpose of the Reservoir Restoration Project and any future sediment removal projects is to maintain the capacity of the Reservoir and to protect the capabilities of the Dam's outlet works. Reservoir capacity and operability of the outlet works are necessary to protect life and property by attenuating storm water flow peaks and to capture locally generated water to support the region's water supply. The Reservoir capacity and functioning outlet works are also needed to provide Supplemental Releases (described in Section 3.3) to provide for enhancement of downstream habitat to benefit the Santa Ana sucker and other species.

The San Gabriel Mountains exhibit an extremely high erosion rate (Sinclair 1954; Scott and Williams 1978). Additionally, storm water runoff from burned watersheds can result in greatly increased flows and higher quantities of sediment and debris in the flows due to burned and dislodged vegetation and lowered infiltration rates. Sediment inflow from natural erosion in the watershed and substantial sediment accumulation from fire/flood sequences significantly reduce the amount of storage capacity of the Reservoir over time.

The need for sediment removal is determined based on the amount of sediment deposition behind the Dam. Too much sediment accumulation can affect the ability of the outlet works (i.e., valves, gates, and spillway) to function correctly and can reduce available Reservoir capacity below that which is necessary for flood control storage or to safely contain future sediment inflow including the "Design Debris Event" (DDE). The DDE is defined as the quantity of sediment produced by a saturated watershed significantly recovered from a burn (after four years) as a result of a 50-year, 24-hour rainfall amount according to Public Works' Sedimentation Manual. The DDE for Big Tujunga Reservoir is approximately 6.9 mcy.

In order to preserve Big Tujunga Reservoir's capacity to retain storm flows and debris and to maintain the outlet works (i.e., valves, gates, and spillway) free of sediment and debris so they can function properly, Public Works would remove sediment from Big Tujunga Reservoir and deposit the sediment in Maple Canyon SPS. Sediment excavations would be conducted over an approximate 45-acre area within Big Tujunga Reservoir. The actual amount of sediment removal would depend on the amount of sediment deposition for each sediment removal maintenance project. The pending Reservoir Restoration Project (currently planned to be initiated in spring 2023) would remove between 2.1 mcy (i.e., the existing amount of sediment currently within Big Tujunga Reservoir) and 4.4 mcy (i.e., the existing remaining capacity of Maple Canyon SPS) of sediment; the actual amount of sediment removal beyond the existing 2.1 mcy would depend on the amount of sediment deposition in the coming years. This HCP would also cover future sediment removal activities within the Reservoir, assuming capacity remains for sediment placement in Maple Canyon SPS or LACFCD (Public Works) obtains the appropriate environmental clearances to deposit sediment elsewhere.

3.4.4.1.1 Project Schedule

Sediment removal projects are anticipated to begin approximately April 16 and would continue until all sediment above the Reservoir bottom is removed, or five years, whichever comes first. All sediment removal operations that would occur within Big Tujunga Reservoir, including dewatering, sediment removal activities, and equipment set-up and break-down, would be conducted annually from approximately April 16 to October 14 (i.e., the non-storm season); work could continue past October 14 until the first major forecasted storm. Approximately 20 double-bottom belly dump trucks would be mobilized to the site at the beginning of the non-storm season and would stay on site until the sediment removal activities are concluded for that season unless repairs, emergency, or other unusual needs arise that necessitate removing the trucks from the site. Sediment placement activities at Maple Canyon SPS would occur concurrent with sediment removal activities from the Reservoir. Vegetation clearing and site preparation at Maple Canyon SPS could occur prior to April 15, and final site compaction could occur after October 15. No sediment removal activities would occur from the first major storm through the remainder of the storm season (approximately October 15 to April 15); during the storm season, the Dam would be operated following normal flood control operation.

3.4.4.1.2 Pre-Dewatering Activities

As described in Section 3.1, during the storm season, flows are released from the Dam on an as needed basis, particularly during and after large storm events, to prevent/minimize downstream flooding and ensure adequate capacity within Big Tujunga Reservoir for the next storm event. As the storm season proceeds, water may be held in the Reservoir to provide for water conservation (described in Section 3.2) and supplemental releases (described in Section 3.3). During the storm seasons preceding sediment removal activities, supplemental water will not be held in the Reservoir. Water that would be released as part of normal flood control and water conservation operations would not be considered dewatering activities associated with sediment removal projects. During each year of sediment removal, Dam operators will release water from the Dam with a goal to reach an elevation of 2,188 feet by April 15. During each year of sediment removal, dewatering would occur from April 15 until the Reservoir is dry. The starting elevation on April 15 may vary each year based on rainfall patterns, but the goal will be for the Reservoir elevation to be at 2,188 on this date.

Public Works' Contractor would be responsible for three initial tasks: (1) installing a bypass line to divert inflow from the Reservoir (behind the Dam) into Big Tujunga Creek, (2) dewatering the plunge pool and removing fish, and (3) installing sediment filtration BMPs at the plunge pool's outfall into Big Tujunga Creek. These efforts are anticipated to take approximately five days and are discussed in detail below.

Creek Flow Diversion

During sediment removal during the non-storm season, Public Works would not have the ability to make releases from the Dam because no water would be retained within Big Tujunga Reservoir during sediment removal activities. To facilitate creek flow diversion during the non-storm season, a High-Density Polyethylene (HDPE) creekflow bypass line would be constructed to allow natural flows from the upstream Big Tujunga Creek to bypass construction activities.

The bypass would include a temporary inlet structure in the upstream area of the Reservoir to capture and direct the upstream creek flows into the bypass line; downstream of the bypass, the stream would be dry to permit construction work below the waterline. The bypass line would be laid along the length of the Reservoir and passed through a penstock within the Dam through a valve and would outlet at the mouth of Big Tujunga Creek near the plunge pool. Once the bypass line is fully installed and operational, all seasonal flows in Big Tujunga Creek would flow in an amount and rate dictated by natural conditions, as if the Dam were not there. Therefore, all outflows to Big Tujunga Creek downstream of the plunge pool would be equal to the inflows at the upstream portion of the Reservoir. This bypass line is consistent with the control of water approach that was successfully implemented during the 2009–2010 Big Tujunga Dam Rehabilitation Project.

Plunge Pool Dewatering

The plunge pool would be dewatered using pumps in order to prepare the plunge pool to receive dewatering flows. During this time, all Dam valves would be closed; no water releases would occur from the Dam into the plunge pool. Biologists would relocate any special status fish and aquatic herpetofauna species prior to dewatering the plunge pool per avoidance and minimization measures described below (see Section 3.7). After dewatering of the plunge pool is complete, Public Works' Contractor would evaluate whether removal of any existing sediment within the plunge pool would be required to facilitate its use as a sedimentation basin. Any sediment removed from the plunge pool would be deposited within Maple Canyon SPS. During sediment removal activities, sediment that accumulates within the plunge pool would be removed periodically, as necessary.

Water Quality Filtration BMPs

During this time, Public Works' Contractor would install water quality filtration BMPs between the plunge pool and the mouth of Big Tujunga Creek. These BMPs—such as sand/gravel bags, silt fencing, and/or other filtering devices—would be placed to prevent sediment from exiting the plunge pool into downstream waters and would be designed to tolerate the maximum outflow expected during dewatering. Once installed, the BMPs would allow the plunge pool to serve as a large sedimentation basin in which waters released from the Dam would be temporarily retained to allow for sediments to drop to the bottom of the pool. These BMPs would be designed with the goal of incorporating every reasonable effort to prevent or limit the flow of disturbed sediment and particulate matter downstream during project activities.

3.4.4.1.3 Dewatering of Reservoir and Control of Water

As the creek flow diversion, plunge pool dewatering, sediment removal, and BMP installation efforts are occurring during the first five days of project activity, all Dam valves would be closed; no water releases would occur from the Dam into the plunge pool. During this time, recession flows (i.e., inflow into the Reservoir) would pond behind the Dam. An analysis of data from the Public Works' database of daily releases in the month of April from 1998 through 2012 determined the inflow that can be expected during wet, average, and dry years over the duration of the project.[36] These flows were then used to calculate the rise in Reservoir elevation over the five days of pre-dewatering activities. In a wet year, the Reservoir would rise to elevation of 2,221 feet. In an average year, the Reservoir would rise to 2,207 feet. In a dry year, the rise would be negligible.

Wet Year Dewatering

Flow rates are a factor for consideration when determining the impacts of dewatering on the hydrology and aquatic habitat of Big Tujunga Creek. A Dewatering Schedule was developed for a wet year scenario by examining historic flows during wet years (i.e., rainfall greater than 30 inches). The average inflow to Big Tujunga Reservoir during the months of April and May in a wet year is estimated to be 72.5 cfs.

The Wet Year Dewatering Schedule is the anticipated schedule that Public Works would implement during a wet year to dewater the Reservoir after April 15 (Table 12).

[36] The wet year data is the average inflow during the month of April in the wettest three years between 1999 and 2012. The dry year average inflow is the average inflow in April during the driest year between 1999 and 2012. The average year data is the average between the wet and dry year average inflow.

TABLE 12
"WET YEAR" DEWATERING SCHEDULE

Day	Time	Dam Flows	Estimated Elevation (feet above msl)	Activity
1	All Day	None (Close Valves)	2,188	Dewater plunge pool, install bypass line, and install filtration BMPs
2	All Day	None (Close Valves)	–	
3	All Day	None (Close Valves)	–	
4	All Day	None (Close Valves)	–	
5	All Day	None (Close Valves)	2,221	
6	8:00 AM to 3:00 PM	15 cfs to 60 cfs	2,222	Ramp Up Water Releases from Dam
7	8:00 AM to 3:00 PM	75 cfs to 100 cfs	2,221	
8	All Day	120 cfs	2,220	
9	All Day	140 cfs	2,216	
10	All Day	160 cfs	2,210	
11	All Day	180 cfs[37]	2,202	Peak Water Releases from Dam to Reach Minimum Pool[a]
12	8:00 AM to 5:00 PM	180 cfs	2,188	
13	All Day	82.5 cfs	–	Pumping of 10 cfs and bypass pipeline flows of 72.5 cfs until dewatering is complete
14	All Day	82.5 cfs	–	
15	All Day	82.5 cfs	–	
16	All Day	82.5 cfs	–	
17	All Day	82.5 cfs	–	
18	All Day	82.5 cfs	–	
19	All Day	82.5 cfs	–	
20	All Day	82.5 cfs	–	
21	All Day	82.5 cfs	–	
22	All Day	82.5 cfs	–	
23	All Day	82.5 cfs	–	
24	All Day	82.5 cfs	–	
25	12:00 AM to 3:00 AM	82.5 cfs	2,170	

msl: mean sea level; BMPs: best management practices; cfs: cubic feet per second

[a] Although not specifically shown through a change in valve pressure in this table, the flows would ramp down naturally from 180 cfs as the water Reservoir level decreases (Chimienti 2012).

Source: Mahulikar 2013.

[37] Environmental documentation for the pending Reservoir Restoration Project precedes the approval of the HCP. Although water conservation releases of up to 250 cfs during the non-storm season are being discussed with the USFWS as part of the HCP, Public Works is proposing 180 cfs as the maximum release during annual dewatering of the pending Reservoir Restoration Project to be consistent with the project description in previous environmental documentation for the Reservoir Restoration Project.

At the end of the five days of pre-dewatering activities, ponded water would reach an elevation of 2,221 feet above msl based on an average inflow of 72.5 cfs in a wet year. At this time, Valve A-1 would be used to release water starting at 15 cfs and ramping flows up to 180 cfs (Table 12). It would take approximately five days of ramping flows to reach an outflow of 160 cfs. After two additional days of releasing at 180 cfs, the water elevation would be below the elevation of the inlet on Riser 1 for Penstock 2. At this time, either Valve 2 would be used or pumps would be used to continue to dewater the Reservoir. The pumps would be powered by generators or electricity available at the Dam control house. In total, approximately five days of ramping releases from 0 to 160 cfs and two additional days of releases at 180 cfs would be required to dewater the Reservoir in a wet year from an elevation of 2,221 feet above msl to an elevation of 2,188 feet above msl. Flows would ramp down (decrease) naturally as the Reservoir level decreases (Chimienti 2012).

At this point, Public Works' Contractor would have completed installation of the upstream bypass line, and inflows to the Reservoir would then be diverted through the HDPE line directly into Penstock 1 or 2. The Contractor would use a floating barge and pumps to continue to dewater the Reservoir from an elevation of 2,188 feet above msl to the top of sediment elevation at 2,170 feet above msl. The pumps would release approximately 10 cfs through either Penstock 1 or 2. The pumped water would combine with the bypass water for a total of approximately 82.5 cfs, and this outflow would continue for approximately 13 days until the Reservoir is completely dewatered to the sediment level. In addition, a 5-foot-by-5-foot hydraulic slide gate is located on the upstream face of the Dam at elevation 2,144 feet above msl. The slide gate may be used for dewatering in Year 2 and subsequent years, once sediment is excavated from the vicinity of its inlet.

In total, the dewatering process in a wet year could require a minimum of 25 days; however, only two days would include releases as high as 180 cfs. These time frames are estimates only; dewatering activities may take longer if storms occur late in the rainy season or after April 15. The maximum 180 cfs release used in this scenario may be increased to 250 cfs for dewatering for future infrequent long-term maintenance projects.

Average Year Dewatering

Average year dewatering would follow a similar pattern of ramping up and ramping down flows (as shown in Table 12) to minimize impacts to fish and other aquatic resources downstream of the plunge pool in Big Tujunga Creek.

The average inflow to Big Tujunga Reservoir during the month of April in an average rainfall year (i.e., 22 to 30 inches of rainfall) is 37 cfs. With no outflow from the Dam during the first five days of pre-dewatering activities, the water would rise from an elevation of 2,188 feet above msl to approximately 2,207 feet above msl. Valve A-1 would be used to dewater the Reservoir from an elevation of 2,207 feet above msl to an elevation of 2,202 feet above msl. Flows would be ramped starting at 15 cfs until 100 cfs is reached, which would require approximately two days. Flows would be released for approximately two days at 100 cfs to reach an elevation of 2,188 feet above msl and would be done by either opening Valve 2 to less than 10 percent, or with the use of pumps.

Once the water level is at an elevation of 2,188 feet above msl, the bypass line would be completely installed and inflows to the Reservoir would be bypassed through either Penstock 1 or 2. Public Works' Contractor would pump water through either Penstock 1 or 2 at 10 cfs, and this flow would mix with the bypass flow of 37 cfs for a total outflow of 47 cfs. It would take 13 days to release the remaining water from the Reservoir using pumps at a rate of 47 cfs. In total, the dewatering process in an average year would require 21 days at a minimum.

Dry Year Dewatering

Dry year dewatering would follow a similar pattern of ramping up and ramping down flows, as shown in Table 12, to minimize impacts to fish and other aquatic resources downstream of the plunge pool in Big Tujunga Creek.

The average inflow to Big Tujunga Reservoir during the month of April in a dry year (i.e., less than 22 inches of rainfall) is 1.7 cfs. With an inflow of only 1.7 cfs, the Reservoir elevation would not change during the five days of pre-dewatering activity and would remain at an elevation of 2,188 feet above msl. After five days, the bypass line installation would be complete and the Contractor would begin pumping 10 cfs into either Penstock 1 or 2. The pumped flow would combine with the bypass flow for a total outflow of 11.7 cfs. Releasing water at this rate would require approximately 12 days to lower the Reservoir level from an elevation of 2,188 feet above msl to 2,170 feet above msl. In total, the dewatering process in a dry year would take a minimum of 17 days.

3.4.4.1.4 <u>Sediment Removal from Big Tujunga Reservoir</u>

Once the Reservoir is fully dewatered, excavation of the sediment from the Reservoir and transport to Maple Canyon SPS would begin. The footprint of sediment removal would cover approximately 45 acres within the Reservoir. Sediment removal activities at the Reservoir would continue to occur until the remaining ultimate capacity of Maple Canyon SPS has been exhausted, until the required Reservoir capacity is achieved, or the five-year sediment removal duration is complete.

Workdays are anticipated to include approximately eight hours per day of equipment activity, assuming a maximum of 400 round-trip truck trips per workday (i.e., an average of 50 trucks per hour over an eight-hour workday). If work proceeds slower on some days than others, the eight-hour workday may be extended; however, the work shall be limited to approximately 400 round-trip truck trips within a given day. Additionally, Public Works' Contractor must document the number of round-trip truck trips for each day of sediment removal and maintain an accurate log of daily truck trips and mileage per truck; the daily log must be available for review and confirmation by Public Works upon request.

It is anticipated that approximately 20 double-bottom belly dump trucks with capacities of 18 cy per load would be used to transport the sediment from the Reservoir to Maple Canyon SPS. Approximately 20 double-bottom belly dump trucks would be mobilized to the site at the beginning of the non-storm season and would stay on site until the sediment removal activities are concluded for that season unless repairs, emergency, or other unusual needs arise that necessitate removing the trucks from the site. The dump trucks would then leave the site at the end of the non-storm season. Therefore, the daily dump truck trips would be limited to traveling between the Reservoir and Maple Canyon SPS, and the truck drivers and other employees would drive to the site each day in their personal/work vehicles. Approximately 53 personal/work vehicles would be traveling each day to and from the site. Work would be conducted during the non-storm season between approximately April 16 and October 14 (or until the first forecasted storm). Work would typically be conducted Monday through Friday on a weekly basis; however, the air quality analysis for the pending Reservoir Restoration Project assumed work may occur Monday through Saturday for a conservative analysis.

All off-road equipment would be required to be Tier 4[38] to significantly reduce air quality pollutants. Bulldozers and other heavy equipment would be operated continuously at Maple Canyon SPS in order to spread and compact the sediment during the non-storm season. The access roads behind the Dam on either side of the Reservoir would be rehabilitated to restore access to the dewatered Reservoir bottom. This connection would allow trucks to travel via a one-way loop using the internal access roads but would not limit the contractor to using this route as long as all South Coast Air Quality Management District (SCAQMD) thresholds and County specifications are met.

Maple Canyon SPS is the closest active sediment placement site to the Reservoir. Empty trucks would travel approximately 1.8 miles from the top of Maple Canyon SPS, across Big Tujunga Canyon Road to the westernmost leg of the access road, to the Dam structure. Trucks would travel through the approximate 0.7-mile loop behind the Dam, of which approximately 0.33 mile would be unpaved along the Reservoir bottom, where the trucks would be filled with sediment. Full trucks would then travel approximately 2.4 miles from the Dam, down the easternmost leg of the access road and across Big Tujunga Canyon Road to Maple Canyon SPS. The entire truck loop would be approximately 5 miles in total. Of this access road loop, approximately 2.15 miles are currently unpaved. The unpaved roadway would be paved with asphalt (with the exception of 0.33 mile in the Reservoir beneath the ordinary high water mark [OHWM]) as part of the pending Reservoir Restoration Project in order to reduce fugitive dust emissions. The existing approximately 3 miles of paved access roads would be maintained in their existing condition. For stockpiling of aggregate material, the full trucks would travel on the same route (as if traveling to Maple Canyon SPS), but before crossing Big Tujunga Canyon Road to Maple Canyon SPS, the trucks would turn into the staging area west of Maple Canyon and Big Tujunga Canyon Road. Trucks would travel on a 20-foot access road where 12 stockpiles would be created to temporarily store up to approximately 28,000 cy of aggregate material. Some of this material may be used to supplement cobble/gravel substrate downstream as a potential habitat enhancement (see Section 5.5).

Coast live oak trees are present along portions of the access road between the Reservoir and Maple Canyon SPS. Though not anticipated, if any coast live oak tree branches or roots need to be trimmed or maintained during sediment removal projects, it would be done under the direction of a certified Arborist to ensure that it would avoid or minimize adversely affecting the health and viability of the oak trees.

3.4.4.1.5 Sediment Placement at Maple Canyon SPS

Prior to any sediment placement, areas within the fill footprint of Maple Canyon SPS would be cleared of vegetation and grubbed. Sediment brought to Maple Canyon SPS would be dumped by trucks into a temporary stockpile, where dozers would push the sediment and spread it into fill areas. This would involve the creation of benched terraces and access roads that zigzag through the SPS. Benching at regular intervals and low slopes (i.e., 2:1) would be incorporated as an additional measure to reduce erosion. Approximately 20 double-bottom belly dump trucks would be mobilized to the site at the beginning of the non-storm season and would stay on site until the sediment removal activities are concluded for that season unless repairs, emergency, or other unusual needs arise that necessitate removing the trucks from the site.

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38 The engines for the off-road equipment must be certified by the U.S. Environmental Protection Agency (USEPA) or the California Air Resources Board (CARB) to meet the Tier 4 Final emission requirements listed in the *Code of Federal Regulations* (Title 40, Part 89, Control of Emissions from New and In-use Nonroad Compression-Ignition Engines), as shown in the SCAQMD's Best Available Control Technologies Guidelines for Non-Major Polluting Facilities (BACT Guidelines Part D), or equipment would need to otherwise demonstrate that it meets the Tier 4 Final emission limits shown in the BACT Guidelines.

Maple Canyon SPS currently holds approximately 3.0 mcy of sediment. An additional 4.4 mcy of sediment would cover approximately 29.7 acres within Maple Canyon SPS, of which approximately 8.0 acres currently contains sediment from previous projects; this would eliminate the remaining capacity of the SPS. If only 2.1 mcy is removed from the Reservoir during the pending Reservoir Restoration Project, fewer acres of Maple Canyon SPS would be impacted at this time, which would leave 2.3 mcy of remaining capacity for future sediment removal projects.

The design for Maple Canyon SPS is based on Public Works' Hydraulic Design Manual standards and incorporates features to reduce erosion. The vehicular access road, underground drainage pipes, and surface drainage facilities (e.g., gutters, inlets, and surface drains) were installed throughout Maple Canyon SPS during the previous sediment placement activities to convey surface runoff through Maple Canyon SPS, intercept any natural seepage from the underlying strata, and collect and convey these waters through an underground pipe to discharge into Big Tujunga Creek approximately 4,000 feet downstream of the Dam. Debris basins were also installed at the upstream end of each underground drainage pipe to catch eroded sediment from the natural drainages. During the implementation of the pending Reservoir Restoration Project and any future sediment removal projects, these drainage facilities would be extended into new fill areas of Maple Canyon.

It is possible that sediment placement at Maple Canyon SPS would occur in two (or more) phases if less than the remaining 4.4 mcy capacity of the SPS is placed during the pending Reservoir Restoration Project. Phase 1 would include the pending Reservoir Restoration Project (currently approximately 2.1 mcy of sediment and aggregate). In order to reduce the potential for fugitive dust, the 2.1 mcy of sediment, (approximately 10 acres of placed sediment) would be revegetated as deemed acceptable by the USFS. If phasing is required, then Phase 2 would be completed at a later date and may include multiple subphases to place the remaining SPS capacity of 2.3 mcy of sediment and aggregate. Upon completion of all sediment placement, LACFCD (Public Works) would revegetate the remaining 16 acres of the SPS following the same concepts as Phase 1. Although not anticipated, partial removal of previously planted vegetation from Phase 1 may be required to fill the remainder of Maple Canyon. Once Phase 2 and any subsequent phases/subphases are complete, the entire fill area would be revegetated in accordance with the requirements of the USFS Supplemental Use Permit (SUP) and revegetation plan.

In 2012, Public Works prepared a draft *Maple Canyon Sediment Placement Site Revegetation and Ultimate Completion Guidance* document that set forth a plan for closure of Maple Canyon SPS as part of the issuance of the SUP for the pending Reservoir Restoration Project. The USFS has prepared a *Draft Maple Canyon Sediment Placement Site Revegetation Plan* which describes in detail, the revegetation activities required to restore biological functions to the hillsides, reduce visual impacts, and control erosion at Maple Canyon SPS. The revegetation plan includes the application of locally collected native seed mix; installation of container stock plants, such as trees and native shrubs; and temporary irrigation to ensure appropriate establishment of the vegetation. All seeds for native trees, shrubs, and grasses would be selected from those that are growing naturally on the sides of and around Maple Canyon SPS and would be collected from the Angeles National Forest, Zone 993. Revegetation efforts at Maple Canyon SPS would require occasional water truck trips from the Reservoir to fill the existing 50,000-gallon water tank at Maple Canyon SPS for use in irrigation. The plan requires LACFCD (Public Works) to provide annual monitoring reports to the USFS to document the success of the revegetation efforts.

3.4.4.1.6 Temporary Stockpile Staging Area

Sediment removal operations would also involve the on-site crushing and stockpiling of rock and gravel materials that are determined to be suitable for beneficial re-use within the Angeles National Forest. During sediment removal activities, some large rocks would be set aside within the dewatered Reservoir; these would be processed/crushed to reduce the size of the rocks and sorted by size for stockpiling of up to 28,000 cy. This activity may occur during each year of sediment removal activity. Once the aggregate has reached a volume of approximately 28,000 cy from the crushing process, the stockpiles would not be replenished. Aggregate material would be stored at the staging area west of Maple Canyon SPS and would be available for future use by both Public Works' Stormwater Maintenance Division (SWMD) and Road Maintenance Division (RMD) for routine maintenance activities that are unrelated to the pending Reservoir Restoration Project. The cobble/gravel may also be used for potential habitat enhancement projects (see Section 5.5). After the aggregate material stockpile has reached a volume of approximately 28,000 cy, all sediment (including aggregate material) removed from the Reservoir would be deposited within Maple Canyon SPS. The stockpiles of aggregate would remain at the staging area until they are used over time through various ongoing road and general maintenance activities. The rate at which the stockpiles will be used is unknown, and the ultimate end use of the aggregate material is unknown; therefore, they are considered to potentially remain on site for an extended period of time. At the staging area, the aggregate would be arranged into 12 gravel cones, which would range in height from approximately 14 to 41 feet tall and in diameter from 42 to 120 feet wide at maximum capacity.

3.4.4.1.7 Other Miscellaneous Improvements

Other minor activities that would occur in conjunction with the pending Reservoir Restoration Project include: (1) hydroblasting to flush a stilling well on the Dam crest; (2) repairing the hydraulic sluicegate; (3) paving the access road and repairing the culvert crossing; (4) conducting slope protection measures adjacent to the spillway; (5) widening the southern access ramp to safely access the Reservoir bottom; and (6) installing a boat dock at the Dam. These activities are described in more detail below.

In order to maintain the functionality of the existing stilling well that is located on the Dam's crest, the stilling well would be hydroblasted to clear cement slurry that has accumulated within the pipe of the well. The Public Works' Contractor would unplug the existing 4-inch pipeline and 10-inch pipeline so that the water inside the 10-inch vertical pipe within the Dam structure would fluctuate with Reservoir water elevation changes. While the Reservoir is dewatered, the discharge from the hydroblasting of the stilling well would be discharged to the upstream face of the Dam, and the water would be captured and stored in temporary water tanks that would be mobilized at the site. This process would last a couple of days and would occur one time.

The sediment removal activities associated with the pending Reservoir Restoration Project would expose the existing sluice gate hydraulic system, which is currently covered with sediment. In order to maintain functionality, portions of the existing sluice gate hydraulic system would be replaced. This activity would occur for approximately one month. All work would occur within the Dam structure. The sluice gate hydraulic system would require the installation of new needle valves and ball valves and modification and/or replacement of sections of the pipes within the system. All activities related to the repair of the sluice gate hydraulic system would be completed with hand tools; no additional vehicles would be required.

On the existing access road downstream of the Dam where the road crosses over the Big Tujunga Creek, a new concrete slab would be poured over the existing culvert crossing. This would be a one-time event that would occur before any large construction trucks/equipment would be allowed to cross the culvert. Additionally, prior to sediment removal activities as part of the pending Reservoir Restoration Project, approximately 2.15 miles of haul road behind the Dam would be paved with asphalt in order to reduce fugitive dust from truck trips.

Between the plunge pool on the western side of the Dam and the north access road is an area of steep slopes that will be modified to minimize erosion of the naturally rocky slopes. The slope repair involves the import and placement of light riprap and crushed rock from the stockpile areas placed over a geotextile filter fabric on the face of the slope to repair existing slope erosion and prevent further degradation of the surface soils. The area of repair is adjacent to the existing spillway retaining wall to the south and the existing northern access road. This work is a one-time activity that is anticipated to occur over the course of approximately one month.

During the initial year of sediment removal for the pending Reservoir Restoration Project, up to 60,400 cy of excavated sediment from the Reservoir would be placed as engineered fill below a former landslide on the slope above the existing access road. This would allow safe clearance for an access road connection between the existing southern access road (near the control house on the southern side of the Dam) and the interior of the Reservoir area. This “upper south access road” would be constructed only in the initial year of the pending Reservoir Restoration Project but would be maintained as needed throughout the sediment removal activities. Upon completion of sediment removal from the Reservoir, the repaired landslide and access road would be restored to original condition.

The installation of a boat dock was originally included in the 2006 Big Tujunga Dam Rehabilitation Project and was scheduled to be completed as part of that project. Delays in completing the construction prevented the boat dock from being installed. Therefore, the boat dock will be installed near the end of the pending Reservoir Restoration Project once sediment at the Dam face has been removed. The work will consist of installing anchors to the Dam structure, running cables, and placing the boat dock in the Reservoir.

3.4.4.1.8 Demobilization

During the years when sediment removal projects (or other infrequent large-scale maintenance projects) are occurring, Big Tujunga Reservoir would continue to be operated according to standard operating guidelines during the rainy season from approximately October 15 through April 15. Public Works’ Contractor would demobilize from the Reservoir before the first major storm (approximately October 15) of each year. The Contractor would be required to remove all equipment and remove or secure structures within the Reservoir, including temporary water diversion structures and BMPs. Public Works’ Contractor would remobilize at the end of each storm season (approximately April 15). Once the sediment removal is complete and all equipment and structures are removed from the Reservoir and Maple Canyon SPS, there would be no long-term changes to the regular inspection, maintenance, or operations at the Reservoir.

3.4.4.2 SUBSURFACE GROUTING

Big Tujunga Dam is a concrete-thickened arch dam. The original Dam had a grout curtain installed during its construction in the mid-1930s; subsequent grouting operations were conducted with the collaboration of the DSOD. An initial subsurface consolidation grouting program was conducted within the new footprint of the new thickened arch dam during the Big Tujunga Dam Rehabilitation Project. Future subsurface grouting may be needed if settlement or anomalies are noted (e.g., excessive seepage or settling). This work may require holding the Reservoir at a drawn-down elevation to allow a grouting program to be conducted and could require the complete dewatering of the Reservoir if a serious issue arises. Dam safety monitoring equipment would be used to determine if and when any future subsurface grouting would be necessary. Subsurface grouting is considered a major effort and would likely take an entire non-storm season to complete. Subsurface grouting is anticipated to occur, at most, once every ten years.

The physical extent of the impact footprint and the duration of subsurface grouting would be less than that described above for sediment removal projects, and dewatering methods would be similar. Note that a subsurface grouting maintenance activity would require preparation of environmental documentation and regulatory permitting.

3.4.4.3 CONCRETE REPAIR

Big Tujunga Dam is a concrete-thickened arch dam. Spalling concrete (i.e., flakes of concrete that break off the larger solid concrete structure) along the spillway, abutments, or the main Dam structure may need to be repaired periodically. This repair may require the drawdown of the Reservoir to an elevation that would allow access to a repair site. If the area requiring repair is on the upstream side of the Dam, it may require complete dewatering if a major repair is needed. If the area requiring repair is on the downstream face of the Dam, valves may be temporarily closed to facilitate the work. Concrete repair is considered a major effort and would likely take an entire non-storm season to complete. Concrete repair is anticipated to occur, at most, once every ten years.

The physical extent of the impact footprint and the duration of concrete repair would be less than that described above for sediment removal projects, and dewatering methods would be similar. Note that a concrete repair maintenance activity would require preparation of environmental documentation and regulatory permitting.

3.5 SPILLWAY IMPROVEMENT PROJECT

Public Works is planning a Spillway Improvement Project to increase the storage capacity behind Big Tujunga Dam while maintaining the existing combined spillway capacity of 113,035 cfs to pass the Probable Maximum Flood event. The Spillway Improvement Project would raise the height of the crest of the Dam's right abutment spillway by 8 feet to an elevation of 2,298 feet. This modification would increase the Reservoir pool area from approximately 86 acres to approximately 93 acres, which would increase the storage capacity of the Reservoir by an additional 719 af. It is anticipated that the additional capacity would be utilized only about once every ten years (during ten-year storm events) and would inundate the additional area for approximately two to four weeks. Between ten-year storm events, the Reservoir footprint would not increase, and the spillway modifications would not change daily operation of the Dam.

The temporary disturbance footprint to build the Spillway Improvement Project would generally be within the existing developed footprint of the Dam. The Reservoir would be partially dewatered to the level of bedrock at elevation 2,250 feet. The physical extent of the impact footprint and the duration of construction for the Spillway Improvement Project would be less than that described above for sediment removal projects, and dewatering methods would be similar. Note that the Spillway Improvement Project would require preparation of environmental documentation and regulatory permitting.

3.6 FUTURE TRANSLOCATION

The Santa Ana Sucker Recovery Plan identifies Big Tujunga Creek above Big Tujunga Dam and its connecting tributaries (e.g., Fall Creek and Mill Creek) as a potential future translocation site (USFWS 2017a). The mainstem of Big Tujunga Creek upstream of its confluence with Fall Creek (near Fall Creek Camp) was observed to have suitable habitat during previous surveys (O'Brien 2019). Although translocation is not proposed by Public Works, another agency (e.g., USFWS, USFS, USGS, CDFW) may translocate Santa Ana sucker and/or other special status fish upstream of the Reservoir. Any future translocation activity would be permitted/approved by a separate regulatory action by the entity proposing the translocation and the corresponding regulatory agencies. Following a future translocation, the Santa Ana sucker and/or other special status fish species could occur in the stream-like portion of the upper Reservoir. Avoidance and Minimization Measure MAIN-1 shall apply to areas upstream of the Reservoir only after a translocation occurs.

3.7 AVOIDANCE AND MINIMIZATION MEASURES

3.7.1 OPERATION

These conservation measures shall be followed during operational activities.

OPER-1 Dam releases for the purpose of flood control shall primarily occur during the storm season from October 15 to April 15; however, flood control releases may be conducted at other times of year due to rain events that occur outside the storm season. Based on existing operational guidelines, flood control releases shall be conducted so that outflow is comparable to inflow except where limited by downstream constraints such as the Oro Vista Avenue crossing (currently 500 cfs). Flood control releases shall not be ramped.

OPER-2 Dam releases for the purposes of water conservation shall primarily occur during the non-storm season (April 16 to October 14); however, they may be conducted at any time of year based on the ability of the downstream spreading grounds to accommodate groundwater recharge. During the Santa Ana sucker breeding season (March 1 to July 31), non-flood control releases (e.g., water conservation, valve testing, etc.) shall not exceed 250 cfs. Non-flood control operations, other than valve tests, shall "ramp" releases[39] (i.e., step-wise increases and decreases); the maximum step-wise increase/decrease during ramping shall be 100 cfs over four hours.

OPER-3 When sufficient water is available at the end of the storm season from storage of residual flows, supplemental releases totaling 1,500 af per year shall be made over the course of the non-storm season (i.e., April 16 to October 14) to enhance downstream aquatic habitat.[40] The specific timing of the supplemental releases will be determined in consultation with the HCP Working Group. If the HCP Working Group cannot come to a consensus, the specific timing will be determined by the USFWS, LACFCD (Public Works), and LADWP. The releases shall be additional to natural recession inflows and normal Dam seepage. Releases shall be made either in the form of sustained flows or as pulsed flows, as determined through Adaptive Management discussions with the HCP Working Group. If the HCP Working Group cannot come to consensus, the approach to the releases will be determined by the USFWS, LACFCD (Public Works), and LADWP. During normal to wet years, a minimum of 1,500 af shall be released over the non-storm season. During dry years when water supplies are limited, water shall be managed to provide for the supplemental releases to benefit the Santa Ana sucker during the summer months rather than releasing water earlier in the spring for water conservation; a minimum of 361 to 1,083 af shall be released over the non-storm season (or as long as water is available).

OPER-4 LACFCD (Public Works) shall monitor Covered Species populations and aquatic and riparian habitat quality as determined through consultation with the HCP Working Group (i.e., methods and frequency of monitoring). If the HCP Working Group cannot come to consensus, the monitoring strategy will be determined by

[39] If additional analysis determines that it would be better for downstream habitat not to ramp the flows, the operational guidelines would be adjusted through the Adaptive Management process that will be included in this HCP (see Section 7.3).

[40] If additional analysis determines that it would be better for downstream habitat not to conduct supplemental releases, the operational guidelines would be adjusted through the Adaptive Management process that will be included in this HCP (see Section 7.3).

the USFWS, LACFCD (Public Works), and LADWP. Results of monitoring shall be used to adjust conservation measures and/or recommend habitat enhancement measures. Adaptive Management shall be used to adjust conservation measures (within standard Public Works operational parameters) or monitoring (within the HCP budget), as necessary, to achieve the HCP's biological goals.

LACFCD (Public Works) shall establish an annual budget to carry out potential habitat enhancement measures recommended by the HCP Working Group. The budget shall accrue cumulatively so that budget not spent in one year shall roll over to the next year to fund larger habitat enhancement efforts in future years. Habitat enhancement projects selected for implementation must be within the habitat enhancement budget accrued to date. If the habitat enhancement fund accrued exceeds five years of the annual budget, subsequent contribution to the habitat enhancement fund shall be waived until a habitat enhancement action is implemented.

LACFCD (Public Works) shall report compliance with conservation measures, the results of monitoring, and implementation of habitat enhancement in an annual report.

LACFCD (Public Works) and LADWP shall meet with the USFWS at least once per year to discuss implementation of the HCP (i.e., HCP Working Group Meeting). The HCP Working Group shall include LACFCD (Public Works), LADWP, USFWS (approval authority), CDFW (advisory role), and USFS (advisory role). LACFCD (Public Works) shall prepare meeting minutes to document the annual meeting with the USFWS and any Adaptive Management discussions and/or decisions.

3.7.2 MAINTENANCE

These avoidance and minimization measures shall be followed during maintenance activities, as applicable. These measures were prepared based on the infrequent long-term, large-scale maintenance events that require dewatering of the Reservoir. Table 13 shows which subset of measures shall be required for (1) inspections/testing, (2) regular short-term, small-scale maintenance, and (3) infrequent short-term, small-scale maintenance.

MAIN-1 **Santa Ana Sucker, Arroyo Chub, and Santa Ana Speckled Dace.** During maintenance activities, the following measures shall be followed prior to work within the plunge pool or stream. Following a future translocation of Santa Ana sucker and/or other special status fish species upstream of the Reservoir, it would also apply to the area upstream of the Reservoir to Fall Creek.

A. Prior to initiation of maintenance projects that could affect Santa Ana sucker, arroyo chub, or Santa Ana speckled dace, a Special Status Fish Relocation Plan (SSFRP) shall be prepared by the LACFCD to describe the methodology to move Santa Ana sucker, arroyo chub, and Santa Ana speckled dace adults/juveniles out of work areas (e.g., the plunge pool and areas along the stream where BMPs shall be installed for water quality) and/or to allow for the continued fish passage while water is diverted around an in-stream work area. The SSFRP shall describe the potential relocation site. The relocation site shall mimic site conditions as closely as possible; adequate food resources for the fish and shelter from predators shall be present at the relocation site. The SSFRP shall describe any follow-up monitoring that would be necessary and additional contingency measures for management of the relocation site. The LACFCD and USFWS shall approve the SSFRP prior to relocating any special status fish species. The SSFRP shall be prepared, approved, and implemented prior to dewatering (beyond normal Dam operations) and the initiation of maintenance projects.

B. A one-visit pre-construction survey for Santa Ana sucker, arroyo chub, and Santa Ana speckled dace shall be conducted by a qualified Biologist (one with experience surveying for the Santa Ana sucker that is approved by the USFWS) immediately prior to installation of water quality BMPs at the work area within the plunge pool or stream. If any Santa Ana suckers or other special status fish species are observed, the Biologist shall relocate all individuals to areas of suitable habitat per the SSFRP. All non-native animal species encountered during the pre-construction survey shall be permanently removed. Following translocation of special status fish upstream of the Reservoir, this pre-construction survey shall be conducted after MAIN-2 and MAIN-4 to ensure that arroyo toads and nesting riparian birds are not affected by the pre-construction fish survey.

C. A qualified Biologist that is approved by the USFWS shall be present during dewatering of the plunge pool or other work area within the stream to ensure no native fish are stranded. If any native fish are observed during the monitoring, they shall be captured by the Biologist through seining (or use of other appropriate nets) and released at the relocation site as described in the SSFRP. A Letter Report shall be prepared to document the results of the pre-construction surveys and monitoring and shall be provided to the LACFCD and USFWS within 30 days of completion of the survey.

D. Regardless of whether special status fish species are observed during pre-construction surveys, the combination of water quality BMPs and/or blocking nets shall be used to exclude special status fish species from entering the work area along the stream. The design of the exclusion and method of installation shall be included in the SSFRP and approved by the LACFCD and USFWS. Blocking nets and water quality BMPs shall be installed under the supervision of a Biological Monitor in order to ensure that no special status fish species are impacted during installation of the exclusion measures.

E. Regardless of the results of pre-construction surveys, the limits of maintenance activities along the stream shall be marked with lath and rope, orange snow fencing, or other suitable fencing to provide an adequate boundary for construction work. Signs shall be posted to indicate that the area upstream/downstream of the work area is an “Environmentally Sensitive Area” and that no work activities shall occur outside the fencing. Worker Environmental Awareness Program (WEAP) training shall educate workers on the importance of Environmentally Sensitive Areas. The Biological Monitor shall check the fencing/signage weekly to ensure that it stays in place throughout maintenance activities and shall notify the LACFCD immediately if the fencing/signage needs to be repaired.

F. Prior to dewatering of the Reservoir (beyond normal Dam operations) and/or any work in the plunge pool or areas along the stream, LACFCD or LACFCD’s Contractor shall install water quality filtration BMPs appropriate to the maintenance project. Filtration BMPs—including but not limited to sand/gravel bags, silt fencing and/or other filtering devices—shall be placed between the plunge pool and Big Tujunga Creek to prevent sediment from exiting the plunge pool into downstream waters. Once installed, the BMPs would allow the plunge pool to serve as a large sedimentation basin in which waters released from the Dam would be temporarily retained to allow for sediments to drop to the bottom of the pool. These BMPs would be designed with the goal of preventing or limiting the flow of disturbed sediment and particulate matter downstream during maintenance activities. The LACFCD shall hire an Environmental Compliance Monitor to inspect the BMPs daily throughout the maintenance activity. If BMPs are not functioning properly, the Environmental Compliance Monitor shall notify LACFCD immediately and corrective action shall be taken immediately. If effective corrective action is not taken within 48 hours, the Environmental Compliance Monitor shall recommend that LACFCD's Construction Inspector suspend construction activities; the Environmental Compliance Monitor shall report the conditions and necessary corrective actions to the LACFCD and USFWS; work shall remain suspended until the condition is corrected to the satisfaction of the LACFCD and the USFWS.

G. In order to minimize impacts on the Santa Ana sucker and its Critical Habitat, Dam releases for maintenance activities during the Santa Ana sucker breeding season (March 1 to July 31) shall not exceed 250 cfs; and, with the exception of valve tests, Dam operations shall ramp flows (i.e., step-wise increases and decreases) to mimic natural stream hydrology.

H. A screen with 0.125-inch mesh shall be used at the inflow of the pump for dewatering the Reservoir to prevent non-native animals from spreading from the Reservoir to areas below the Dam occupied by Santa Ana sucker. All non-native animal species encountered during dewatering of the Reservoir shall be permanently removed from the Reservoir. Placement of non-native species shall not be allowed in the Reservoir, plunge pool, or Big Tujunga Creek.

I. When the bypass line is in place, water temperature shall be maintained from the inflow to the outflow. The bypass line shall be insulated and/or methods shall be used to decrease the water temperature prior to its re-entering the stream (e.g., submerge, cover, or shade the bypass line; avoiding black or corrugated pipe if not shaded).

J. A qualified Biological Monitor (one with experience with special status fish species and approved by the USFWS) shall conduct daily monitoring along the creek during dewatering outside the storm season (April 16 to October 14) and stream bypass installation. The Biological Monitor shall also conduct weekly monitoring throughout maintenance activities to ensure that BMPs are in place and no release of sediment is observed downstream of the plunge pool and to ensure that Santa Ana sucker, arroyo chub, or Santa Ana speckled dace are not stranded as dewatering flows recede. The Biological Monitor shall visually monitor habitat from the Dam to approximately 1.5 miles downstream of the Dam. Following a future translocation of special status fish upstream of the Reservoir, monitoring will also include habitat from upstream of the work area to Fall Creek.

   If the Biological Monitor notes a change in the condition of stream habitat that was likely caused by dewatering flows and/or BMPs not functioning effectively to protect water quality,[41] the Biological Monitor shall immediately notify the LACFCD's Construction Inspector that immediate corrective action is required. For dewatering releases, if corrective action has not been taken within 48 hours, the Biological Monitor shall recommend that LACFCD's Construction Inspector suspend construction activities, and the Biological Monitor shall

[41] Flood control releases may occur in association with a storm that occurs during the non-storm season. Changes in the condition of stream habitat related to flood control releases would not be included in the notification/corrective action requirements unless they were associated with repairing BMP functioning for the maintenance project following the storm.

report the conditions and necessary corrective actions to the LACFCD and USFWS; work shall remain suspended until the condition is corrected to the satisfaction of the LACFCD and USFWS.

If the Biological Monitor observes Santa Ana sucker, arroyo chub, or Santa Ana speckled dace adults, juvenile, or larva stranded in drying pools outside the active channel during dewatering or at any time during construction/maintenance, he/she shall be authorized to relocate the fish to suitable habitat in the adjacent active channel.

The Biological Monitor shall prepare Weekly Monitoring Reports describing construction activities as they pertain to the Santa Ana sucker and Santa Ana sucker Critical Habitat areas; the reports shall be submitted to the LACFCD and USFWS.

K. The SSFRP shall also include discussion of potential relocation necessary based on natural flow conditions from the Dam to 1.5 miles downstream of the Dam. Following a future translocation of special status fish upstream of the Reservoir, monitoring will also include habitat from upstream of the work area to Fall Creek.

   If the Biological Monitor notices that water levels in the active channel of the creek in this area decrease to shallow conditions or that isolated pools develop as a result of natural rainfall conditions, the Biological Monitor shall notify the LACFCD and USFWS of the conditions so the resource agency may consider relocating special status fish to suitable habitat or temporarily into captivity to avoid potential mortality. Because this would be a result of weather conditions and not a result of the maintenance activity, the LACFCD shall not be responsible for relocating the fish (if needed) but shall cooperate with agency efforts to rescue fish. No relocation shall occur until the USFWS has confirmed that relocation shall occur.

L. If the downstream access road needs to be repaired or replaced, the road/stream crossing shall be designed to allow wildlife movement for aquatic species, including special status fish.

MAIN-2 **Arroyo Toad.** During maintenance activities, the following measures shall be followed prior to work upstream of the Reservoir and at the upper end of the Reservoir where conditions transition from Reservoir pool to stream-like.

A. An Arroyo Toad Relocation Plan (ATRP) shall be prepared by the LACFCD to describe the methodology to move arroyo toad adults, eggs, and tadpoles out of the work area and to describe the potential relocation site. The relocation site shall mimic site conditions as closely as possible; adequate food resources for the toad adults/tadpoles and shelter from predators shall be present at the relocation site. The ATRP shall describe any follow-up monitoring that would be necessary and additional contingency measures for management of the relocation site until tadpoles have metamorphosed into adults. The ATRP shall also include specifications for arroyo toad exclusion fencing that shall be needed at the upper end of the work area. The LACFCD and USFWS shall approve the ATRP prior to relocating any arroyo toad adults/eggs/tadpoles and prior to dewatering the Reservoir for the maintenance project (beyond normal Dam operations). The ATRP shall be prepared, approved, and implemented prior to dewatering and the initiation of maintenance work.

B. Three pre-construction surveys for arroyo toad adults, eggs, and tadpoles shall be conducted by a qualified Biologist (one with experience in identifying arroyo toads in all life stages that is approved by the USFWS) within 30 days prior to dewatering of the Reservoir each year maintenance activities are scheduled to be conducted. The surveys shall include both a diurnal and nocturnal component and shall be conducted up to 0.62 mile (1 kilometer) upstream of the project limits of disturbance by a qualified Biologist. If arroyo toad adults, eggs, or tadpoles are observed within the work area, dewatering (beyond normal Dam operations) shall begin after arroyo toads are relocated out of the work area according to the ATRP (described above). If no arroyo toads are observed during the pre-construction surveys, dewatering and maintenance work can proceed as planned. A Letter Report shall be prepared to document the results of the pre-construction survey and submitted to the LACFCD and USFWS within 30 days of completion of the survey. Following translocation of special status fish upstream of the Reservoir, this pre-construction survey shall be conducted prior to the pre-construction fish survey required by MAIN-1 to ensure that arroyo toads are not affected by the pre-construction fish survey.

C. Regardless of the results of pre-construction surveys, the Critical Habitat boundary shall be marked with lath and rope, orange snow fencing, or other suitable fencing to provide an adequate boundary for maintenance work within 500 feet of the Critical Habitat. Signs shall be posted to indicate that the area upstream is an “Environmentally Sensitive Area” and that no work activities shall occur upstream of the fencing. WEAP training shall educate workers on the importance of Environmentally Sensitive Areas. The Biological Monitor shall check the fencing/signage weekly to ensure that it stays in place throughout maintenance activities and shall notify the LACFCD’s Construction Inspector immediately if the fencing/signage needs to be repaired.

D. If arroyo toads are observed during pre-construction surveys, exclusionary fencing shall be installed at the upper work area boundary to prevent arroyo toads upstream of the maintenance project from entering the construction area. The design of the fencing plan shall be included in the ATRP and approved by the LACFCD and USFWS. The exclusionary fencing shall consist of silt fencing, buried at least one-foot deep and installed with no gaps; alternate fencing shall be approved by the LACFCD and USFWS. The fencing shall extend across Big Tujunga Creek around the perimeter of the work area or perpendicular to the creek up to 80 feet in elevation from the creek, or as otherwise approved by the LACFCD and USFWS. Fencing shall be installed under the supervision of a Biological Monitor in order to ensure that no arroyo toad adults/eggs/tadpoles are impacted during installation of the fence.

   Pre-construction surveys shall be conducted for three consecutive nights after the exclusionary fencing is installed and prior to the commencement of maintenance activities each year. Any arroyo toads observed in the work area shall be relocated by a qualified Biologist (one approved by the USFWS to handle arroyo toad/special status species) according to the approved ATRP. If any non-native aquatic species (e.g., non-native fish, bullfrogs, or crayfish) are captured during the survey, they shall be permanently removed from the habitat.

E. A qualified Biological Monitor (one with experience in identifying arroyo toads in all life stages that is approved by the USFWS) shall conduct daily monitoring during dewatering for maintenance and stream bypass installation upstream of the Reservoir during the breeding season (March 1 to June 30). The Biological Monitor shall also conduct weekly monitoring throughout maintenance activities to ensure that species protective measures are in place and that no arroyo toad/eggs/tadpoles are within the footprint of the work area. The Biological Monitor shall monitor habitat from the upper Reservoir to approximately 1,000 feet upstream of the bypass line. If the Biological Monitor notes a change in the condition of habitat immediately upstream of work activities that may have been caused by the maintenance activities and/or by BMPs not functioning effectively, the Biological Monitor shall immediately notify the LACFCD's Construction Inspector that immediate corrective action is required. If corrective action has not been taken within 48 hours, the Biological Monitor shall recommend that LACFCD's Construction Inspector suspend construction activities and the Biological Monitor shall report the conditions and necessary corrective actions to the LACFCD and USFWS; work shall remain suspended until the condition is corrected to the satisfaction of the LACFCD and USFWS.

If the Biological Monitor observes arroyo toad adults/eggs/tadpoles within the work area at any time during construction, he/she shall be authorized to relocate the arroyo toad to suitable habitat upstream of the work area per the ATRP.

The Biological Monitor shall prepare Weekly Monitoring Reports describing construction activities as they pertain to the arroyo toad and arroyo toad Critical Habitat areas; the reports shall be submitted to the LACFCD and USFWS.

F. The Biological Monitor shall also monitor any relocated eggs/tadpoles and shall notify the LACFCD and USFWS if any contingency measures are necessary at the relocation site. Relocated eggs/tadpoles shall be monitored until the young leave the stream/pools as juvenile toads. Weekly Monitoring Reports shall include a description of any relocated eggs/tadpoles.

MAIN-3 **Western Pond Turtle.** During maintenance activities, the following measure shall be followed prior to work within the Reservoir, plunge pool, or stream. Work adjacent to these areas may also require portions of this measure.

A. A Western Pond Turtle Relocation Plan (WPTRP) shall be prepared by the LACFCD to describe the methodology to move western pond turtle out of the work area and/or to allow for the continued turtle passage while water is diverted around an in-stream work area. The WPTRP shall describe the potential relocation site. The relocation site shall mimic site conditions as closely as possible; adequate food resources for the turtles and shelter from predators shall be present at the relocation site. The WPTRP shall describe any follow-up monitoring that would be necessary for the relocated turtles. The WPTRP shall also include specifications for western pond turtle exclusion fencing that shall be needed at the work area. The LACFCD and USFWS shall approve the WPTRP prior to relocating any western pond turtles and prior to dewatering the Reservoir or plunge pool (beyond normal Dam operations). The WPTRP shall be prepared, approved, and implemented prior to dewatering and the initiation of maintenance work.

B. A pre-construction trapping effort shall be conducted by the LACFCD prior to dewatering of the Reservoir/plunge pool (beyond normal operations) or portion of the stream for a maintenance project. The trapping effort shall follow the newest approved protocol for the species (currently USGS 2006) shall be conducted by a qualified Biologist (one permitted to conduct western pond turtle trapping and approved by the USFWS). If western pond turtles are observed within the work area, dewatering (beyond normal Dam operations) shall begin after western pond turtles are relocated out of the work area according to the WPTRP (described above). If no western pond turtles are observed during the pre-construction surveys, dewatering and maintenance work can proceed as planned. If any non-native aquatic species (e.g., non-native fish, bullfrogs, or crayfish) are captured during the survey, they shall be permanently removed from the habitat. A Letter Report shall be prepared to document the results of the pre-construction survey and submitted to the LACFCD and USFWS within 30 days of completion of the survey.

C. Regardless of the results of pre-construction surveys, the limits of work shall be marked with lath and rope, orange snow fencing, or other suitable fencing to provide an adequate boundary for maintenance work. Signs shall be posted to indicate that the areas upstream and downstream are "Environmentally Sensitive Areas" and that no work activities shall occur upstream of the fencing. WEAP training shall educate workers on the importance of Environmentally Sensitive Areas. The Biological Monitor shall check the fencing/signage weekly to ensure that it stays in place throughout maintenance activities and shall notify the LACFCD's Construction Inspector immediately if the fencing/signage needs to be repaired.

D. Prior to dewatering of the Reservoir (beyond normal Dam operations) and/or any work in the plunge pool or areas along the stream, LACFCD or LACFCD's Contractor shall install water quality filtration BMPs appropriate to the maintenance project. Filtration BMPs shall include but shall not be limited to sand/gravel bags, silt fencing and/or other filtering devices. BMPs shall be designed with the goal of preventing or limiting the flow of disturbed sediment and particulate matter downstream during maintenance activities. The LACFCD shall hire an Environmental Compliance Monitor to inspect the BMPs daily throughout the maintenance activity. If BMPs are not functioning properly, the Environmental Compliance Monitor shall notify LACFCD immediately and corrective action shall be taken immediately. If effective corrective action is not taken within 48 hours, the Environmental Compliance Monitor shall recommend that LACFCD's Construction Inspector suspend construction activities; the Environmental Compliance Monitor shall report the conditions and necessary corrective actions to the LACFCD and USFWS; work shall remain suspended until the condition is corrected to the satisfaction of the LACFCD and the USFWS.

E. Regardless of the results of pre-construction surveys, exclusionary fencing shall be installed around the limits of the work area within the Reservoir, plunge pool, or stream to prevent western pond turtles from entering the construction area. The design of the fencing plan shall be included in the WPTRP and approved by LACFCD and USFWS. The exclusionary fencing shall consist of silt fencing, buried at least 18 inches-deep and installed with no gaps; alternate fencing shall be approved by the LACFCD and USFWS. The fencing shall extend across Big Tujunga Creek around the perimeter of the work area or perpendicular to the creek up to 80 feet in elevation from the creek, or as otherwise approved by the LACFCD and USFWS. Fencing shall be installed under the supervision of a Biological Monitor in order to ensure that no western pond turtles are impacted during installation of the fence. One pre-construction survey shall be conducted by a qualified Biologist after the exclusionary fencing is installed and prior to the commencement of maintenance activities to ensure that no turtles are within the fencing. Any western pond turtles observed in the work area shall be relocated by a qualified Biologist (one approved by the USFWS to handle western pond turtle) according to the approved WPTRP.

F. A qualified Biological Monitor (one with experience in identifying western pond turtle and approved by the USFWS) shall conduct daily monitoring during dewatering outside the storm season (April 16 to October 14), installation of BMPs, and work adjacent to the stream during the turtle's active period (March to September). The Biological Monitor shall also conduct weekly monitoring throughout maintenance activities to ensure that species protective measures are in place and that no western pond turtles are within the footprint of the work area. The Biological Monitor shall monitor habitat within 500 feet of the work area. If the Biological Monitor notes a change in the condition of habitat in the vicinity of work activities that may have been caused by the maintenance activities and/or by BMPs not functioning effectively, the Biological Monitor shall immediately notify the LACFCD's Construction Inspector that immediate corrective action is required. If corrective action has not been taken within 48 hours, the Biological Monitor shall recommend that the LACFCD's Construction Inspector suspend construction activities, and the Biological Monitor shall report the conditions and necessary corrective actions to the LACFCD and USFWS; work shall remain suspended until the condition is corrected to the satisfaction of the LACFCD and USFWS.

   If the Biological Monitor observes western pond turtle within the work area at any time during construction, he/she shall be authorized to relocate the western pond turtle to suitable habitat upstream/downstream of the work area per the WPTRP.

   The Biological Monitor shall prepare Weekly Monitoring Reports describing construction activities as they pertain to the western pond turtle; the reports shall be submitted to the LACFCD and USFWS.

G. When the bypass line is in place, water temperature shall be maintained from the inflow to the outflow. The bypass line shall be insulated and/or methods shall be used to decrease the water temperature prior to its re-entering the stream (e.g., submerge, cover, or shade the bypass line; avoiding black or corrugated pipe if not shaded).

H. If the downstream access road needs to be repaired or replaced, the road/stream crossing shall be designed to allow wildlife movement for aquatic species, including western pond turtle.

MAIN-4 **Least Bell's Vireo, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoo.** During maintenance activities, the following measures shall be followed when work is within 500 feet of suitable riparian scrub/woodland habitat.

A. If feasible, vegetation clearing of riparian habitat shall be conducted during the non-breeding season (September 16 to March 14) in order to avoid direct impacts on nests of these species. Vegetation clearing of riparian communities shall be monitored by a qualified Biologist (one with experience monitoring in riparian habitat).

B. Prior to the start of maintenance activities each year, a qualified Biologist (one with experience and all necessary permits to survey for these species[42] and

[42] The qualified Biologist will need to be permitted for the species that have potential to nest at the time of the pre-construction surveys and monitoring. Prior to May 15, the qualified Biologist will only need to have experience with least Bell's vireo. Between May 15 and June 15, the qualified Biologist will need to have experience with least Bell's vireo and southwestern willow flycatcher. Following June 15, the qualified Biologist will need to be permitted for both southwestern willow flycatcher and western yellow-billed cuckoo, in addition to having experience to conduct surveys for least Bell's vireo, if it is an area with potential for yellow-billed cuckoo to occur.

approved by the USFWS) shall survey all riparian habitat within 500 feet of the construction limits for the presence of least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo nests/territories. Three surveys shall be conducted within two weeks prior to the initiation of maintenance activities each year. Any active nests/territories shall be mapped on an aerial photograph and marked on applicable construction plans. A Letter Report shall be prepared and submitted to the LACFCD and USFWS to document the results of the pre-construction survey within 30 days of completion of the survey. Following translocation of special status fish upstream of the Reservoir, this pre-construction survey shall be conducted prior to the pre-construction fish survey required by MAIN-1 to ensure that nesting riparian birds are not affected by the pre-construction fish survey.

C. A 500-foot protective buffer shall be established around a least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo territory identified in the field. The protective buffer shall be marked with lath and rope, orange snow fencing, or other suitable fencing to provide an adequate buffer from construction work. Signs shall be posted to indicate that the area is an "Environmentally Sensitive Area" and that no work activities shall occur within the fencing. WEAP training shall educate workers on the importance of Environmentally Sensitive Areas. The Biological Monitor shall check the fencing/signage weekly to ensure that it stays in place throughout maintenance activities and shall notify the LACFCD's Construction Inspector immediately if the fencing/signage needs to be repaired.

D. If construction activities need to occur closer than 500 feet of an active least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo territory, a Riparian Bird Construction Plan (RBCP) shall be prepared for review and approval by the LACFCD and USFWS. Any activity within 500 feet of an active least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo territory shall be monitored by a qualified Biologist (one with experience and the necessary permits to survey for these species[43] and approved by the USFWS).

   If construction would result in noise readings greater than 60 A-weighted decibels (dBA) at the edge of least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo territory, construction shall not be allowed during the breeding season (March 15 to September 15) unless appropriate noise reduction measures (e.g., temporary noise barriers) are implemented as approved by the LACFCD and USFWS. Noise reduction measures shall be implemented, as needed, to maintain a noise level of less than 60 dBA at the edge of occupied riparian habitat to ensure that the vireo/flycatcher/cuckoo is not indirectly affected by construction noise. Implementation of the noise reduction measures shall be monitored by a qualified Biologist to ensure that the vireo/flycatcher/cuckoo is not inadvertently affected by their installation.

   The RBCP shall also outline a noise monitoring methodology to be used during the breeding season for construction within 500 feet of occupied habitat. The RBCP shall include noise monitoring stations that shall be monitored weekly between March 15 and September 15 to ensure that noise levels remain less than 60 dBA. If noise monitoring determines that the noise level exceeds 60

[43] The 10(a) permits needed to conduct monitoring should correspond to the species that is present. If a southwestern willow flycatcher nest is present, a permit for this species will be needed. If a western yellow-billed cuckoo nest is present, a permit for this species will be needed. If a least Bell's vireo is present, no 10a permit will be needed, but the qualified Biologist will need the necessary experience to survey for this species.

dBA, the Biological Monitor shall immediately notify the LACFCD's Construction Inspector that immediate corrective action is required, and noise reduction measures shall be modified as recommended by a qualified Acoustical Technician to reduce noise levels below 60 dBA. If corrective action has not been taken within 48 hours, the Biological Monitor shall recommend that LACFCD's Construction Inspector suspend construction activities and the Biological Monitor shall report the conditions and necessary corrective action to the LACFCD and USFWS; work shall remain suspended until the condition is corrected to the satisfaction of the LACFCD and USFWS.

E. Regardless of whether least Bell's vireo, southwestern willow flycatcher, and/or western yellow-billed cuckoo are detected during the pre-construction surveys, surveys shall be updated once per week in riparian areas within 500 feet of construction throughout the breeding season (or as long as construction is within 500 feet of riparian habitat). Surveys may be discontinued after July 31 if no least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo have been detected. If a least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo territory is observed, monitoring surveys shall be continued until vireo/flycatcher/cuckoo leave for the wintering grounds (August/September). Weekly monitoring reports shall be prepared by the Biologist and submitted to the LACFCD and USFWS.

MAIN-5 **Nesting Birds.** During maintenance activities, the following measures shall be followed prior to work within the Reservoir, plunge pool, or stream and in the developed areas of the Dam.

A. To the extent possible, vegetation clearing shall be conducted during the non-breeding season (September 1 to January 31) in order to minimize direct impacts on nesting birds. If maintenance work would be initiated during the breeding season for nesting birds/raptors (February 1 through August 31), the maintenance activity shall be conducted in compliance with the conditions set forth in the Migratory Bird Treaty Act.

B. In order to avoid direct impacts on active nests, a pre-construction survey shall be conducted by a qualified Biologist (one with experience conducting nesting bird surveys) for nesting birds and/or raptors within four days prior to clearing any vegetation, installing BMPs, or any work near existing structures. The nesting bird survey area shall include a buffer of 300 feet around the work area for nesting birds and a buffer of 500 feet around the work area for nesting raptors. If the Biologist does not find any active nests in or immediately adjacent to the impact area, the vegetation clearing/construction work shall be allowed to proceed.

C. If the Biologist finds an active nest within or immediately adjacent to the construction area and determines that the nest may be impacted or breeding activities substantially disrupted, the Biologist shall determine an appropriate protective buffer around the nest depending on the sensitivity of the species and the nature of the construction activity. The protective buffer shall be between 25 to 300 feet for nesting birds; 300 to 500 feet for nesting raptors; and 1 mile for bald or golden eagles. If the protective buffer needs to be reduced for nesting birds/raptors, LACFCD shall coordinate with a qualified Biologist to determine the appropriate reduced buffer. If the protective buffer needs to be reduced for bald or golden eagles, LACFCD shall coordinate with the USFWS to determine the appropriate reduced buffer. The active nest shall be protected within the designated buffer until nesting activity has ended. This area shall be designated as an "Environmentally Sensitive Area" and shall be mapped on construction plans. WEAP training shall educate workers on the importance of Environmentally Sensitive Areas. Construction can proceed when the qualified Biologist has determined that fledglings have left the nest or the nest has failed. If any encroachment into a protective buffer is observed, the Biological Monitor shall notify the LACFCD's Construction Inspector of any necessary corrective action needed.

MAIN-6 **Minimize Disturbance.** The disturbance footprint of maintenance projects shall be minimized.

A. Impacts to habitat for Covered Species shall be avoided and/or minimized.

B. The need for dewatering/lowering the Reservoir and/or closing the valves to releases shall be minimized by scheduling multiple maintenance projects within the same area to occur at the same time (or in tandem).

C. Best Management Practices shall be incorporated to minimize indirect effects on habitat for Covered Species. This includes measures to protect water quality, prevent the spread of weed seeds, and prepare for quick emergency response by having appropriate equipment on site (e.g., fire extinguishers and spill kits).

D. Native habitat areas that are temporarily impacted shall be re-seeded with a native species seed mix made of locally collected seed (within the watershed or within the Angeles National Forest) appropriate to the disturbance area following completion of the maintenance project. If appropriate to the location, willow or mule fat cuttings may also be planted. The determination of species to include in the seed mix and whether cuttings will be included shall be made by a qualified Biologist.

3.8 SUMMARY OF COVERED ACTIVITIES

Covered Activities described in this section are summarized in Table 13 along with their anticipated footprint, effects on the flow regime, duration, and frequency. Operation and maintenance activities would occur as needed; however, estimates on the frequency and duration have been given in order to evaluate impacts on Covered Species (see Section 4). Maintenance projects would be consolidated to the extent possible in order to minimize changes to the flow regime and effects on Covered Species.

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
Operation						
Flood Control Operations	None	Yes; lowered before storms to provide capacity for incoming storm flows.	Releases correspond with inflow rates; typically maximum valve release of 500 cfs; once spillway is reached, no maximum.	Primarily October 15 to April 15; however, could occur at any time of year. Release duration depends on rainfall pattern each season; small storm release duration typically 1–2 weeks.	Depends on rainfall pattern (frequency, duration, and intensity of storms) each season; in an average storm season with evenly distributed storms, releases could be once a month for about a week.	OPER-1
Water Conservation Operations	None	Yes; releases are made when capacity is available at the spreading grounds.	Maximum release of 250 cfs during the spawning season (i.e., March 1 to July 31); flows ramped up/down.	Primarily April 16 to October 14; however, could occur at any time of year. Release duration depends on capacity at the spreading grounds, release rate, percolation rate at the spreading grounds, and percent of water lost due to evaporation and transpiration along the route; for an average rainfall year, each water conservation release is typically less than one week; for a wet year; each water conservation release would be 2–3 weeks.	Depends on rainfall pattern (frequency, duration, and intensity of storms) each season; releases typically once every 6–8 weeks.	OPER-2

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
Supplemental Releases	None	Yes; when sufficient water is available (based on rainfall), the Reservoir is managed to hold up to1,500 af of water to be released for habitat enhancement during the non-storm season.	Sustained release rate of 1–4.2 cfs depending on annual rainfall; or may be released as pulses as determined through Adaptive Management.	April 16 to October 14; depends on rainfall pattern each season; sustained release throughout season unless otherwise determined through Adaptive Management.	Constant flow rate or pulse rate determined by HCP Working Group.	OPER-3, OPER-4
Maintenance (will be combined to the extent possible to minimize changes to the flow regime)						
Inspections/Testing						
Facility Inspections	None	Potentially; may need to be lowered or held steady; dewatering may be needed if intake structure needs inspection.	Could temporarily increase or temporarily stop releases; maximum release of 250 cfs held during Santa Ana sucker breeding season (March 1 to July 31).	A few hours.	Monthly; intake structure inspection scheduled to correspond with dewatering for a long-term, large-scale project unless there is a safety concern from an earthquake or a valve issue.	MAIN-1G
Dam Safety Inspections	None	Potentially; may need to be lowered or held steady; dewatering if a major safety concern noted.	Could temporarily increase or temporarily stop releases; maximum release of 250 cfs during Santa Ana sucker breeding season	A few hours; could be extended if monitoring of an anomaly is needed.	Once per year; after an earthquake; or when an anomaly is noted.	MAIN-1G

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
			(March 1 to July 31).			
Valve and Slide Gate Testing	None	No	Could temporarily increase or temporarily stop releases; maximum release of 250 cfs during Santa Ana sucker breeding season (March 1 to July 31).	A few hours.	Twice per year (April/May and October/November).	MAIN-1G
Reservoir Topographical Surveys	None	Potentially; may need to be lowered.	Releases to achieve specific Reservoir elevation would be conducted according to normal operations; maximum flow rate 250 cfs and flows ramped up/down during Santa Ana sucker breeding season (March 1 to July 31).	Within one day.	Once per year or every few years.	MAIN-1G
Regular Short-term, Small-scale Maintenance						
Boat Launch Maintenance	No new disturbance; regrading within existing access road/boat launch ramp footprint.	Potentially; may need to be lowered or held steady.	Releases to achieve specific Reservoir elevation would be conducted according to normal	Within one day.	Once per year.	MAIN-1G, MAIN-5, MAIN-6

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
			operations; maximum flow rate 250 cfs and flows ramped up/down during the Santa Ana sucker breeding season (March 1 to July 31).			
Trash Booming and Removal	None	Potentially; may need to be lowered or held steady.	Releases to achieve specific Reservoir elevation would be conducted according to normal operations; maximum flow rate 250 cfs and flows ramped up/down during the Santa Ana sucker breeding season (March 1 to July 31).	Within one week.	Several times throughout the storm season; as needed during the non-storm season.	MAIN-1G (if during the non-storm season and Reservoir level needs to be lowered)
Infrequent Short-term, Small-scale Maintenance						
Repair of Trash Racks/Penstocks	No new disturbance; on the existing Dam structure.	Potentially; may need to be lowered or held steady.	Releases to achieve specific Reservoir elevation would be conducted according to normal operations; maximum flow rate 250 cfs and flows ramped up/down during	One week.	Once every several years; scheduled to coincide with other maintenance projects.	MAIN-1G, MAIN-5, MAIN-6

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
			the Santa Ana sucker breeding season (March 1 to July 31).			
Repair, Replacement, or Installation of Leakage Points, Piezometers, or Other Instrumentation and Gages	No new disturbance; on the existing Dam structure.	Potentially; may need to be lowered or held steady.	Releases to achieve specific Reservoir elevation would be conducted according to normal operations; maximum flow rate 250 cfs and flows ramped up/down during the Santa Ana sucker breeding season (March 1 to July 31).	One week.	Once every several years; scheduled to coincide with other maintenance projects.	MAIN-1G, MAIN-5, MAIN-6
Repair of Gunite and Erosion Protection	No new disturbance; within limits of existing gunite structure.	Potentially; may need to be lowered or held steady.	Could temporarily stop releases.	One week.	Once every ten years; scheduled to coincide with other maintenance projects.	MAIN-1G, MAIN-4, MAIN-5, MAIN-6
Repair of Downstream Stream Gages	No new disturbance; on the existing gunite structure.	No	Could temporarily stop releases.	One week	Once every ten years.	MAIN-1, MAIN-3, MAIN-4, MAIN-5, MAIN-6

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
Repair of Downstream Stream Channel	Regulatory permitting would be required to impact jurisdictional areas/riparian habitat areas.	No	Could temporarily stop releases; may require stream bypass around the work area.	One month	Once every several years.	MAIN-1, MAIN-3, MAIN-4, MAIN-5, MAIN-6
Repair of Access Road	Regulatory permitting would be required to impact jurisdictional areas/riparian habitat areas unless road work could be completed entirely within the existing roadway.	No	Could temporarily stop releases; may require stream bypass around the work area.	One month	Once every 10 years.	MAIN-1, MAIN-3, MAIN-4, MAIN-5, MAIN-6
Rockfall Hazard Measures for Access Roads	Some disturbance of cliff faces along existing access roads	No	No	Construction one month; maintenance 2-3 weeks	Once for construction; maintenance once every several years	MAIN-4 (if riparian habitat is within 500 feet), MAIN-5, MAIN-6
Geotechnical Exploration	Limited disturbance for geotechnical borings/trenching.	Potentially; may need to be lowered or held steady.	Could temporarily stop releases.	One day to a few weeks.	Once every ten years.	MAIN-1G, MAIN-4 (if riparian habitat is within 500 feet), MAIN-5, MAIN-6

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
Infrequent Long-term, Large-scale Maintenance						
Sediment Removal	Reservoir footprint (approximately 45 acres) would be disturbed for sediment removal; sediment would be placed at Maple Canyon. Regulatory permitting would be required.	Yes; complete dewatering required.[b]	Bypass line required; outflow would equal inflow during non-storm season; no supplemental releases during the non-storm seasons when work is occurring.	Throughout the non-storm season over multiple years.	Once every ten years.	MAIN-1, MAIN-2, MAIN-3, MAIN-4, MAIN-5, MAIN-6
Subsurface Grouting	Some disturbance adjacent to the existing Dam structure; regulatory permitting would be required.	Yes; partial or complete dewatering required.[b]	Bypass line if complete dewatering required; outflow would equal inflow during non-storm season; no supplemental releases during the non-storm seasons when work is occurring.	Throughout the non-storm season over one year.	Once every ten years.	MAIN-1, MAIN-2 (if complete dewatering), MAIN-3, MAIN-4, MAIN-5, MAIN-6

TABLE 13
SUMMARY OF COVERED ACTIVITIES

	Physical Disturbance Footprint	Changes to Water Reservoir Level Needed	Potential Effects on Flow Rate	Anticipated Duration of Activity[a]	Frequency of Activity[a]	Conservation Measures/Avoidance and Minimization Measures
Concrete Repair	Limited disturbance to the existing Dam structure; regulatory permitting would be required if access within jurisdictional waters is needed.	Yes; partial or complete dewatering required.[b]	Bypass line if complete dewatering required; outflow would equal inflow during non-storm season; no supplemental releases during the non-storm seasons when work is occurring.	Throughout the non-storm season over one year.	Once every ten years.	MAIN-1, MAIN-2 (if complete dewatering). MAIN-3, MAIN-4, MAIN-5, MAIN-6
New Construction Project						
Spillway Improvement Project	Limited disturbance to the existing Dam structure; regulatory permitting would be required if access within jurisdictional waters is needed.	Partial dewatering to bedrock at elevation 2,250 feet.[b]	Some supplemental releases may occur during the non-storm seasons when work is occurring; however.	Throughout the non-storm season over two years.	Once	MAIN-1, MAIN-3, MAIN-4, MAIN-5, MAIN-6

cfs: cubic feet per second; af: acre-feet; Public Works: Los Angeles County Public Works.

[a] The duration and frequency of each activity have been estimated; however, each activity would occur as needed to ensure that the Dam remains safe and functional.

[b] See Table 12 for a detailed dewatering schedule; dewatering for subsurface grouting, concrete repair, and the Spillway Modification Project would follow approximately the same schedule as the Reservoir Restoration Project (however, the maximum release may be up to 250 cfs).

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4.0 Potential Biological Impacts/Take Assessment

This section describes the anticipated direct and indirect effects on Covered Species resulting from the Covered Activities described in Section 3. Direct effects are those that could result in direct mortality and/or the removal of habitat for Covered Species. Indirect effects include potential effects on adjacent habitat and individuals in the adjacent habitat as a result of Covered Activities. For example, indirect effects include potential changes in water temperature, dissolved oxygen, water quality, and sediment processes resulting from water management actions and increased noise during maintenance/construction activities. Both direct and indirect effects can be either permanent or temporary. Direct loss of habitat was calculated by overlaying potential disturbance areas for each type of project with vegetation mapping to determine the acreage of each habitat type that would be affected. The analysis of the hydraulic effects on Covered Species in this section is based on the *Big Tujunga Dam Habitat Conservation Plan Hydraulic Analysis* (Psomas 2020b), which is included in the HCP Support Documents (Volume II).

This section begins by describing the physical effects that are anticipated to occur as part of each Covered Activity and goes on to describe the effects on each group of Covered Species. Operation and maintenance activities would occur as needed; however, estimates on the frequency and duration have been given in order to evaluate impacts on Covered Species. Maintenance projects would be consolidated to the extent possible in order to minimize changes to the flow regime and effects on Covered Species.

4.1 PHYSICAL EFFECTS

This analysis assesses the physical effects of flood control operations, water conservation operations, and supplemental releases and maintenance projects for the existing Dam, as described in Section 3. It also assesses potential effects from the Spillway Improvement Project, the future translocation of Covered Fish Species upstream of the Reservoir (by another entity), and the effects of the Mitigation Program, as described in Section 3.

4.1.1 FLOOD CONTROL OPERATIONS

Within a river, different habitat features are created and maintained by a wide range of flow events (e.g., low flow to large floods that provide scouring and redistribute sediment). For example, many channel and floodplain features, such as river bars and riffle-pool sequences, are formed and maintained by periodic bankfull discharges (i.e., high flow conditions). These discharges are flows that can move significant quantities of bed and bank sediment and that occur frequently enough (e.g., every several years) to continually modify the channel (Wolman and Miller 1960). In rivers with a wide range of flood flows, floodplains may exhibit major bar deposits, such as berms of boulders along the channel or other features that are left by infrequent high-magnitude floods (Miller 1990). The predictable diversity of in-channel and floodplain habitat types has promoted the evolution of species that exploit the habitat mosaic created and maintained by hydrologic variability (Poff et al. 1997).

The purpose of a dam is to mitigate large flood flows for the beneficial purpose of protecting life and property downstream. As such, dams interrupt the natural flood cycle for the portion of the stream immediately downstream of the dam. Riverine systems depend on periodic disturbance to maintain functional integrity and enhance biodiversity (Salo et al. 1986; Amoros and Roux 1988; Ward and Stanford 1995). Flooding renews nutrients, reduces anaerobic conditions, increases sediment diversity, opens new patches for colonization, and creates a diversity of ages of habitat patches and successional stages (Ward 1998). Eliminating the natural disturbance regime leads to a simplification of floodplain vegetation as pioneer stages are eliminated and successional processes are interrupted (Decamps and Tabacci 1994).

A series of hydraulic analyses were conducted to describe and examine the functionality of natural fluvial processes downstream of the Dam along Big Tujunga Creek. Historic aerials were obtained to examine the variation in the width of the stream, variation in stream sinuousity, and variation in the extent of riparian vegetation over the analysis period (1954-2017). It was determined that the upper portion (between the Dam and approximately the USFS boundary) is geomorphically controlled; that is, the creek follows essentially the same path because it is limited by the surrounding geomorphology. The downstream portion of the creek (downstream of the USFS boundary) is alluvial and shows alluvial braiding with some changes in the active channel(s) over time. Natural river processes were observed to be in effect over the analysis period, which was entirely during Dam operation. For example, following the Mill Fire in 1975, a sediment deposition event occurred and the active channel moved to flow north around the deposition; riparian vegetation cover also dropped following this event. As expected, with time, the active channel continued to migrate further north around the deposition, and riparian vegetation recovered. It was concluded that over the analysis period, natural variation in the extent of stream, sinuousity, and riparian vegetation had occurred over time; substantial changes were attributed to anthropogenic changes in the system (e.g., construction of a golf course in the flood plain) (Psomas 2020b).

A Cross Section Analysis was conducted at four man-made structures that cross Big Tujunga Creek downstream of the Dam. The historic stream cross section was obtained from as-built plans from the construction of each structure and compared to a recent cross section to determine whether aggradation or degradation had occurred at each structure. No overall trends in aggradation or degradation were observed; it was determined that local geomorphic effects were the primary influence over the stream at each crossing structure (Psomas 2020b).

Sediment was sampled at several points along the creek downstream of the Dam. The study found that grain size is generally coarser downstream. This may be because both coarse and fine sediment is captured by the Dam (sediment trapping), while sediment is replenished by multiple tributaries (sediment loading) as the creek flows downstream. Differences in geology throughout the watershed may lead to more coarse sediment being contributed from downstream tributaries. Lastly, variation in riparian vegetation may affect how much sediment is trapped in each portion of the stream (Psomas 2020b).

As described in Section 3, the Dam initially impounds water and releases outflow comparable to inflow up to 500 cfs. Between 500 cfs and 3,000 cfs, flows are generally controlled by the Dam. Over 3,000 cfs inflow, the Reservoir may go to spillway (depending on the duration of flows and the available capacity of the Reservoir at the time of the storm) and water would flow over the Dam at the same rate as inflow. Decisions about flood control releases need to be made quickly as storms develop and progress based on real-time conditions. As mentioned above, flood control releases are not ramped.

A Flood Flow Frequency Analysis was conducted and determined that a flow of 500 cfs represents an approximately 2- to 5-year storm (20 to 50 percent probability event), and a spillway event represents an approximately 25-year storm (4 percent probability event). A Spearman-Conley test was conducted to compare inflow and outflow for approximately 20 years of data (1998-2017). The outflow was determined not to be substantially different than the inflow; therefore, the Dam has not substantially changed the hydrology of the downstream system (Psomas 2020b).

While the Dam is the primary influence over the creek immediately downstream, several tributaries contribute flow and sediment during storm events as the creek flows downstream toward Hansen Dam; half of the Big Tujunga Creek Watershed is downstream of the Dam. A Tributary Analysis was conducted to determine the point at which the tributaries become a greater influence over flows in the mainstem than the releases from the Dam (i.e., point where tributaries contribute greater than 50 percent of flows during a storm). This point is considered the "Limit of

Hydraulic Influence." The point at which this occurs changes depending on the size of the storm event and size of the release. The Dam typically releases outflow comparable to inflow up to 500 cfs; the Limit of Hydraulic Influence for these releases was determined to be Clear Creek, approximately 1.1 mile downstream of the Dam (Exhibit 11). The Dam releases are the dominant influence over the flows along Big Tujunga Creek from the plunge pool downstream to Clear Creek. Intermediate-sized storms (500 cfs to 3,000 cfs inflow) are generally controlled by the Dam; releases are limited to 500 cfs because a larger release would overtop the Oro Vista Avenue crossing. The Dam attenuates the intermediate-sized storms (inflow to the Reservoir) so that the outflow released from the Dam is not as high as the peak flow would be in a natural system. The Limit of Hydraulic Influence for inflows from 500 cfs to 3,000 cfs is also Clear Creek because outflow is limited to 500 cfs. Downstream of this point, flows from tributaries are proportionately greater than releases from the Dam. While the Dam is controlling flows (i.e., attenuating the peak flows along the mainstem), areas downstream of Clear Creek are experiencing the intermediate-sized storms to some extent due to higher tributary flows. However, the size of the event is dampened (reduced) by the control of flows along the mainstem by the Dam; thus, the riparian system downstream is not experiencing the floods in the same magnitude as it would in a natural system. Once inflow exceeds 3,000 cfs, the Reservoir may go to spillway (depending on the duration of flows and the available capacity of the Reservoir at the time of the storm) and overtop the Dam; then water would flow over the Dam uncontrolled. As the magnitude of the flows coming down the mainstem are greater during an event of this size, the point at which the collective tributary contribution exceeds the mainstem occurs further downstream. The Limit of Hydraulic Influence during a spillway event was determined to be Stone Canyon, approximately 4.8 miles downstream (Exhibit 11). During a spillway event, the entire creek is experiencing the 25-year (or greater) sized storm, which would provide large-scale disturbance needed for a healthy functioning ecosystem. Thus, the conclusion of the Tributary Analysis was that the extent of the Dam's hydraulic influence extends from the Dam to Stone Canyon. The Dam is the primary influence from the Dam to Clear Creek for inflows up to 3,000 cfs, and intermediate-sized storms are dampened from the Dam to Stone Canyon. Inflows over 3,000 cfs may go to spillway approximately every 25 years and provide needed disturbance to the downstream ecosystem (Psomas 2020b).

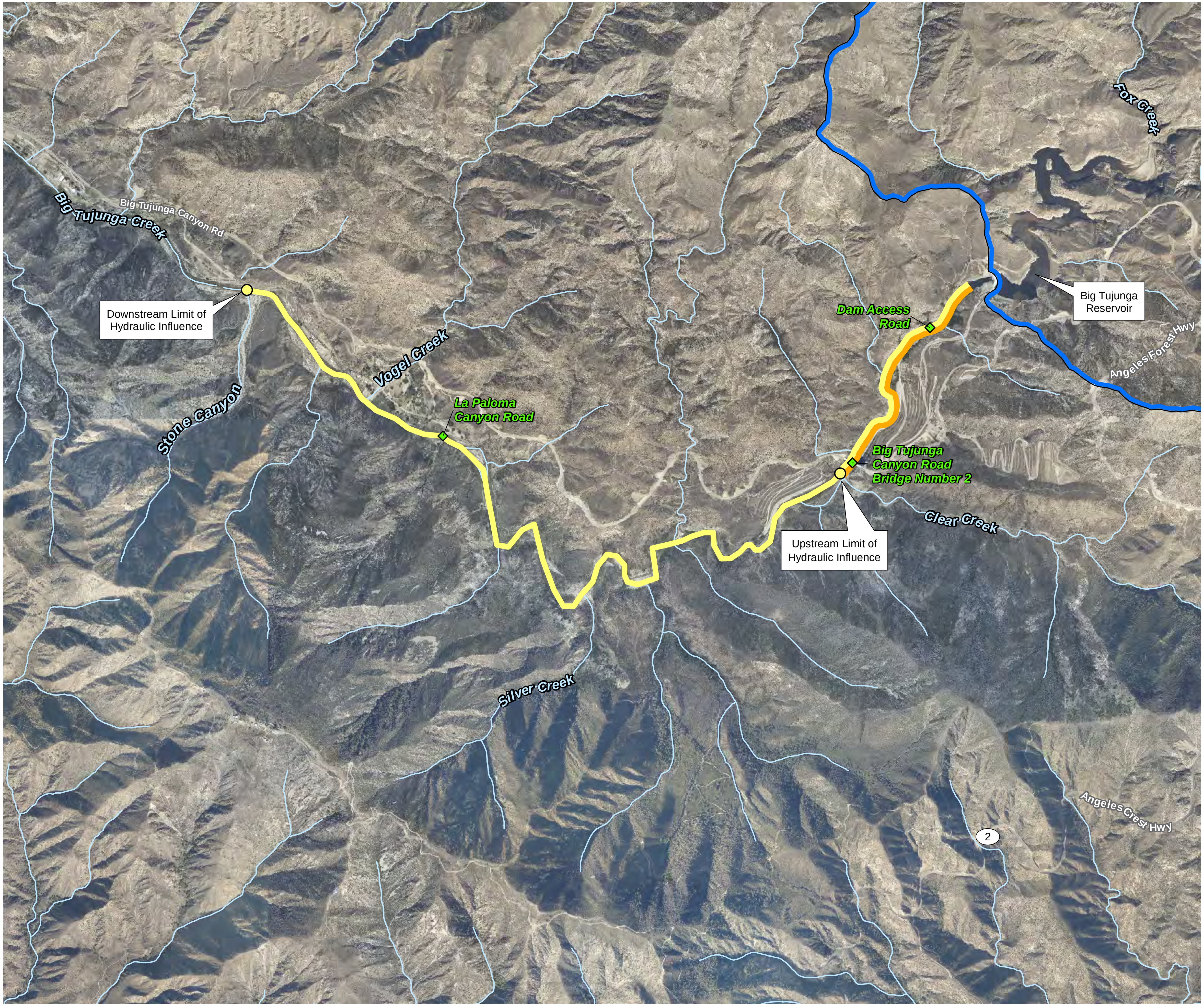
Flood control releases were modeled between the plunge pool and upstream of the Oro Vista Avenue crossing using a two-dimensional (2D), Hydrologic Engineering Center River Analysis System (HEC-RAS) hydraulic model of the stream for a discrete discharge event. Although the maximum flood control release is 500 cfs in order not to overtop the Oro Vista Avenue crossing, the HEC-RAS model was run at 600 cfs to provide a conservative analysis. Model results showed that maximum depths were observed in the narrow reaches in upper end of creek; upstream of La Paloma; and upstream of Big Tujunga Bridge Number 1. Model results also showed a variation in velocity across the stream cross section throughout the study area; while the center of the stream may be flowing at a velocity of 5 feet per second (fps), the stream edges were 1 fps immediately below the plunge pool. The highest velocities were observed in the upper end of the study area, where stream morphology is narrow and steep. The overall maximum velocity for the study area was 10.6 fps; however, the majority of the stream had a maximum velocity of approximately 4 fps (Exhibit 12).

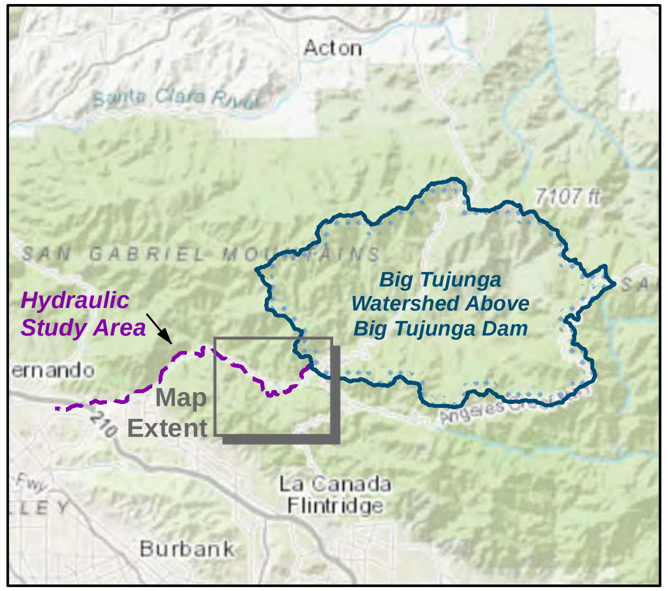
In order to move sediment and overcome the threshold of root ball strength for grasses (i.e., to remove vegetation), the stream needs to achieve velocities of 4 fps or greater. Thus, the modeled outflow of 600 cfs is expected to move a limited amount of sediment and remove a limited amount of vegetation because only a limited portion of the stream would exceed the 4-fps threshold. Dam operations release up to 500 cfs in order not to overtop Oro Vista Avenue; therefore, stream velocities would be slower than that shown on Exhibit 11 and a smaller portion of the stream (if any) would exceed the 4-fps threshold. Therefore, a spillway event may be needed for the downstream system to move a substantial amount of sediment and remove a substantial amount of in-stream vegetation. However, the model assumed no tributary inflow whereas during storms, tributaries would also be contributing flows that would increase stream velocities over those shown by the model. Additionally, for intermediate-size events (500 cfs to 3,000 cfs inflows), outflows of up to 500 cfs would be released from the Dam over a longer duration than if the storm had occurred in an uncontrolled system. Longer duration of higher velocity flows provides additional stress on vegetation and would lower the threshold of root ball strength. Therefore, depending on the type of vegetation and flow from the tributaries, vegetation could be removed during intermediate-sized storms, even with outflows of less than 500 cfs. Approximately 111.20 acres of riparian vegetation within the Limit of Hydraulic Influence would be indirectly affected by the disruption in the natural flood cycle (Exhibit 13, Table 14).

TABLE 14
VEGETATION TYPES AND OTHER LANDCOVERS
WITHIN THE LIMIT OF HYDRAULIC INFLUENCE

Vegetation Type or Landcover	Code	Total in HCP Study Area (Acres)	Total from Plunge Pool to Clear Creek (acres)	Total from Clear Creek to Stone Canyon (acres)	Total Indirectly Affected
Alluvial Scrub		**493.72**	**0.00**	**16.54**	**16.54**
Scale Broom Scrub	6	493.72	0.00	16.54	16.54
Chaparral		**154.15**	**0.00**	**0.02**	**0.02**
Birch Leaf Mountain Mahogany Chaparral	12	78.98	0.00	0.02	0.02
Riparian Forest		**690.71**	**15.56**	**63.80**	**79.36**
White Alder Grove–Willow Thicket	19	66.59	15.56	48.48	64.04
California Sycamore Woodland–Fremont Cottonwood Forest	20	0.23	0.00	0.23	0.23
Fremont Cottonwood Forest	22a	29.37	0.00	0.24	0.24
Black Willow Thicket–Fremont Cottonwood Forest	27	346.25	0.00	14.85	14.85
Riparian Scrub		**142.48**	**0.31**	**6.18**	**6.49**
Mulefat Thicket	30	35.21	0.31	6.18	6.49
Seep		**2.05**	**1.71**	**0.00**	**1.71**
Disturbed Freshwater Seep	36	1.82	1.71	0.00	1.71
Forest/Woodland		**96.47**	**0.25**	**3.92**	**4.17**
Coast Live Oak Woodland	37	84.04	0.25	3.92	4.17
Riparian Invasive		**14.68**	**0.00**	**1.69**	**1.69**
Broom Patch	43	1.69	0.00	1.69	1.69
Open Water		**91.85**	**0.06**	**0.07**	**0.13**
Open Water	48	91.85	0.06	0.07	0.13
Alluvium		**10.12**	**0.00**	**0.14**	**0.14**
Dry Wash	49	10.12	0.00	0.14	0.14
Other Landcover		**321.94**	**0.90**	**0.05**	**0.95**
Developed/Ornamental	51	267.67	0.90	0.05	0.95
Total		**2,334.09**	**18.79**	**92.41**	**111.20**

As determined by the Tributary Study, the influence of Dam releases during storms with inflows greater than 500 cfs reaches downstream to Stone Canyon. However, during the non-storm season, the tributaries are not flowing; therefore, the influence of Dam releases extends downstream to Hansen Dam.





Limits of Hydraulic

Upstream Area of Hydraulic Influence for Flood Control Operations

Downstream Area of Hydraulic Influence for Flood Control Operations

Stream Crossing

Stream Centerline[1]

Big Tujunga Upper Watershed Boundary (Above the Dam)

N W E S

2,000 1,000 0 2,000 Feet

[1]Source: USGS National Hydrography Dataset
Aerial Source: LAR-IAC 2014

Limit of Hydraulic Influence

Exhibit 11

Big Tujunga Dam

PSOMAS

(Rev: 10/16/2020 MMD) R:\Projects\DPW\3DPW150105 (prev 3DPW028201)\Graphics\HCP

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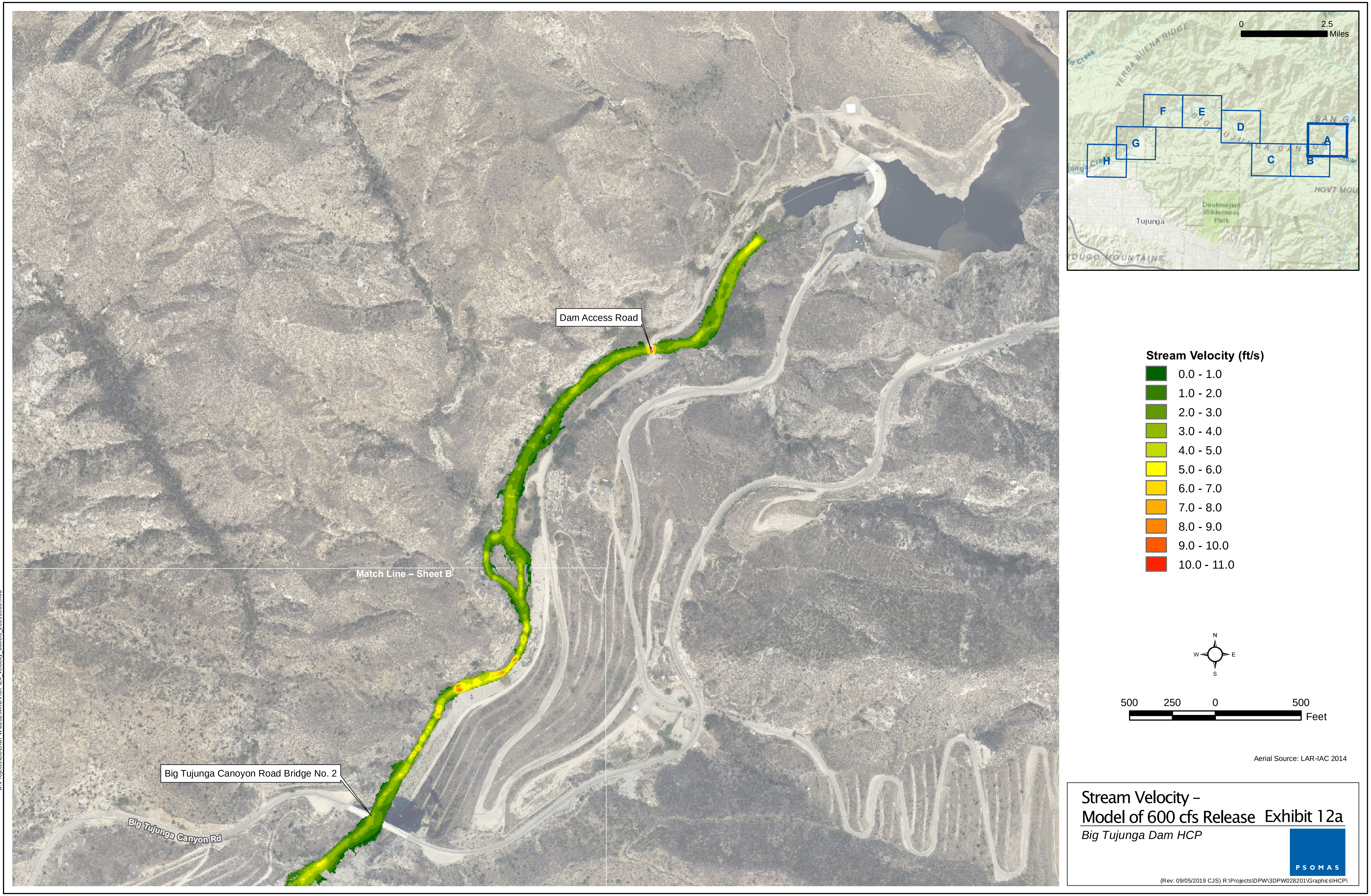
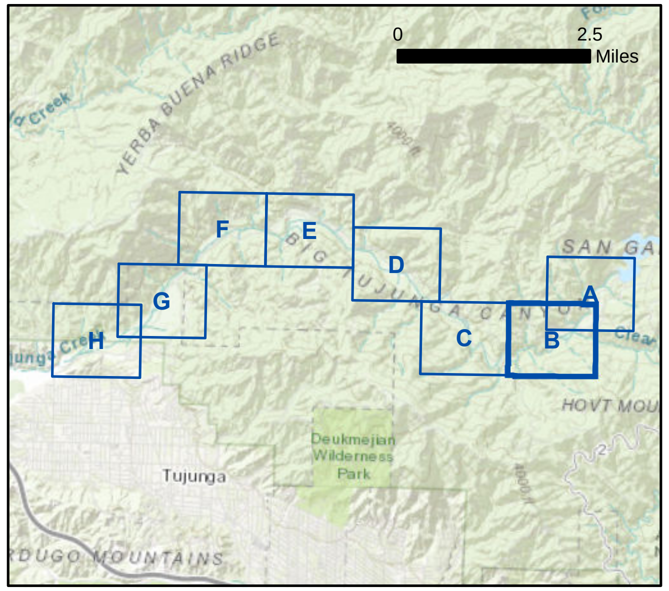


Stream Velocity – Model of 600 cfs Release Exhibit 12a

Big Tujunga Dam HCP



Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N W E S

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity –
Model of 600 cfs Release Exhibit 12b

Big Tujunga Dam HCP

PSOMAS

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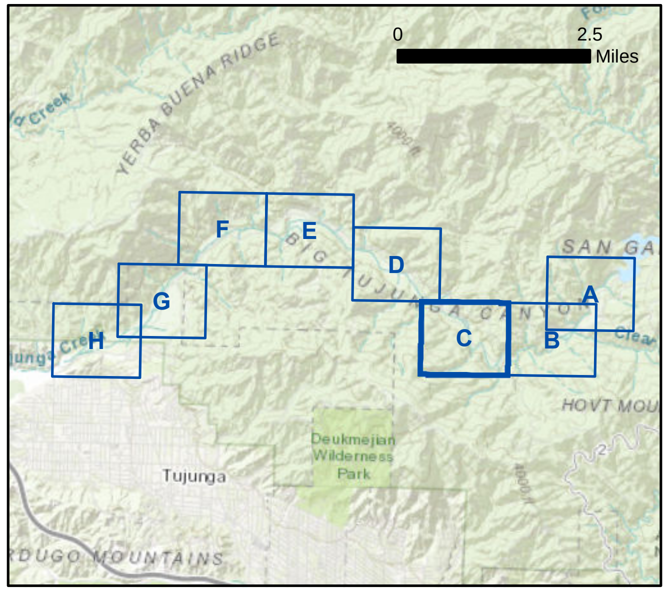

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N W E S

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 600 cfs Release Exhibit 12c

Big Tujunga Dam HCP

PSOMAS

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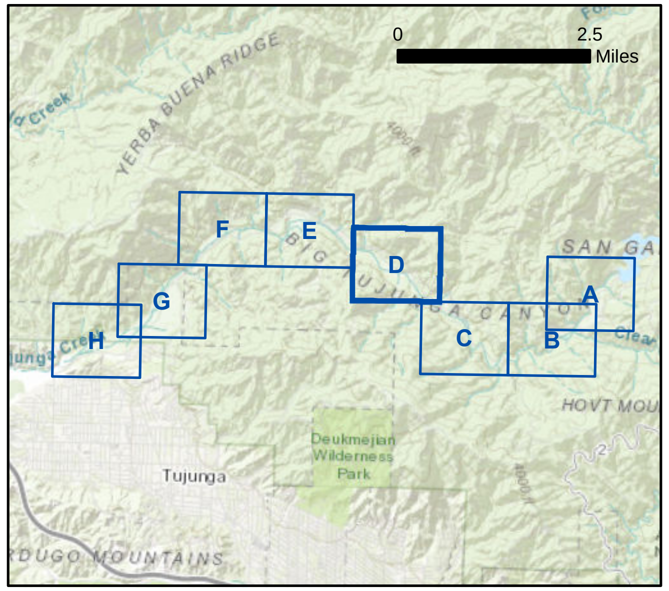

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N
W E
S

500 250 0 500
Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 600 cfs Release Exhibit 12d

Big Tujunga Dam HCP

PSOMAS

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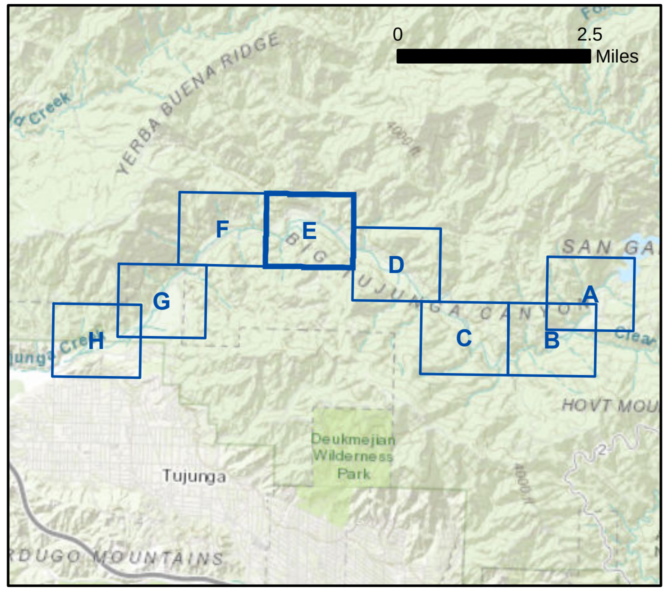

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N W E S

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 600 cfs Release Exhibit 12e

Big Tujunga Dam HCP

PSOMAS

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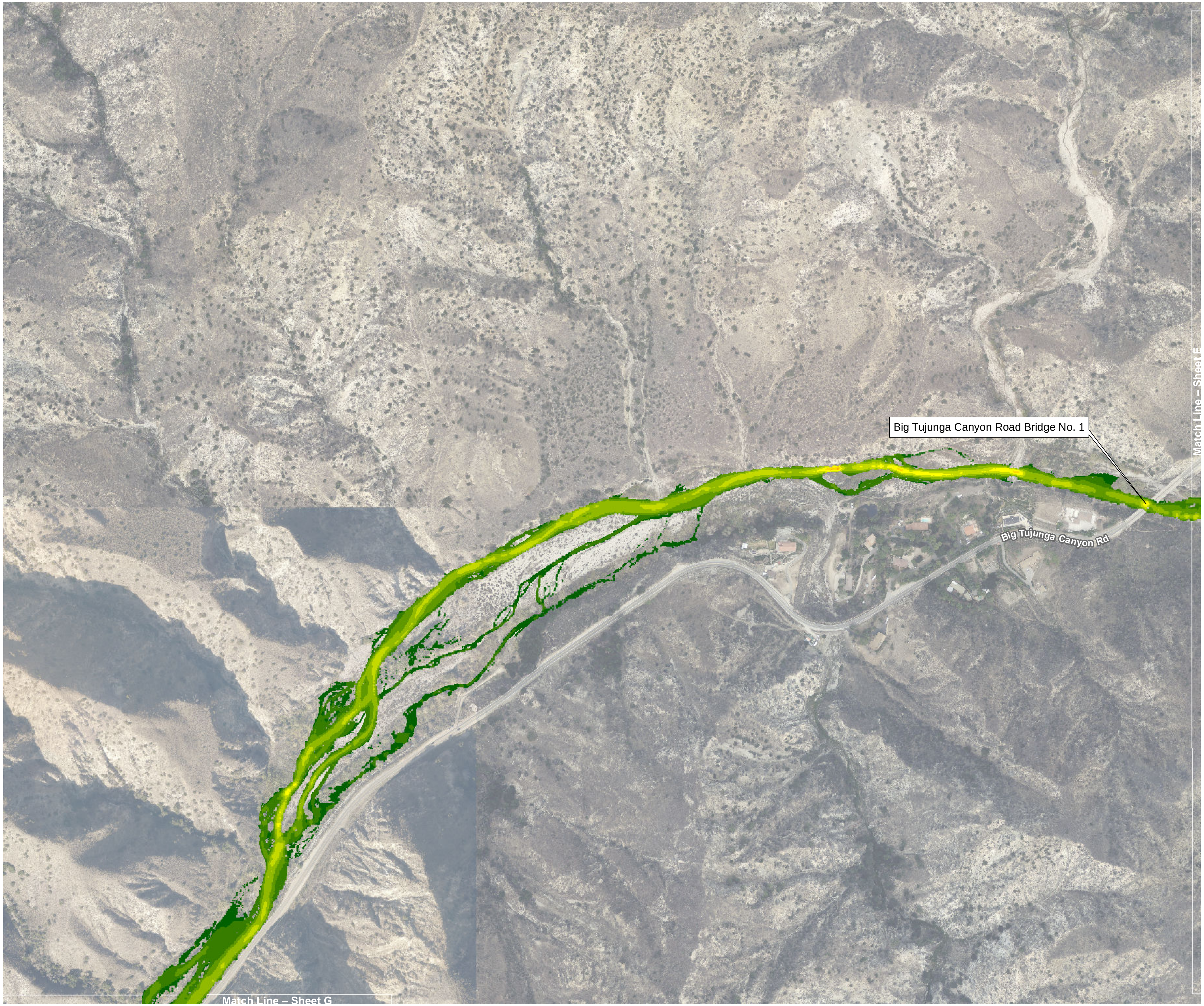

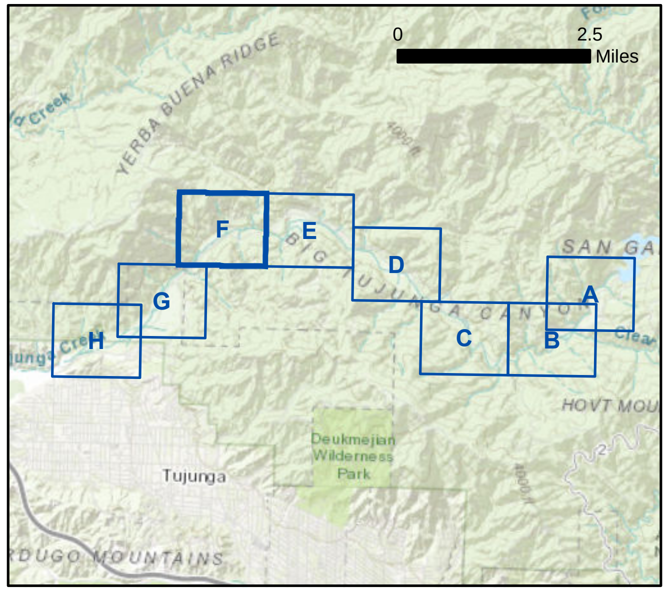

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N
W E
S

500 250 0 500
Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 600 cfs Release Exhibit 12f

Big Tujunga Dam HCP

PSOMAS

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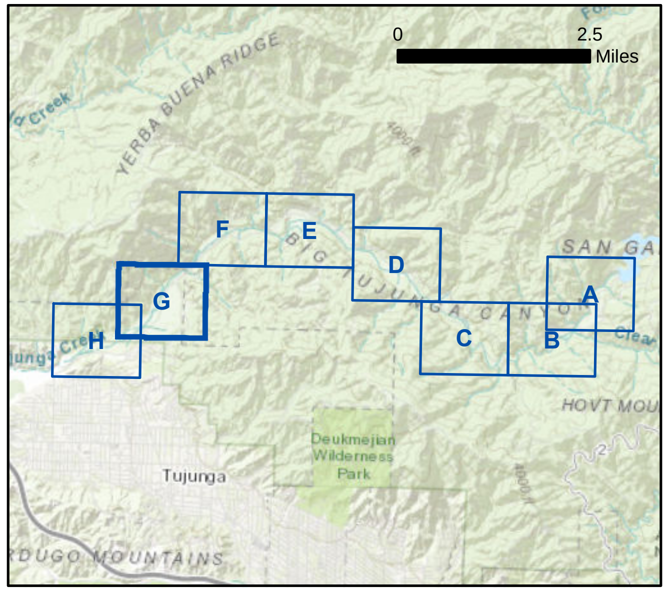

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N E S W

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 600 cfs Release Exhibit 12g

Big Tujunga Dam HCP

PSOMAS

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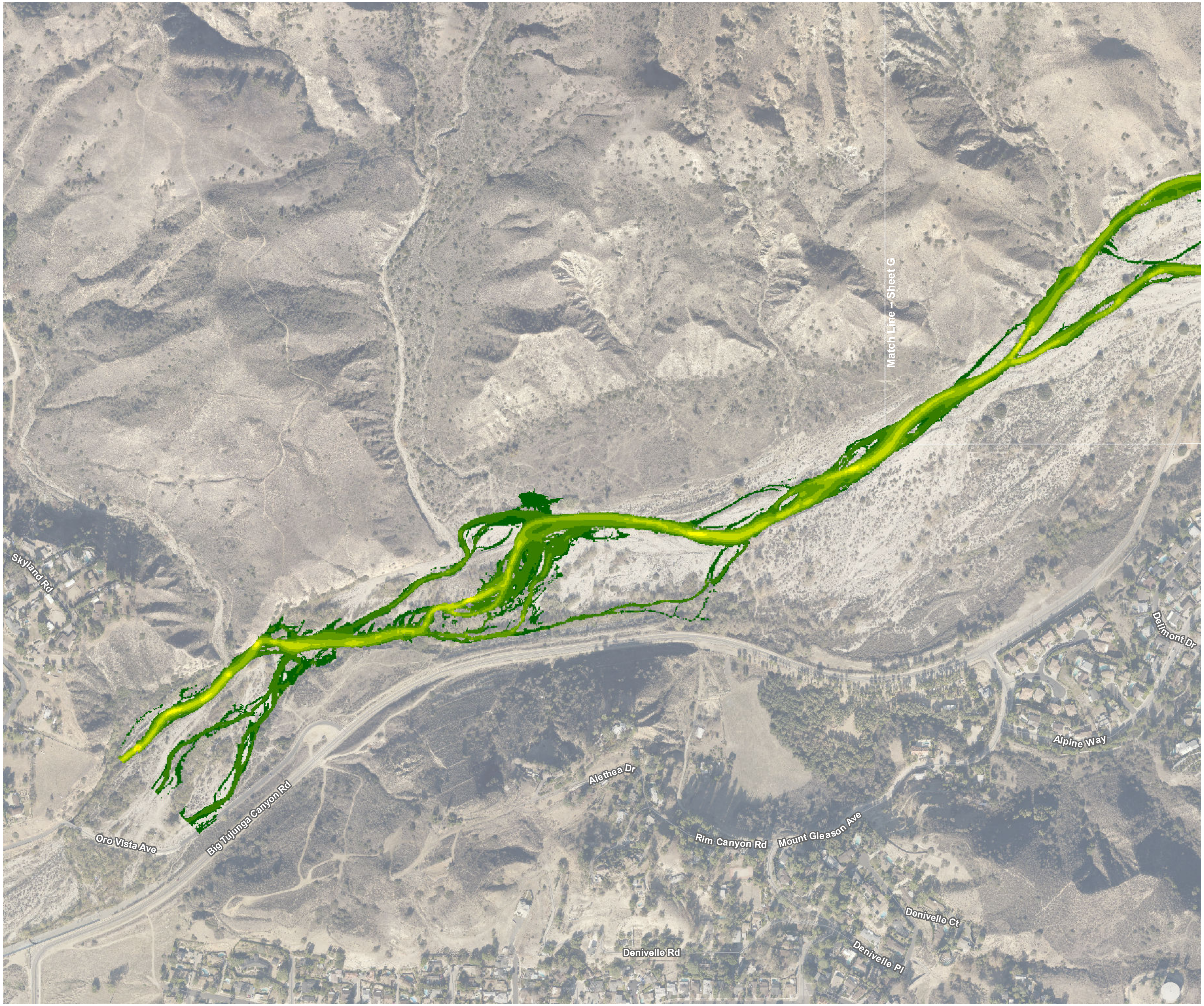

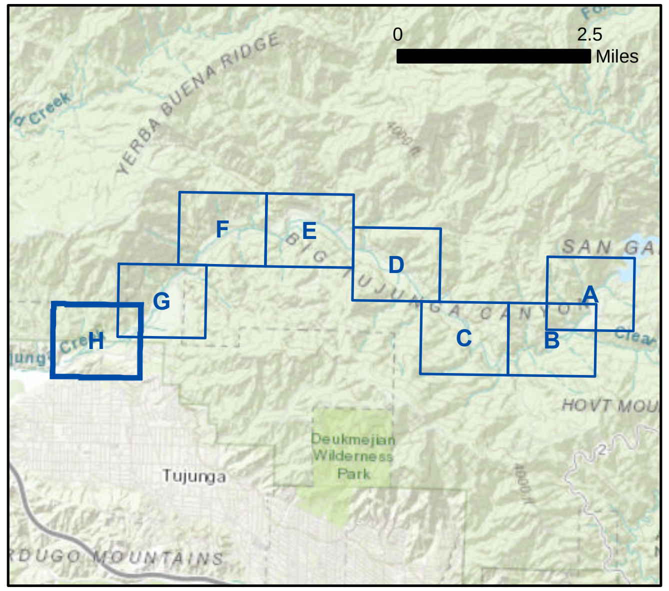

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N E S W

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 600 cfs Release Exhibit 12h

Big Tujunga Dam HCP

PSOMAS

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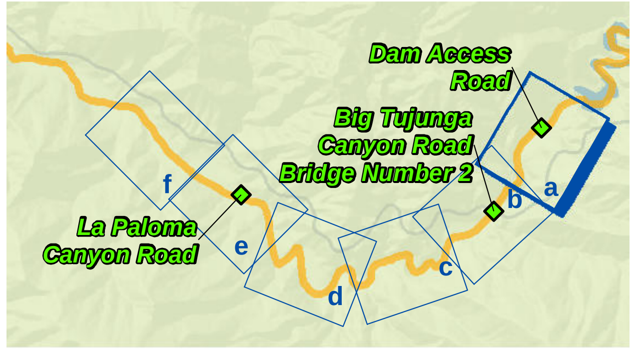

Downstream Area of Hydraulic Influence for Flood Control Operations

Chaparral

7 : Thick Leaf Yerba Santa Scrub

Riparian Forest

19 : White Alder Grove–Willow Thicket

Seep

36 : Disturbed Freshwater Seep

Forest/Woodland

37 : Coast Live Oak Woodland

Open Water

48 : Open Water

Other Landcover

51 : Developed/Ornamental

320 160 0 320 Feet

Vegetation Within Limits of Hydraulic Influence

Exhibit 13a

Big Tujunga Dam HCP

PSOMAS

(Rev: 10/19/2020 MMD) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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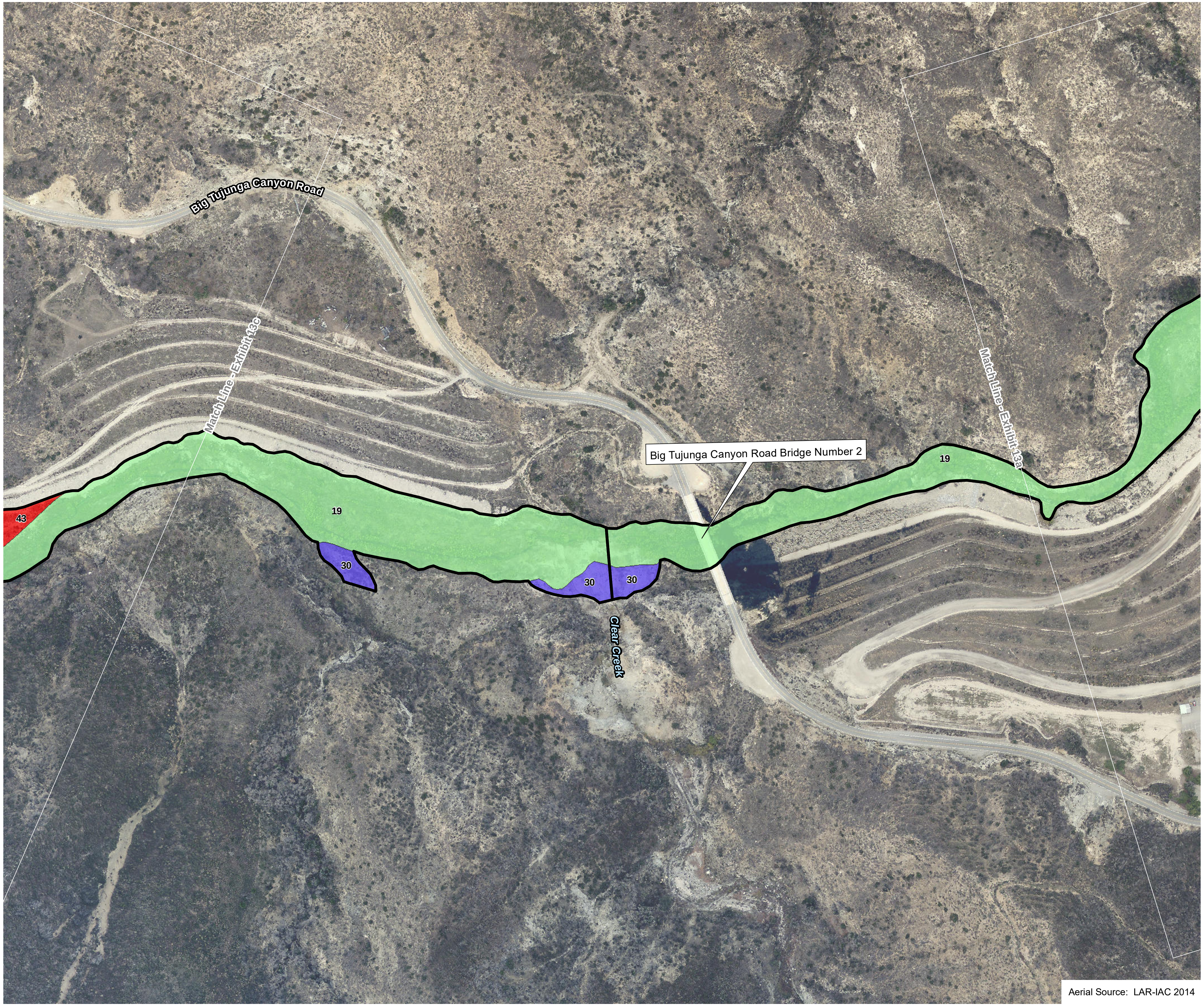

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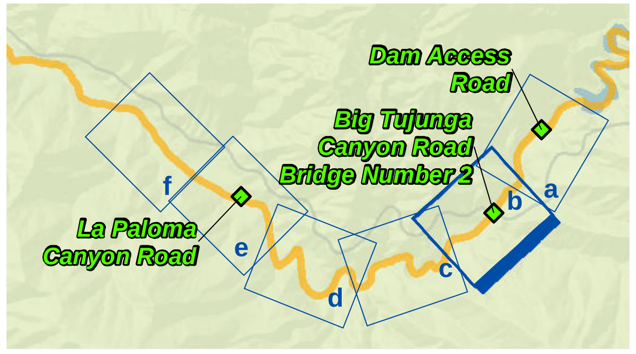

Downstream Area of Hydraulic Influence for Flood Control Operations

Riparian Forest

19 : White Alder Grove–Willow Thicket

Riparian Scrub

30 : Mulefat Thicket

Riparian Invasive

43 : Broom Patch

320 160 0 320 Feet

Vegetation Within Limits of Hydraulic Influence

Exhibit 13b

Big Tujunga Dam HCP

PSOMAS

(Rev: 10/19/2020 MMD) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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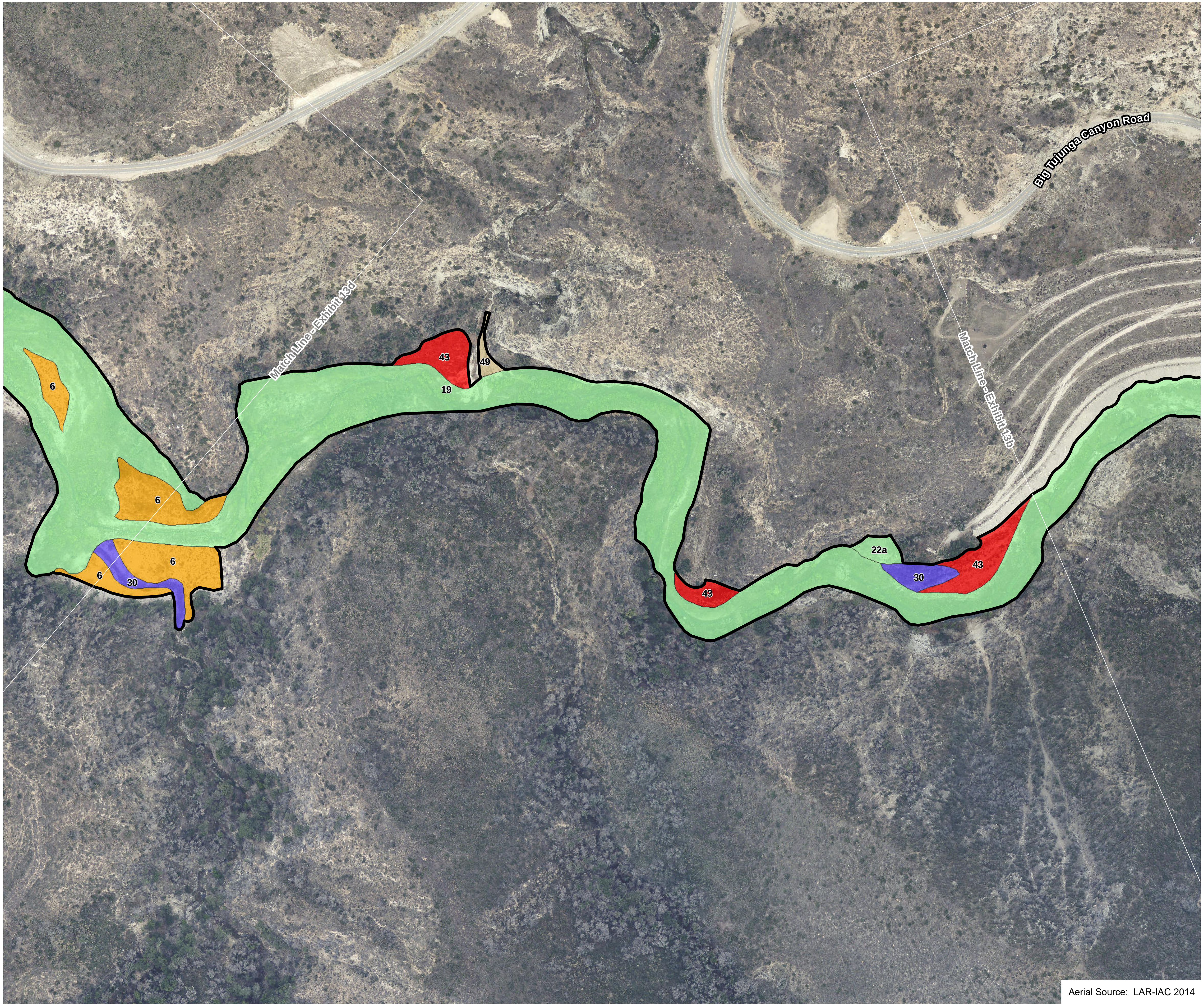

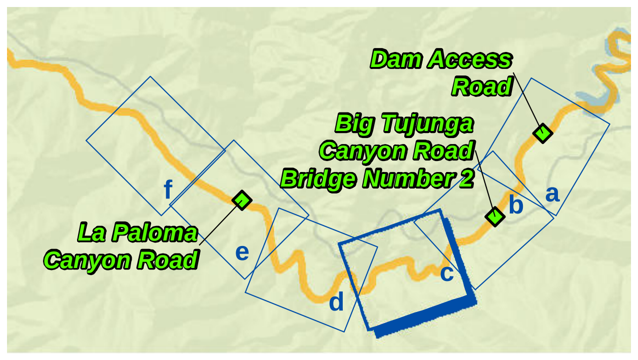

Downstream Area of Hydraulic Influence for Flood Control Operations

Alluvial Scrub

6 : Scale Broom Scrub

Riparian Forest

19 : White Alder Grove–Willow Thicket

22a : Fremont Cottonwood Forest

Riparian Scrub

30 : Mulefat Thicket

Riparian Invasive

43 : Broom Patch

Alluvium

49 : Dry Wash

320 160 0 320 Feet

N W E S

Vegetation Within Limits of Hydraulic Influence

Exhibit 13c

Big Tujunga Dam HCP

PSOMAS

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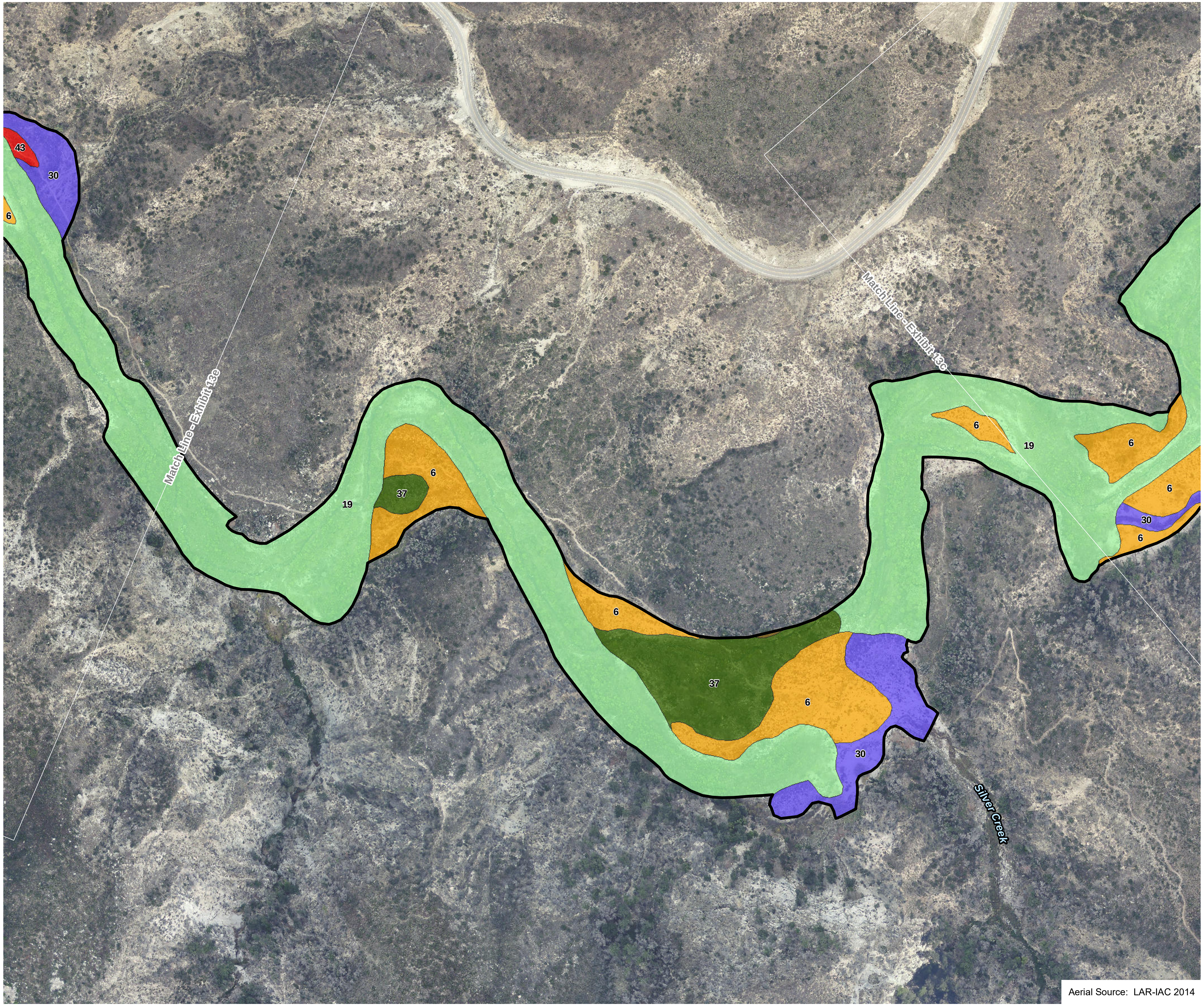

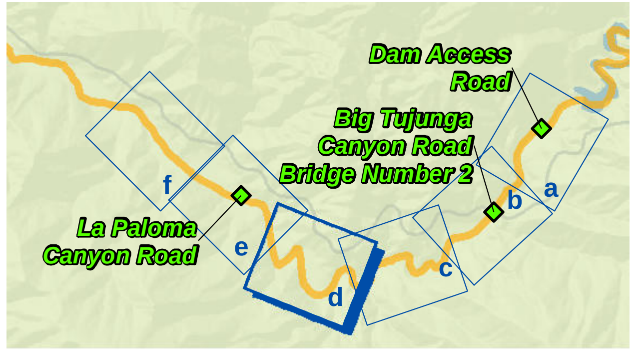

Downstream Area of Hydraulic Influence for Flood Control Operations

Alluvial Scrub

6 : Scale Broom Scrub

Chaparral

12 : Birch Leaf Mountain Mahogany Chaparral

Riparian Forest

19 : White Alder Grove–Willow Thicket

Riparian Scrub

30 : Mulefat Thicket

Forest/Woodland

37 : Coast Live Oak Woodland

Riparian Invasive

43 : Broom Patch

320 160 0 320
Feet

N E S W

Vegetation Within Limits of Hydraulic Influence

Exhibit 13d

Big Tujunga Dam HCP

PSOMAS

(Rev: 10/19/2020 MMD) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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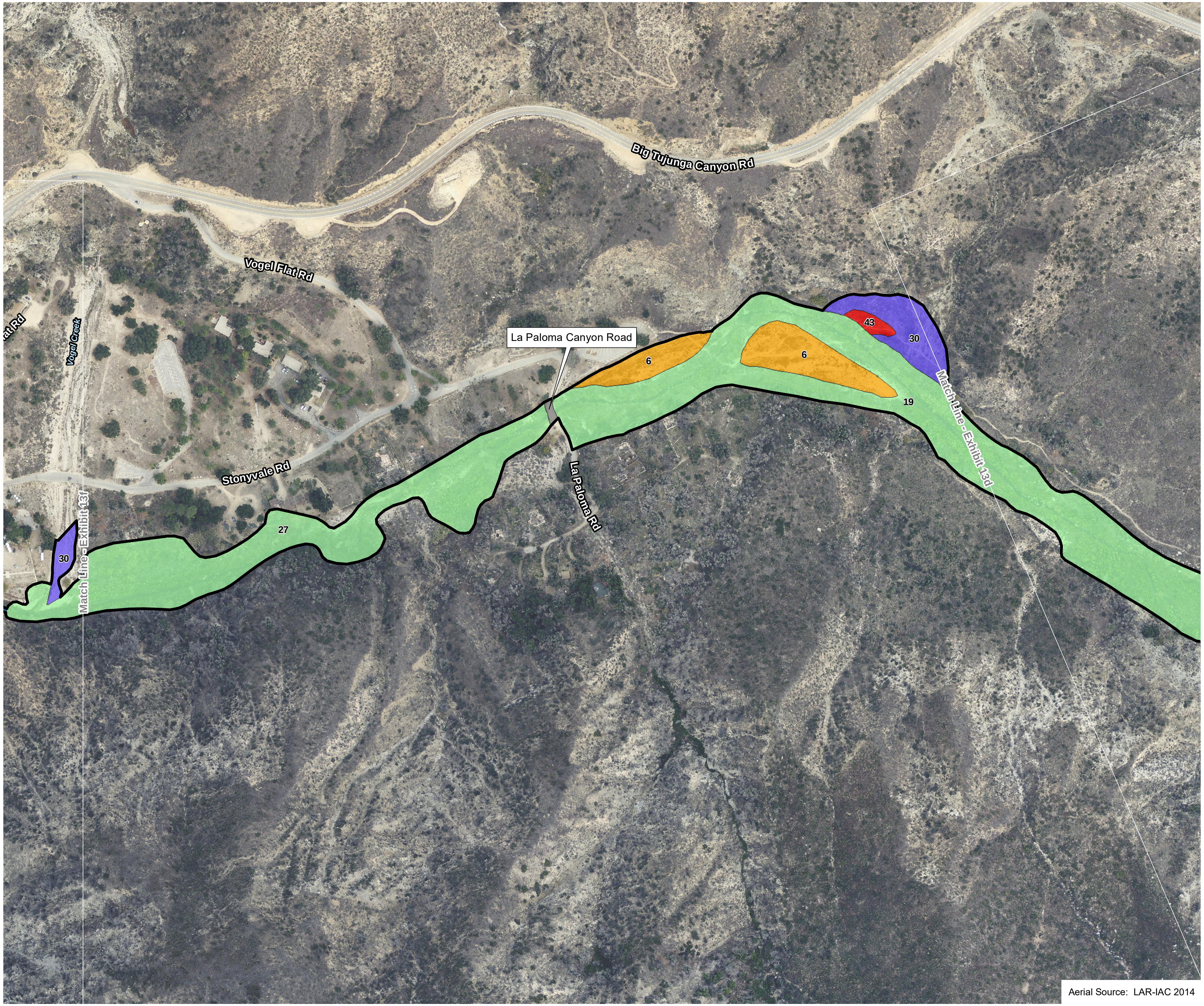

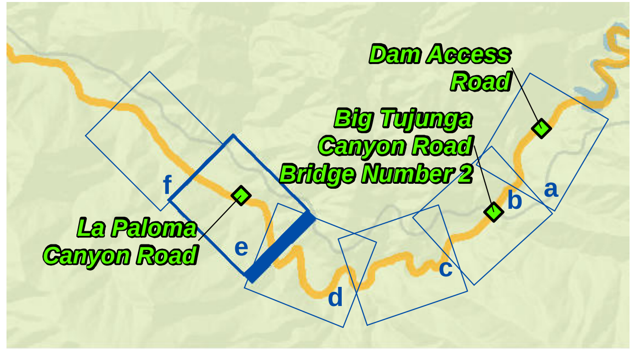

Downstream Area of Hydraulic Influence for Flood Control Operations

Alluvial Scrub

6 : Scale Broom Scrub

Riparian Forest

19 : White Alder Grove–Willow Thicket

27 : Black Willow Thicket–Fremont Cottonwood Forest

Riparian Scrub

30 : Mulefat Thicket

Riparian Invasive

43 : Broom Patch

Open Water

48 : Open Water

Other Landcover

51 : Developed/Ornamental

320 160 0 320 Feet

Vegetation Within Limits of Hydraulic Influence

Exhibit 13e

Big Tujunga Dam HCP

PSOMAS

(Rev: 10/19/2020 MMD) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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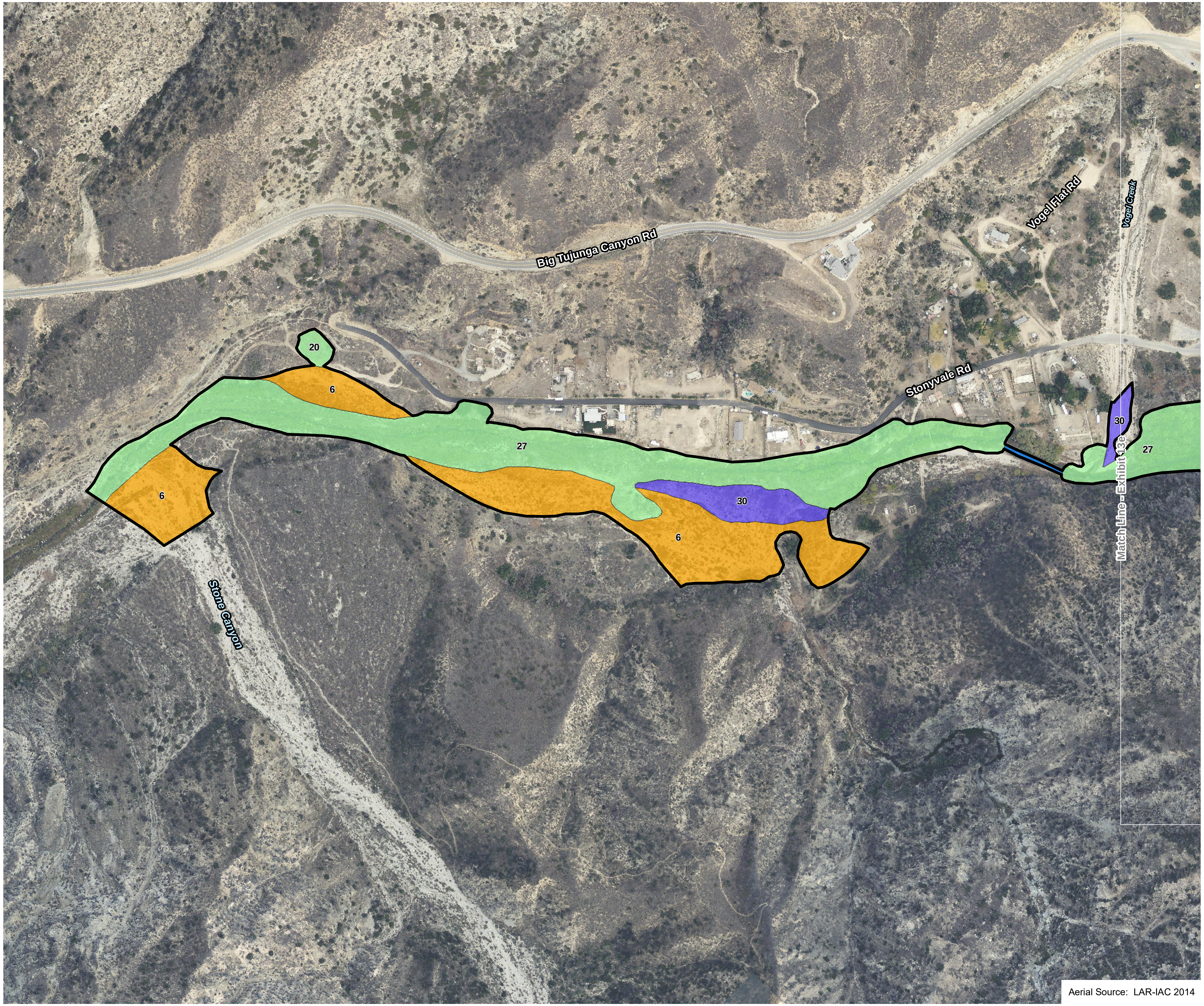

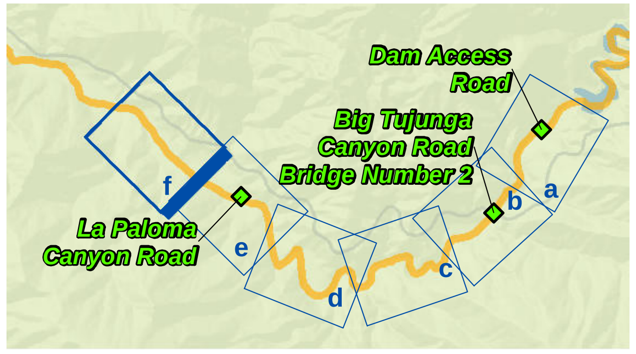

Downstream Area of Hydraulic Influence for Flood Control Operations

Alluvial Scrub

6 : Scale Broom Scrub

Riparian Forest

20 : California Sycamore Woodland–Fremont Cottonwood Forest

27 : Black Willow Thicket–Fremont Cottonwood Forest

Riparian Scrub

30 : Mulefat Thicket

Open Water

48 : Open Water

320 160 0 320 Feet

N E S W

Vegetation Within Limits of Hydraulic Influence

Exhibit 13f

Big Tujunga Dam HCP

PSOMAS

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Minimum pool elevation of the Reservoir is 2,225 feet.[44] The maximum water surface elevation is 2,290 feet, which corresponds to an inundation area of 85.7 acres. The Reservoir pool can fluctuate between these elevations during normal flood control operations.

4.1.2 WATER CONSERVATION OPERATIONS

As described in Section 3, water conservation releases generally range from 100 cfs to 250 cfs. Releases need to be at least 100 cfs to make it to the downstream spreading grounds. Water conservation releases are typically made within a few days to a few weeks after a storm event, once the spreading grounds have capacity for the water. According to OPER-2, water conservation releases would be ramped during the Santa Ana sucker breeding season (March 1 to July 31).

Water conservation releases between the plunge pool and upstream of the Oro Vista Avenue crossing were modeled using a 2D HEC-RAS hydraulic model of the stream for a discrete discharge event. Model results showed that maximum depths were observed in the narrow reaches in the upper end of the creek, upstream of La Paloma, and upstream of Big Tujunga Bridge Number 1. Model results showed variation in velocity across the stream cross section throughout the study area; while the center of the stream may be flowing at a velocity of 3 to 4 fps, the stream edges were less than 1 fps, even immediately below the plunge pool. The highest velocities were observed in the upper end of the study area, where stream morphology is narrow and steep. The overall maximum velocity for the entire study area was 8.2 fps; however, the majority of the stream had a maximum velocity of about 3 fps (Exhibit 14) (Psomas 2020b).

Water conservation releases are not expected to move sediment or remove vegetation because the stream velocities are not expected to be high enough to exceed the 4-fps threshold for the majority of the stream (only in small patches). Sediment transport and vegetation disturbance would be expected to occur only during flood control releases and storm events, as described above (Psomas 2020b).

Minimum pool elevation of the Reservoir is 2,225 feet. The maximum water surface elevation is 2,290 feet, which corresponds to an inundation area of 85.7 acres. The Reservoir pool can fluctuate between these elevations during normal water conservation operations. However, the mean Reservoir water surface elevation over the non-storm season is 2,240.7 feet, which corresponds to a mean inundation area of 48.0 acres (Zargaryan 2019a). Therefore, the variation in the amount of Reservoir pool versus stream-like habitat in the upper Reservoir would be approximately 37.7 acres over 1.12 stream miles in the upper Reservoir (Exhibit 15).

4.1.3 SUPPLEMENTAL RELEASES

As described in Section 3, up to 1,500 af of water is captured over the storm season to be released over the non-storm season. To date, the SASWG has chosen to release these as continuous releases with the same amount of water added to the inflow throughout the non-storm season (e.g., outflow equals inflow plus approximately 4 cfs supplemental release). However, the resource agencies may choose to change the approach and to (1) vary the amount of supplemental releases over the non-storm season, (2) release supplemental releases as pulsed releases, and/or (3) not release them at all. The approach to supplemental releases under the HCP will be determined at the annual HCP Working Group Meeting; it is considered one of the Adaptive Management actions that will be determined based on the feedback from monitoring results and weather conditions of the year per OPER-4.

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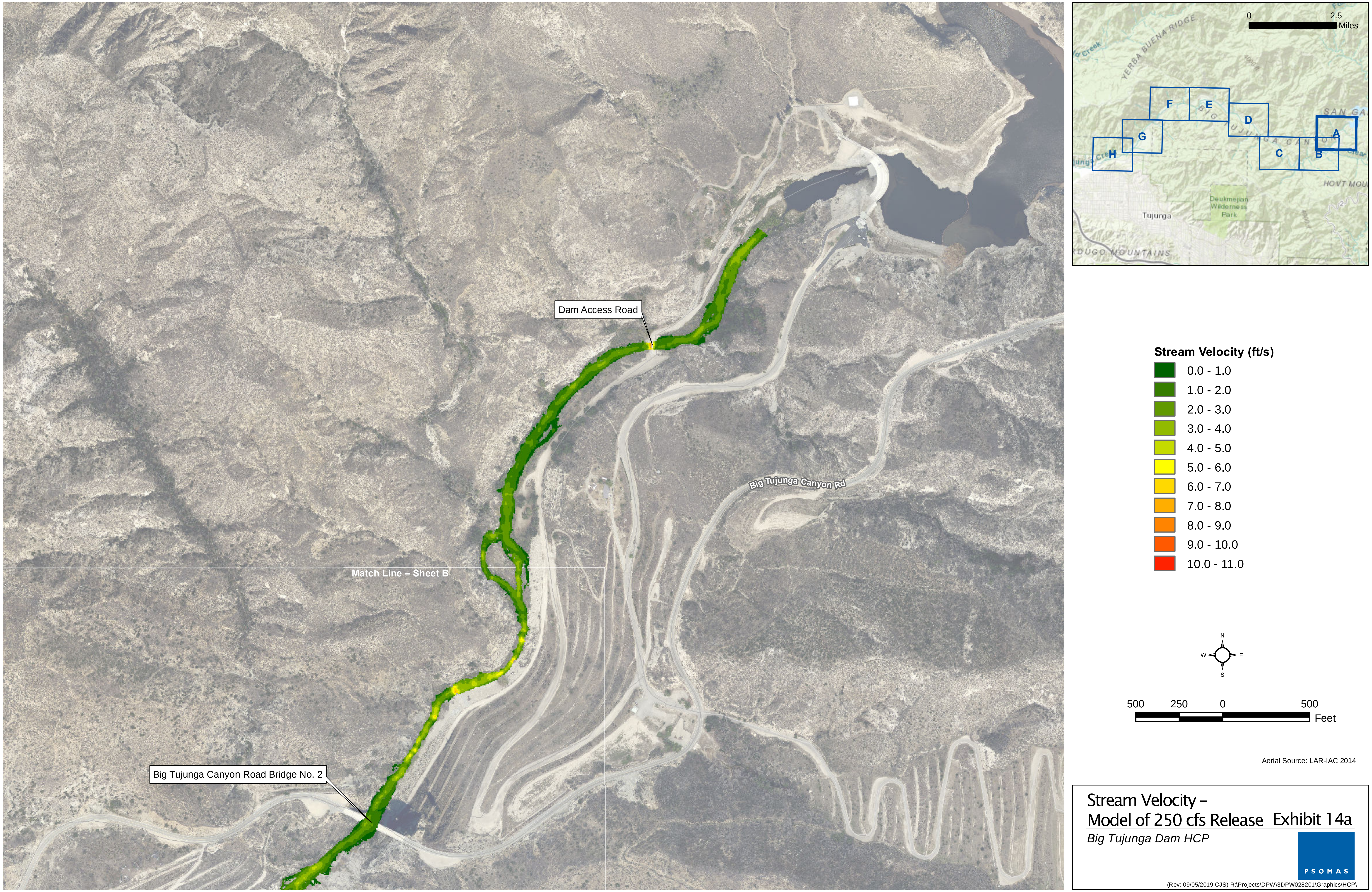
44 The elevation of minimum pool may change in the future (e.g., following sediment removal).

Supplemental releases were requested by the USFWS during the Rehabilitation Project Section 7 Consultation with the intention of enhancing downstream habitat through the summer months by keeping the stream wetted continuously and providing fresh, cool, oxygenated water to downstream pools. The supplemental releases began in 2012 following completion of the Rehabilitation Project, which installed the low-flow valve. Since the supplemental releases began, the amount of in-stream vegetation has increased dramatically. It is believed that the additional water during the spring/summer growing season allowed willows and cattails to grow faster and encroach into the stream, slowing the velocity of the water, increasing the deposition of sediment, and thereby increasing embeddedness of cobble substrate (Psomas 2019b). Additionally, between 2013 and 2018, non-native predators spread to occupy all but a few of the sampled reaches. It is believed that the year-round flow allowed the stream to flow more continuously, rather than drying into an intermittent stream during the summer months, which allowed the non-native species to expand throughout the system rather than containing them to the deeper year-round pools (Psomas 2019b). While supplemental releases are expected to have contributed to these factors, the effects cannot be entirely attributed to the supplemental releases because the system was also recovering from the 2009 Station Fire. The USFS reported that prior to the 2009 Station Fire, non-native predators occurred continuously throughout the system; the current extent of non-native species could be a return to past conditions (Psomas 2019a). Additionally, since the supplemental releases began in 2012, the region has experienced multiple consecutive years of below-average rainfall. The decline in habitat quality from 2012 to 2018 resulted from multiple landscape-scale factors; it is difficult to determine which portion was due to the supplemental releases versus recovery of the system from the 2009 Station Fire and the consecutive years of low-rainfall conditions (Psomas 2019b). Supplemental releases provided water during the spring/summer months that allowed Big Tujunga Creek to continue to flow, rather than drying up, over the multiple consecutive years of below-average rainfall; this may have been instrumental for supporting Covered Fish species through the extended drought (Psomas 2019c). The SASWG discusses the pros and cons of the supplemental releases annually; the release strategy each non-storm season has been determined by the SASWG based on the amount of water available and the weather conditions of the year.

A Supplemental Release Study was conducted to characterize the downstream system (i.e., between the plunge pool and upstream of the Oro Vista Avenue crossing) with and without supplemental releases. Since outflow equals inflow during the non-storm season, the "without supplemental releases" series was developed based on the mean monthly inflow to the Reservoir from April 15 to October 15. The "with supplemental release" series was developed by adding 5 cfs to the mean monthly inflow for April 15 to October 15. The 2D HEC-RAS hydraulic model of the stream was run for a discrete discharge event for each month of the non-storm season "with supplemental releases" and "without supplemental releases" (Table 15). Results indicate that the supplemental releases add from 2.67 to 6.27 acres of additional wetted areas along the entire study (Table 15); however, these additional areas are generally limited to flow depths of 1 inch and velocities much less than 1 fps (Table 16). The supplemental releases result in small increases in maximum depth (less than 0.2-foot increase for most of the active stream) and small increases in average depth (average depth increase of 0.8 inch) (Table 17). The supplemental releases result in a moderate increase in both maximum velocity (0.2 to 0.4 fps for most of the active stream, larger increases in segments) and a moderate increase in average velocity (average 0.2 fps faster) (Table 18; Psomas 2020b). Average velocity with and without supplemental releases is shown for April and September in Exhibits 16 and 17, respectively.



Stream Velocity – Model of 250 cfs Release Exhibit 14a

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 CJS) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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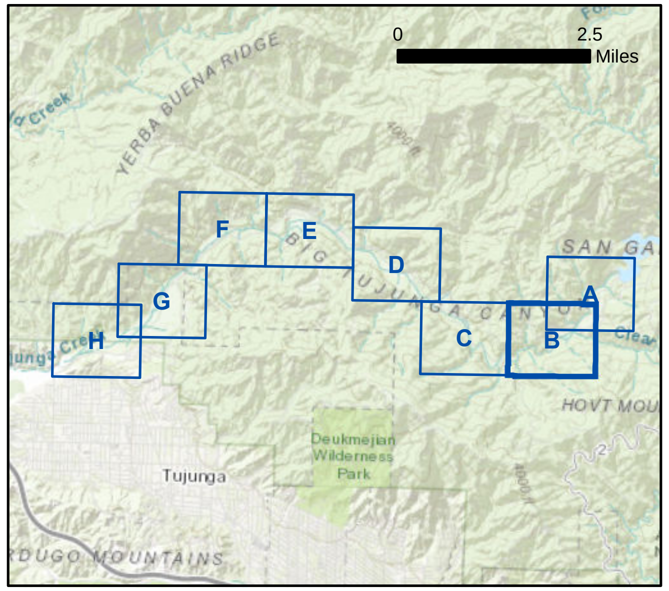

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N W E S

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

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Stream Velocity – Model of 250 cfs Release Exhibit 14b

Big Tujunga Dam HCP

PSOMAS

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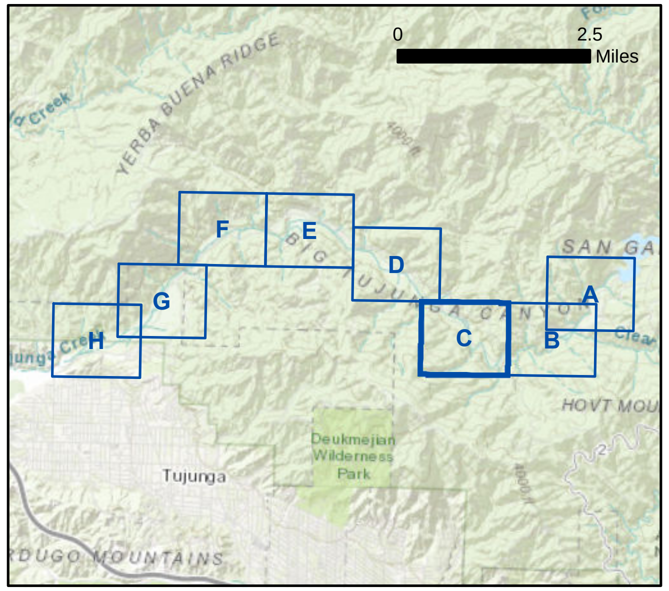

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N E S W

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

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Stream Velocity – Model of 250 cfs Release Exhibit 14c

Big Tujunga Dam HCP

PSOMAS

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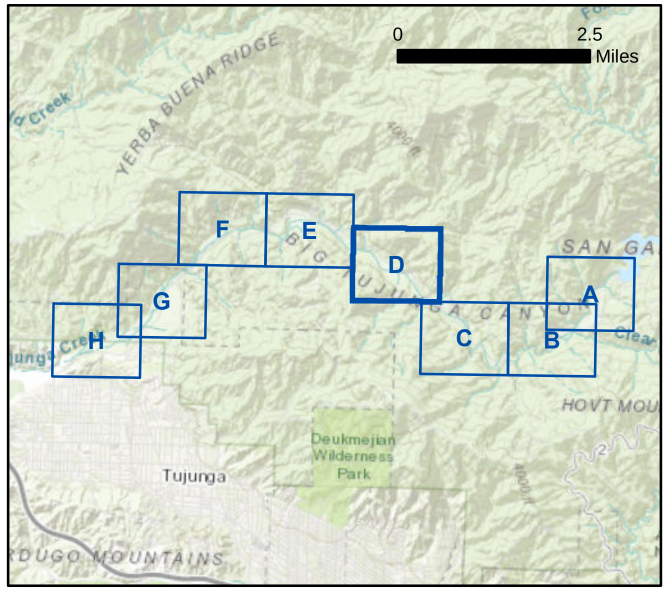

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N W E S

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 250 cfs Release Exhibit 14d

Big Tujunga Dam HCP

PSOMAS

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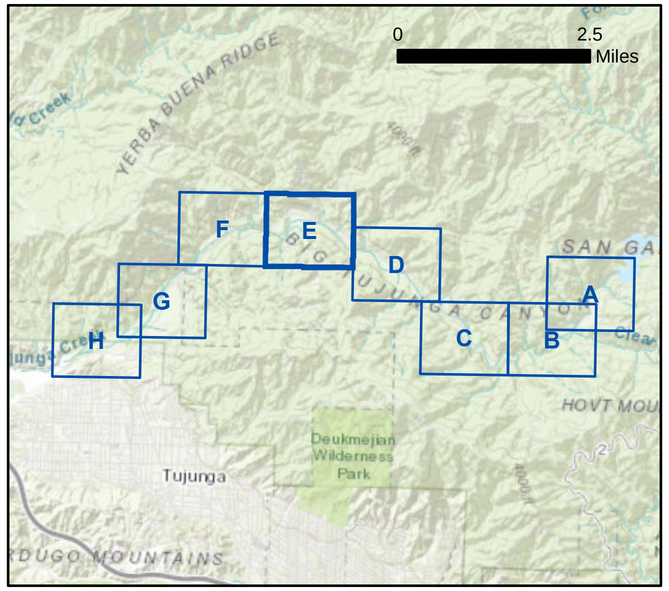

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N W E S

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 250 cfs Release Exhibit 14e

Big Tujunga Dam HCP

PSOMAS

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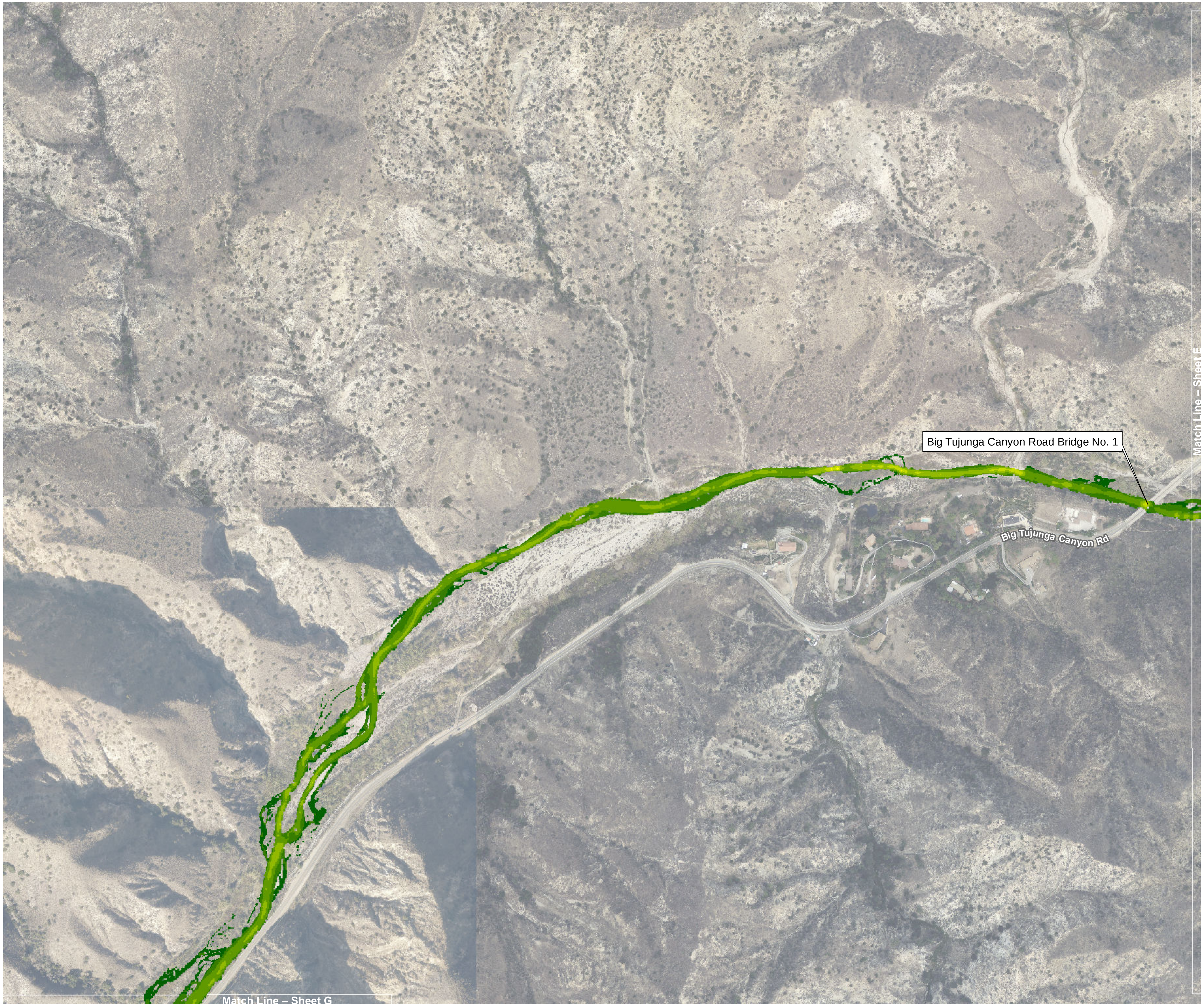

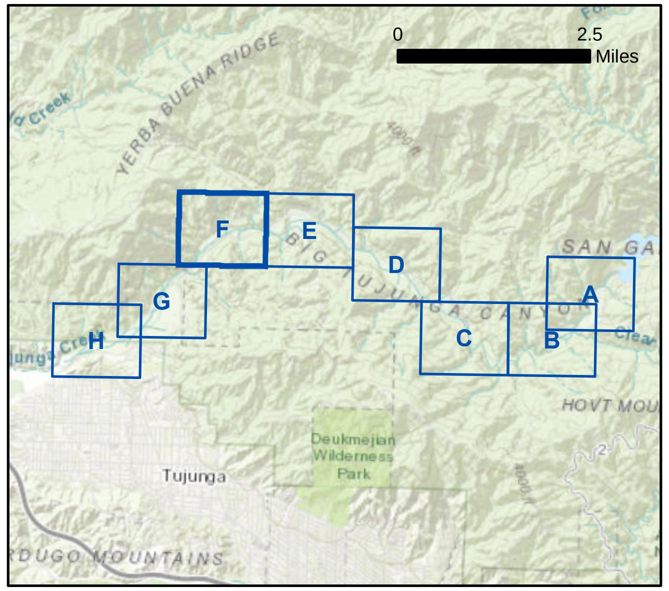

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N W E S

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 250 cfs Release Exhibit 14f

Big Tujunga Dam HCP

PSOMAS

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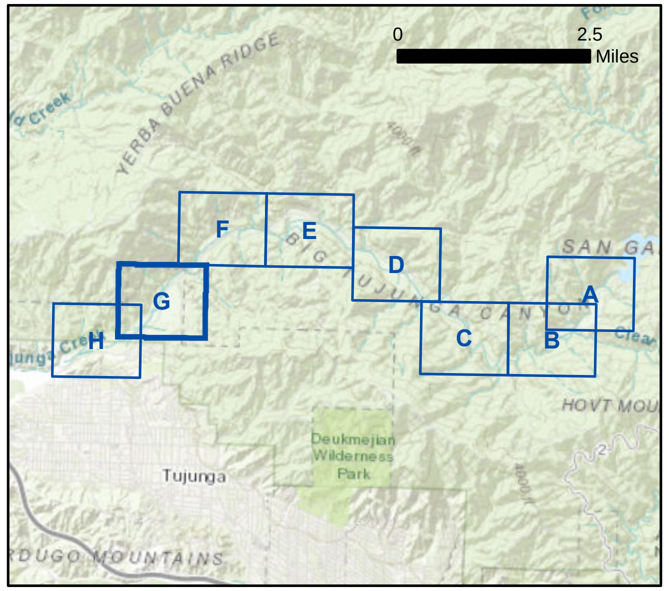

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N
W E
S

500 250 0 500
Feet

Aerial Source: LAR-IAC 2014

Stream Velocity – Model of 250 cfs Release Exhibit 14g

Big Tujunga Dam HCP

PSOMAS

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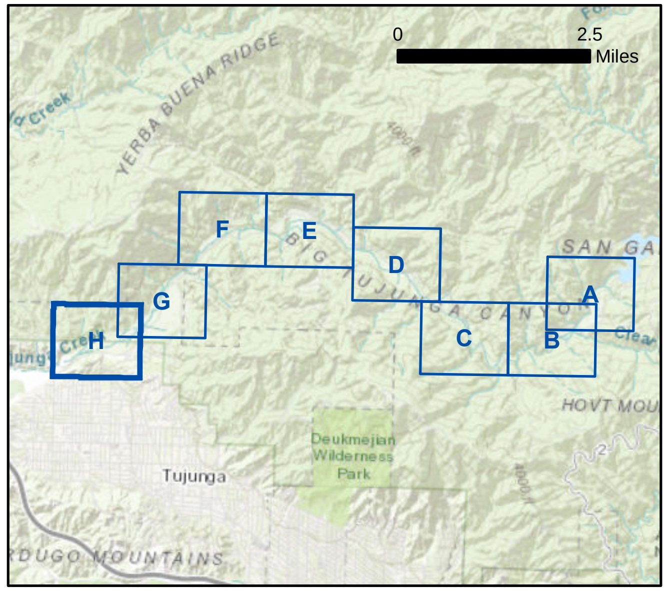

Stream Velocity (ft/s)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0
- 9.0 - 10.0
- 10.0 - 11.0

N E S W

500 250 0 500 Feet

Aerial Source: LAR-IAC 2014

Stream Velocity –
Model of 250 cfs Release Exhibit 14h

Big Tujunga Dam HCP

PSOMAS

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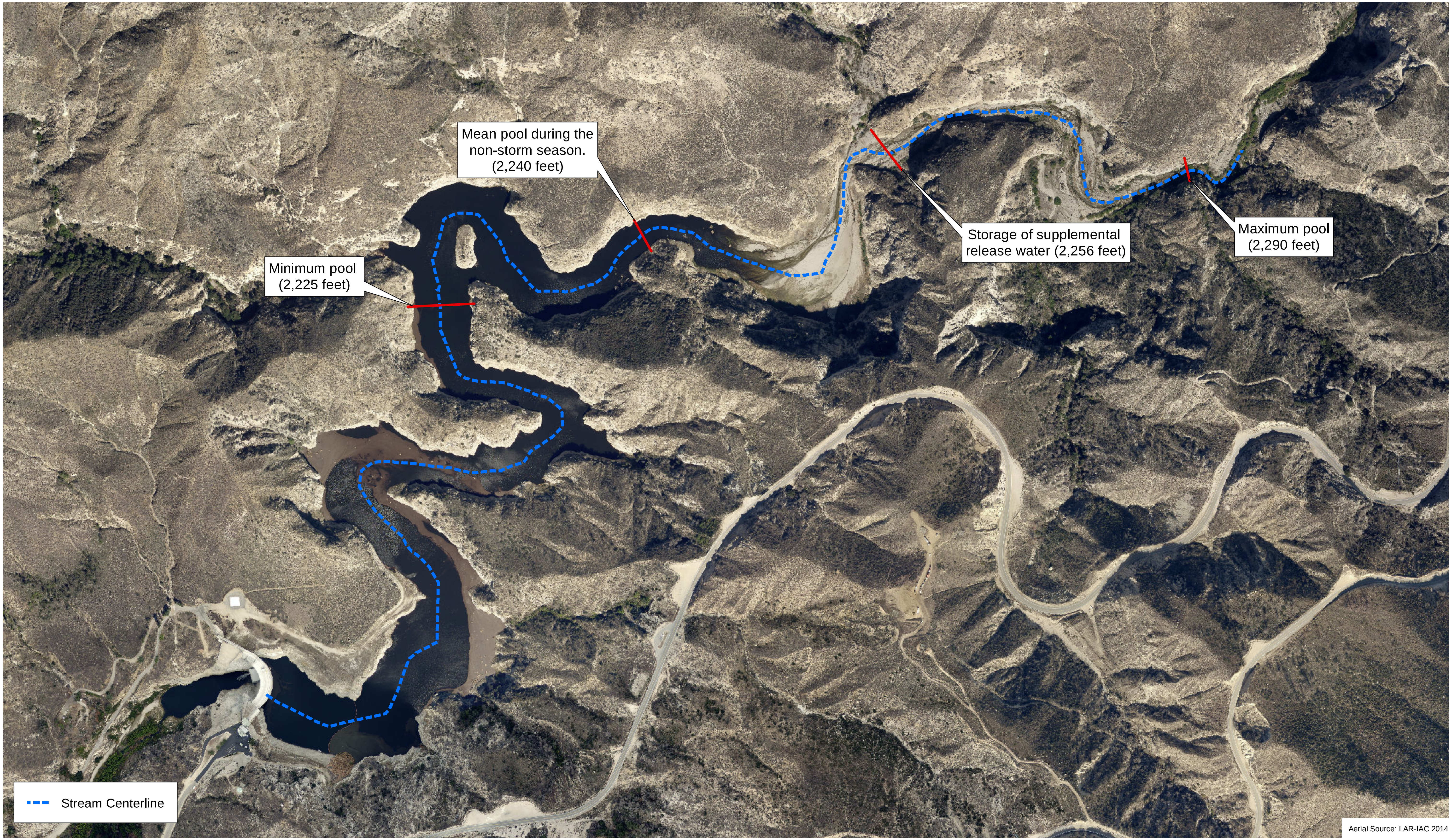

Reservoir Fluctuation

Exhibit 15

Big Tujunga HCP

N W E S

500 250 0 500 Feet

PSOMAS

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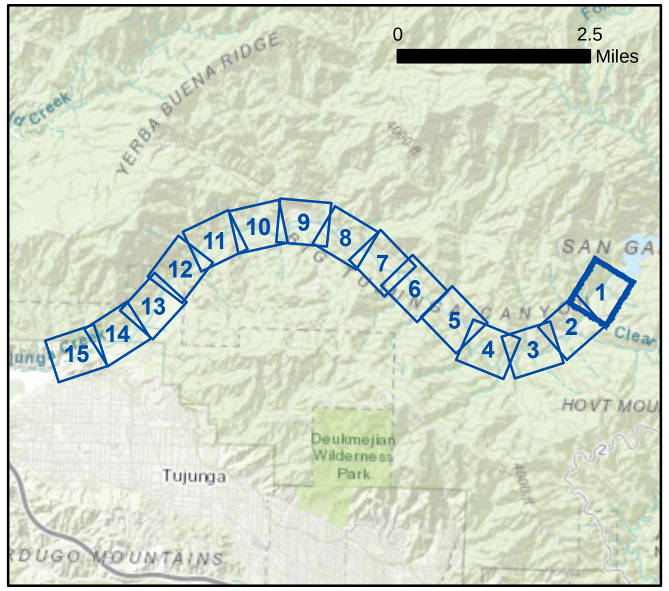
Without Releases

With Releases



Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2
- 3.2 - 3.8

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16

Average Velocity (April) Sheet 1

Big Tujunga Dam HCP

PSOMAS

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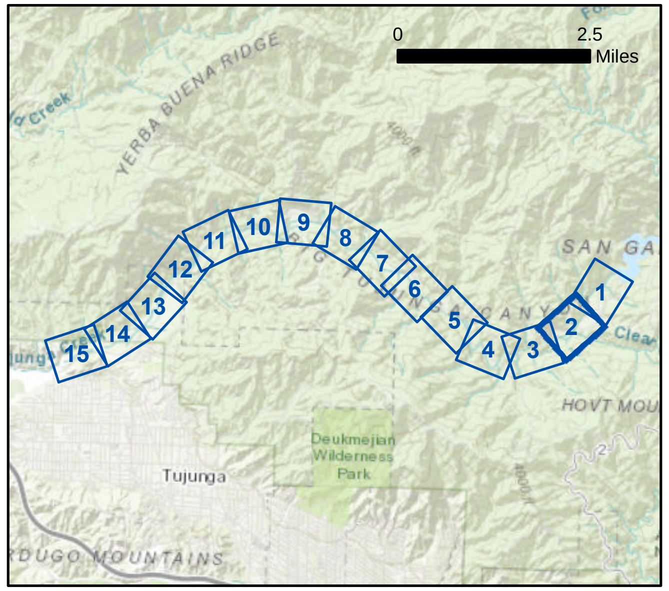


Average Velocity (feet per second)

Pink	0 - 0.6
Dark blue	0.6 - 1.3
Teal	1.3 - 1.9
Light green	1.9 - 2.5
Red	2.5 - 3.2
Dark red	3.2 - 3.8

300 150 0 300 Feet

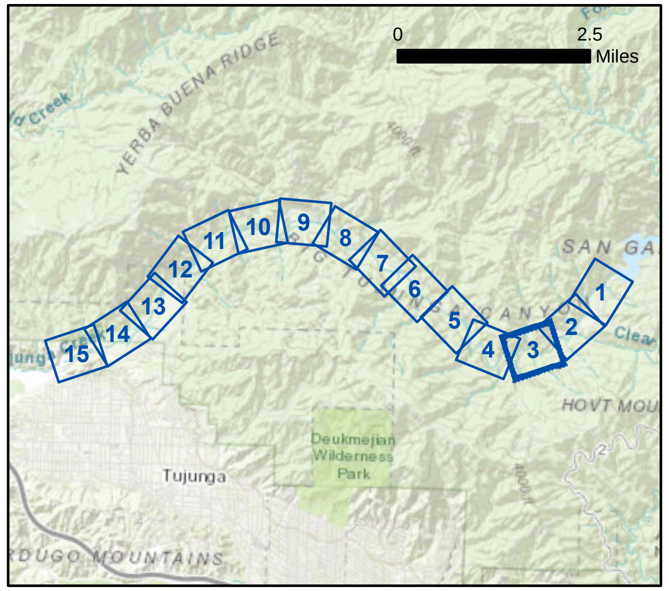
Aerial Source: LAR-IAC 2014

Exhibit 16

Average Velocity (April) Sheet 2

Big Tujunga Dam HCP

PSOMAS



Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16

Average Velocity (April)

Sheet 3

Big Tujunga Dam HCP

PSOMAS

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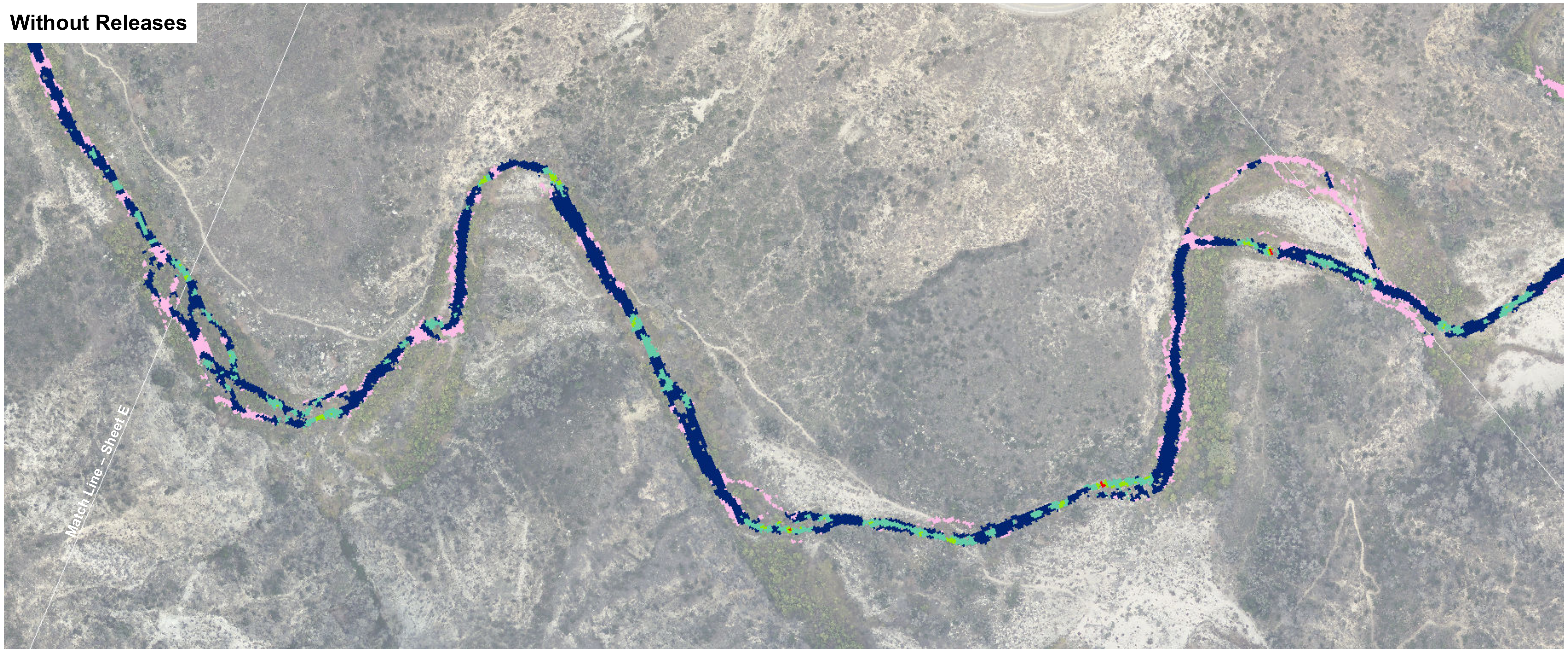

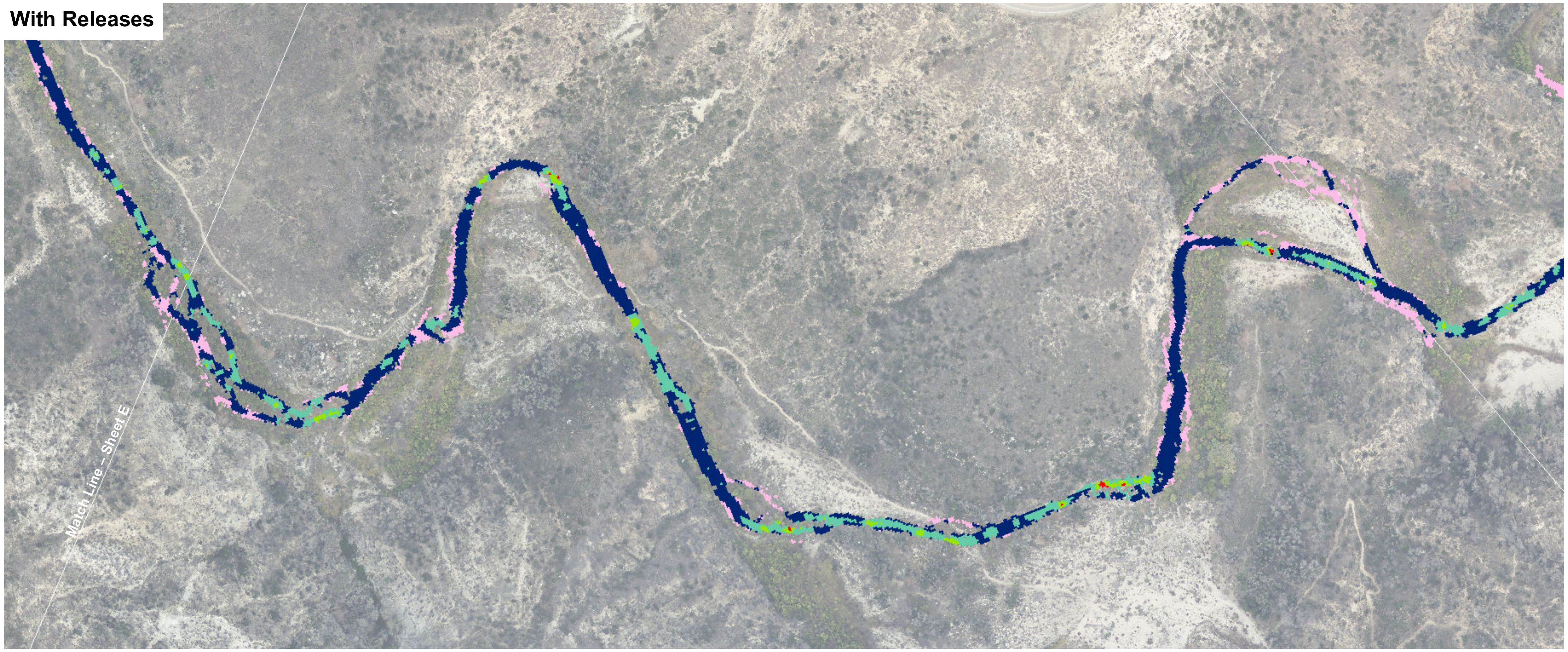

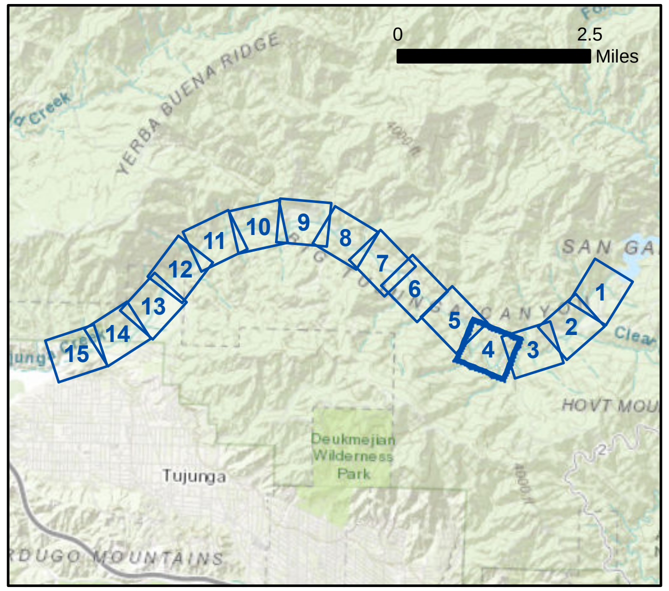

Average Velocity (feet per second)

Pink	0 - 0.6
Dark blue	0.6 - 1.3
Teal	1.3 - 1.9
Light green	1.9 - 2.5
Red	2.5 - 3.2
Dark red	3.2 - 3.8

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Sheet 4

Average Velocity (April)

Big Tujunga Dam HCP

PSOMAS

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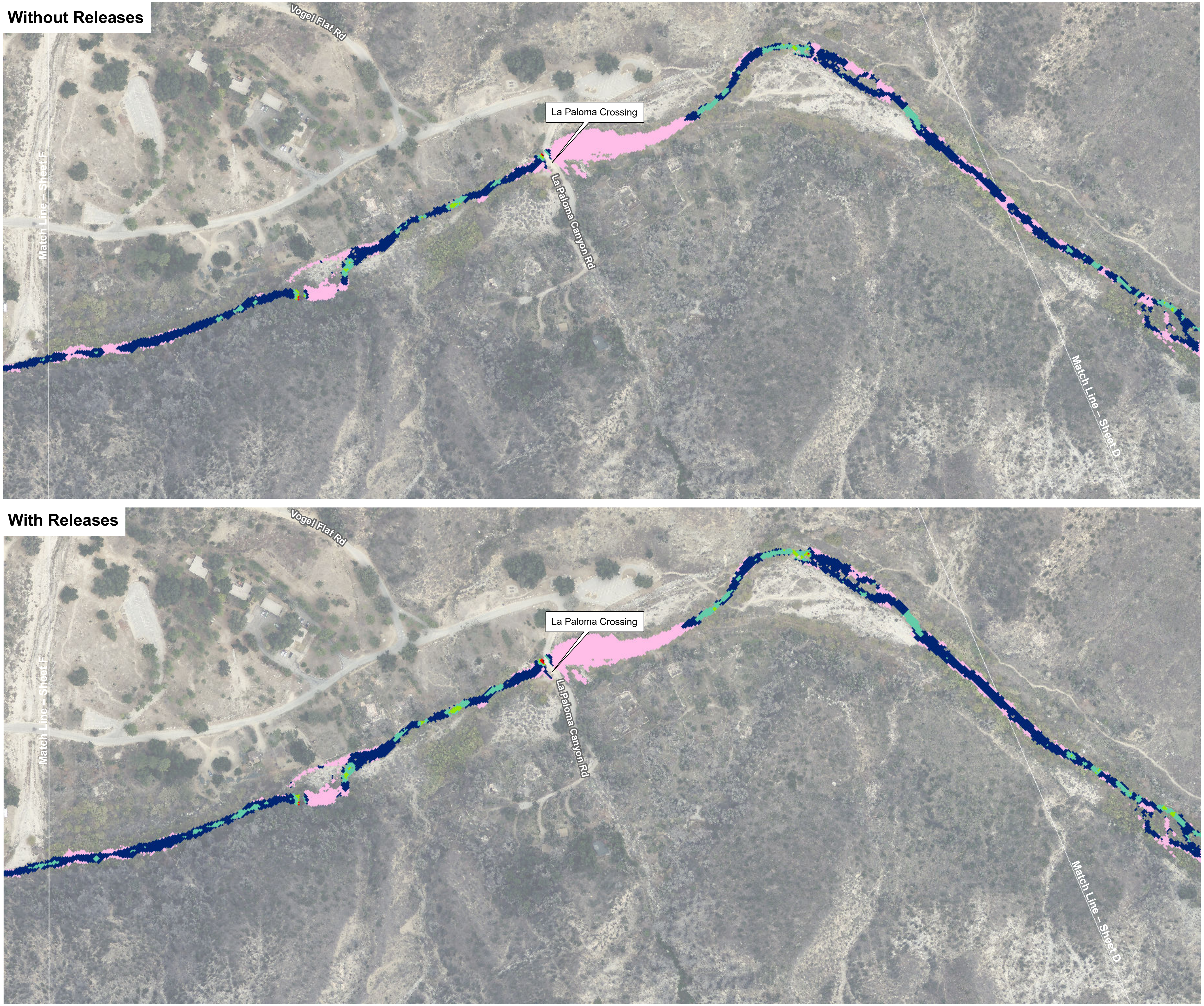

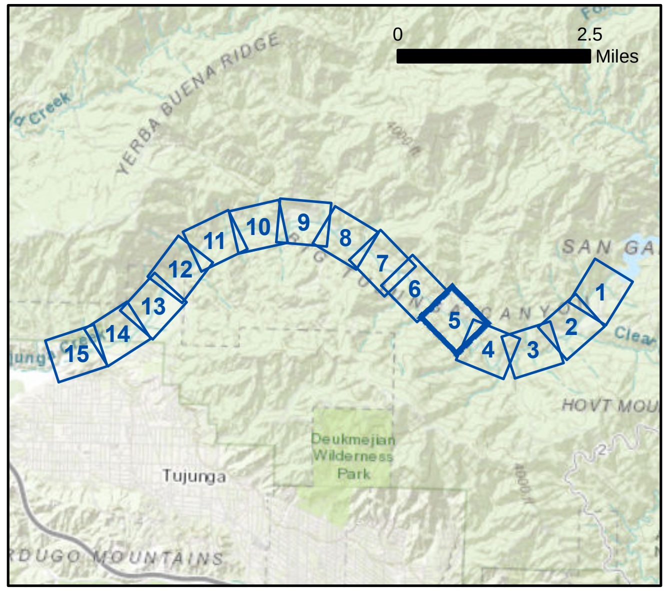

Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2
- 3.2 - 3.8

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Average Velocity (April) Sheet 5
Big Tujunga Dam HCP

PSOMAS

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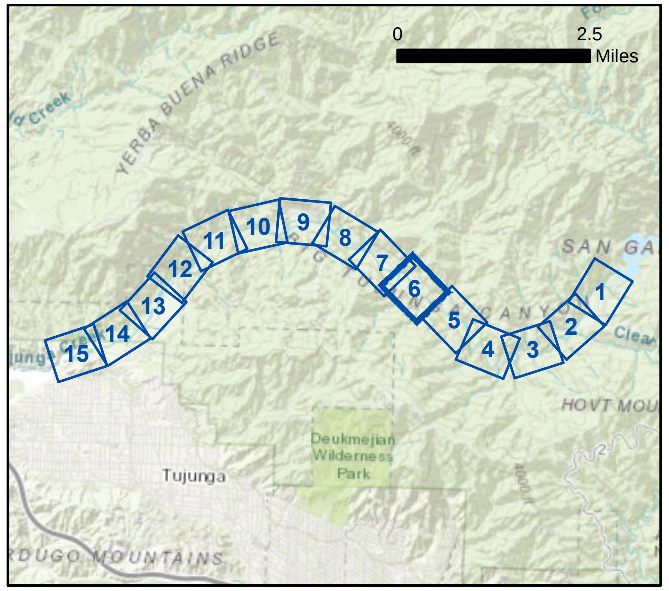

Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Average Velocity (April) Sheet 6
Big Tujunga Dam HCP

PSOMAS

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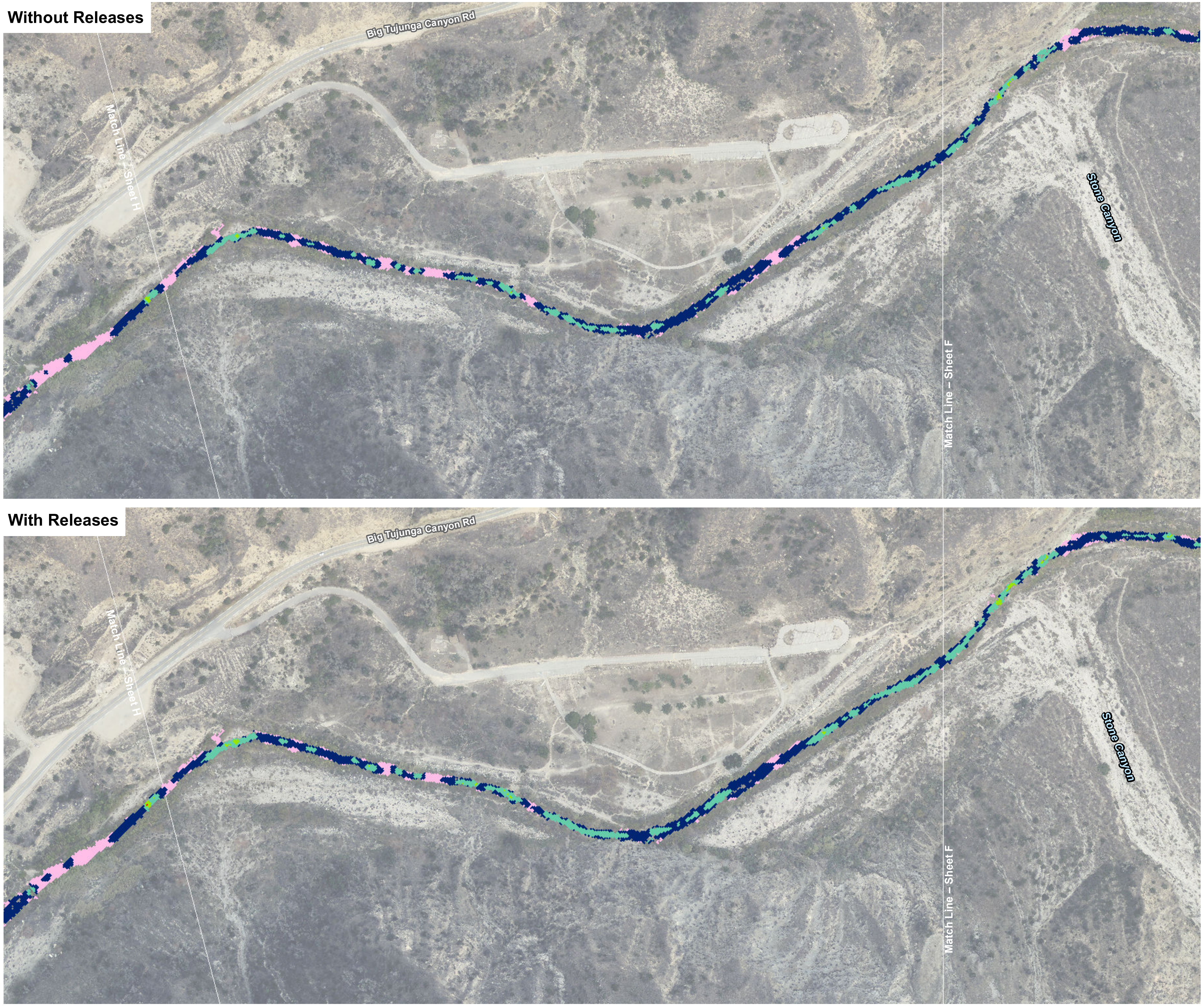

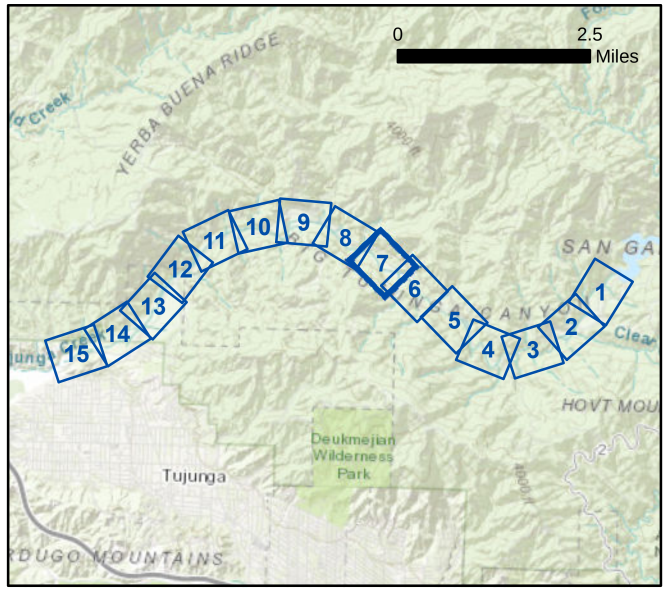

Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Sheet 7

Average Velocity (April)

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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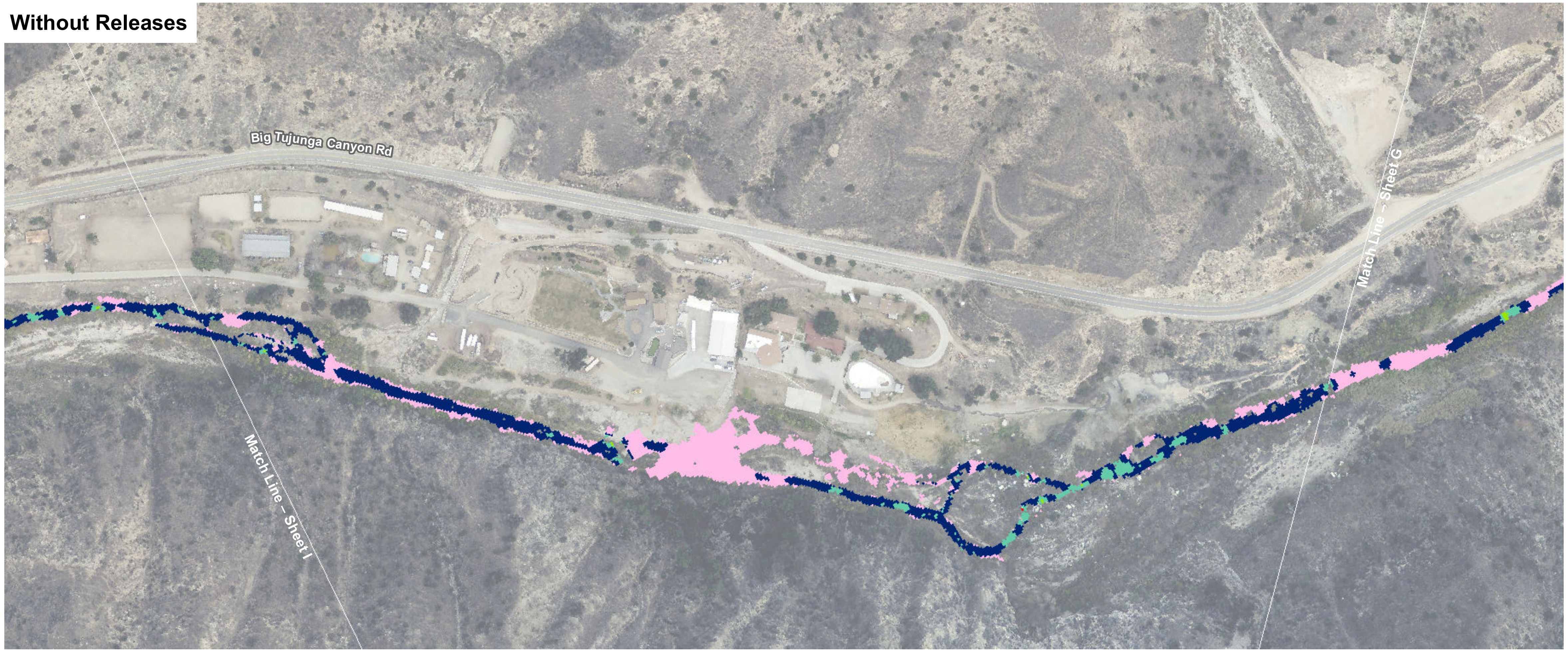

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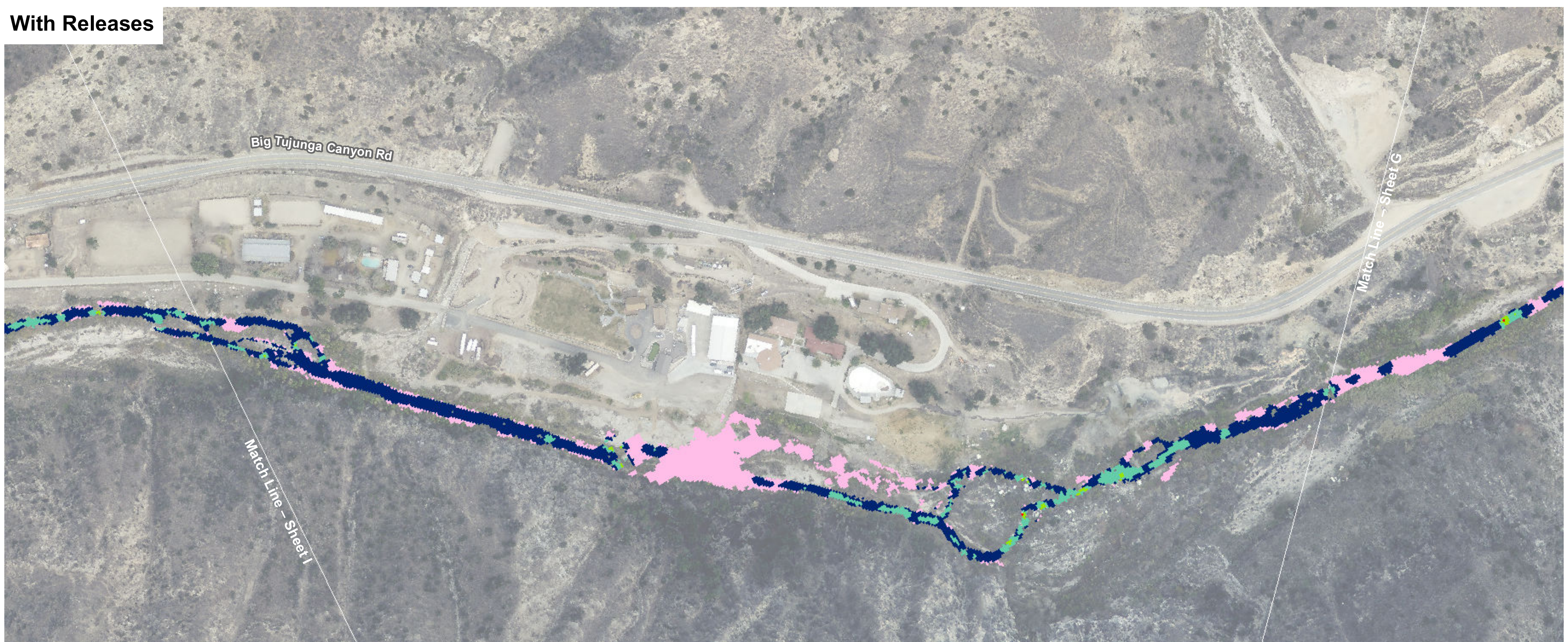

Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Sheet 8

Average Velocity (April)

Big Tujunga Dam HCP

PSOMAS

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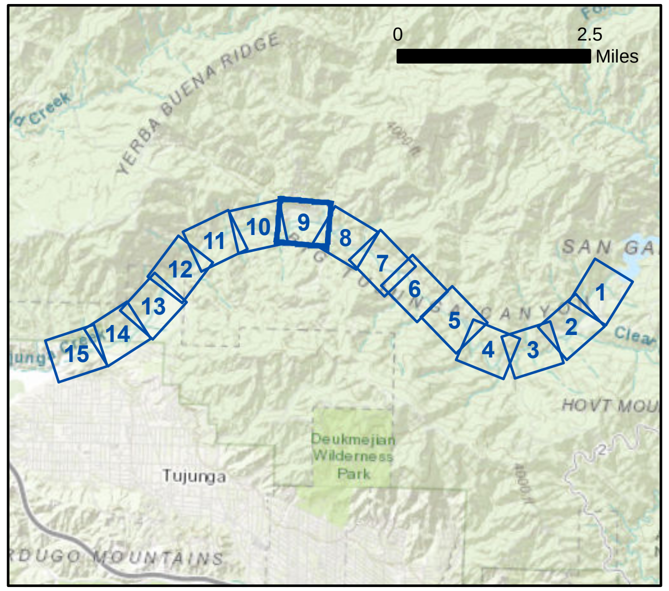
Without Releases

With Releases



Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16

Average Velocity (April) Sheet 9

Big Tujunga Dam HCP

PSOMAS

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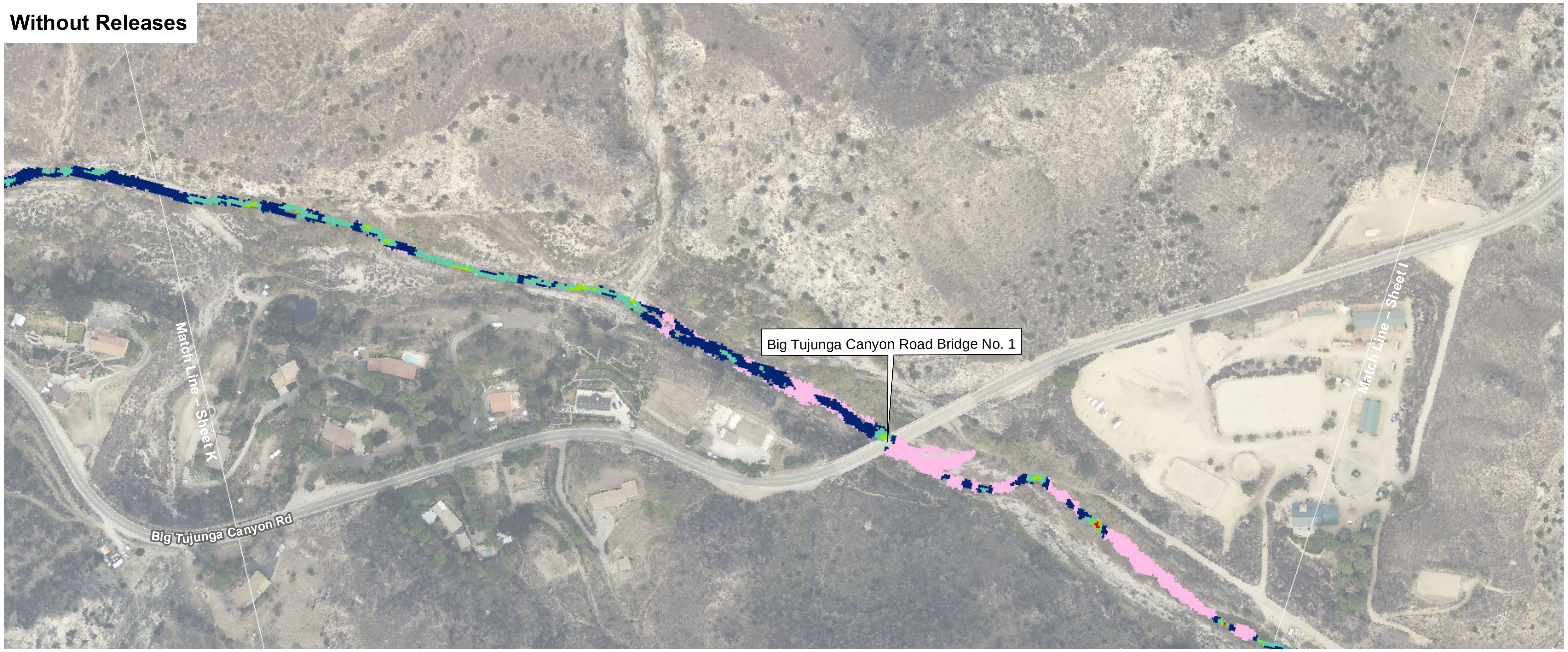

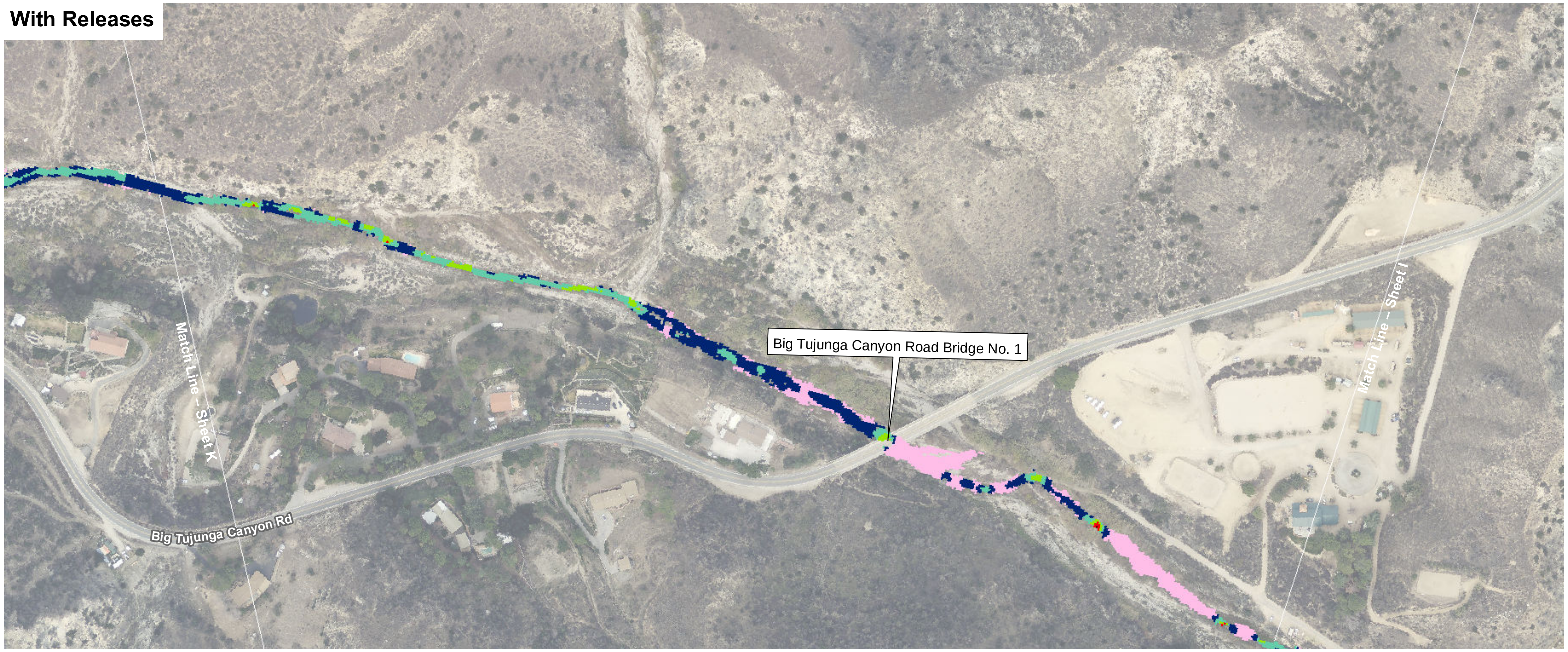

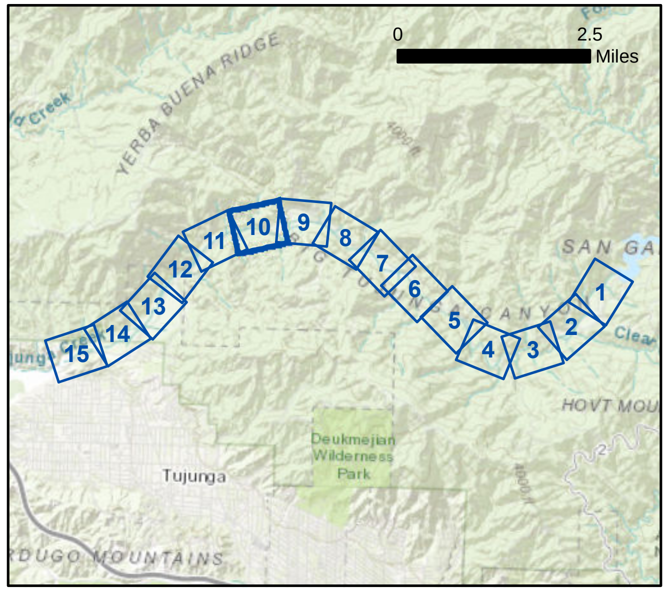

Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2
- 3.2 - 3.8

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Average Velocity (April) Sheet 10
Big Tujunga Dam HCP

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Without Releases

With Releases

Average Velocity (feet per second)

Pink	0 - 0.6
Dark blue	0.6 - 1.3
Teal	1.3 - 1.9
Green	1.9 - 2.5

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16

Average Velocity (April) Sheet 11

Big Tujunga Dam HCP

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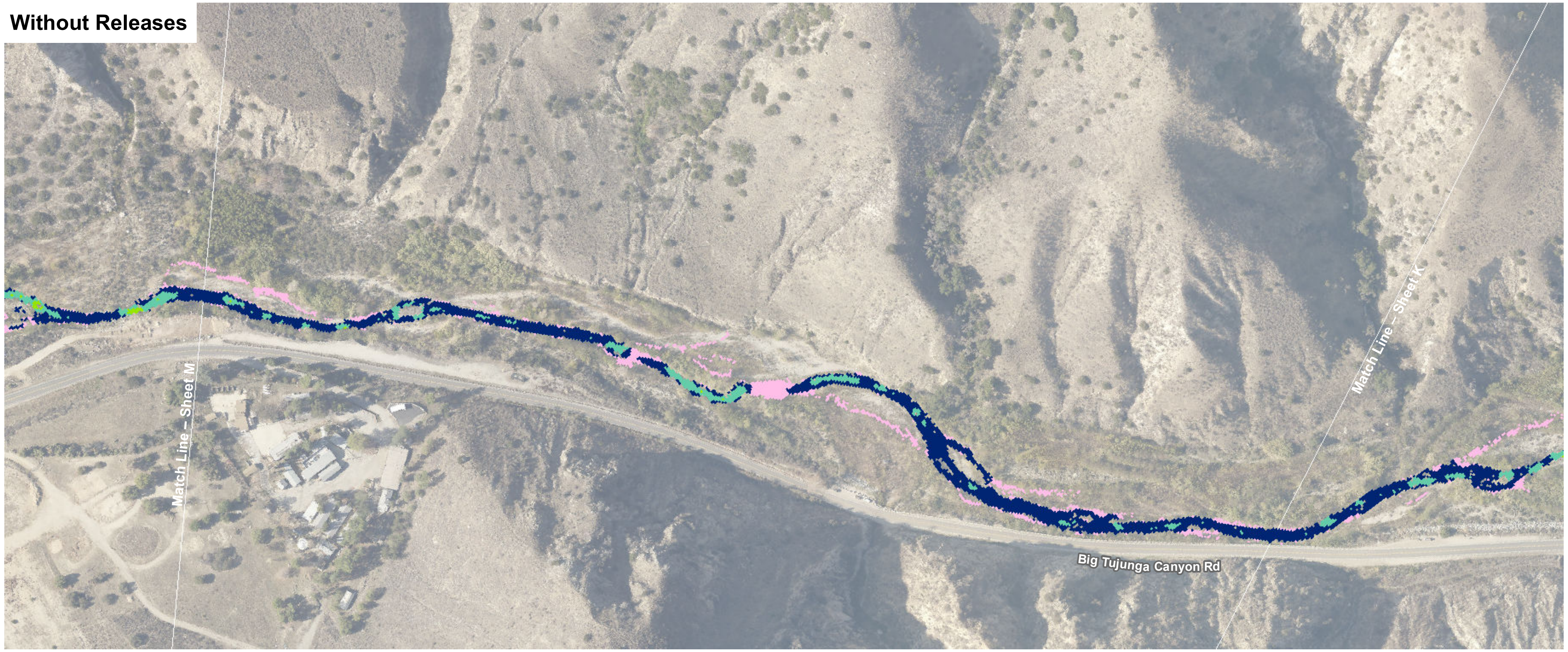

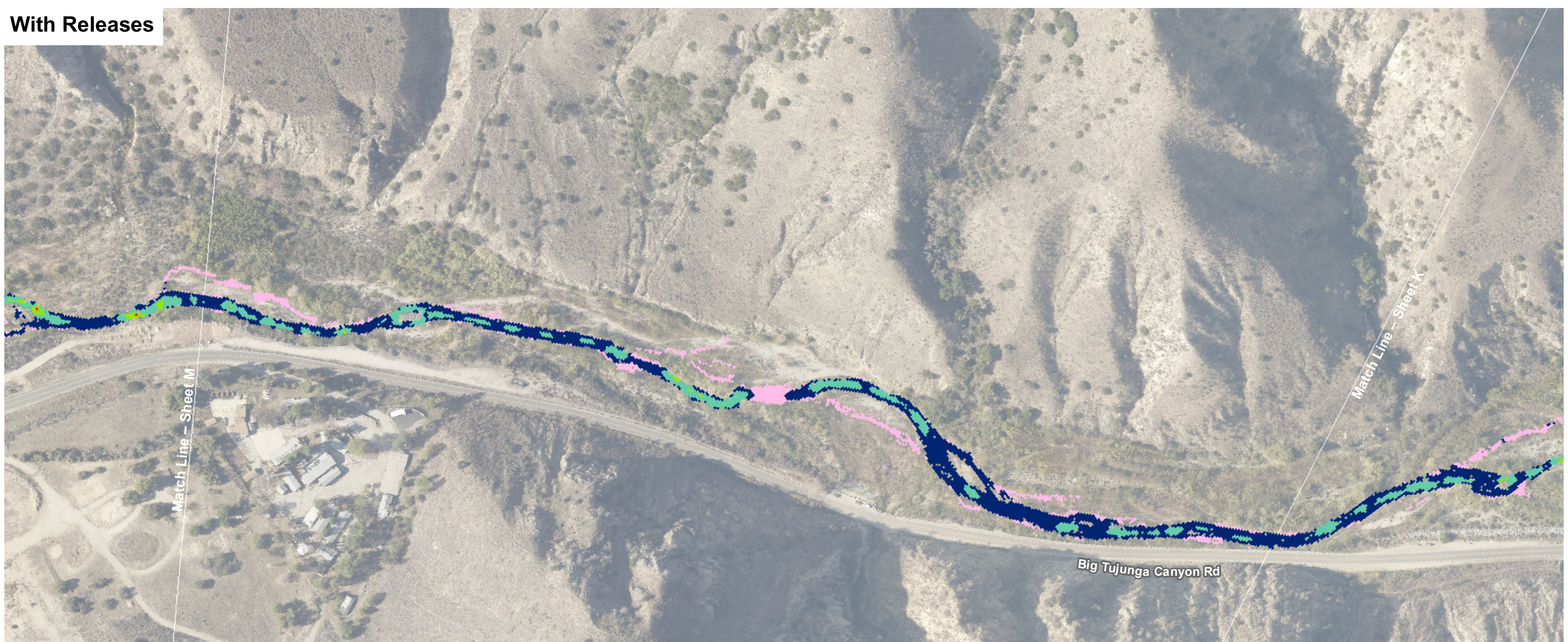

Average Velocity (feet per second)

(pink)	0 - 0.6
(dark blue)	0.6 - 1.3
(teal)	1.3 - 1.9
(green)	1.9 - 2.5
(red)	2.5 - 3.2

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Sheet 12

Average Velocity (April)

Big Tujunga Dam HCP

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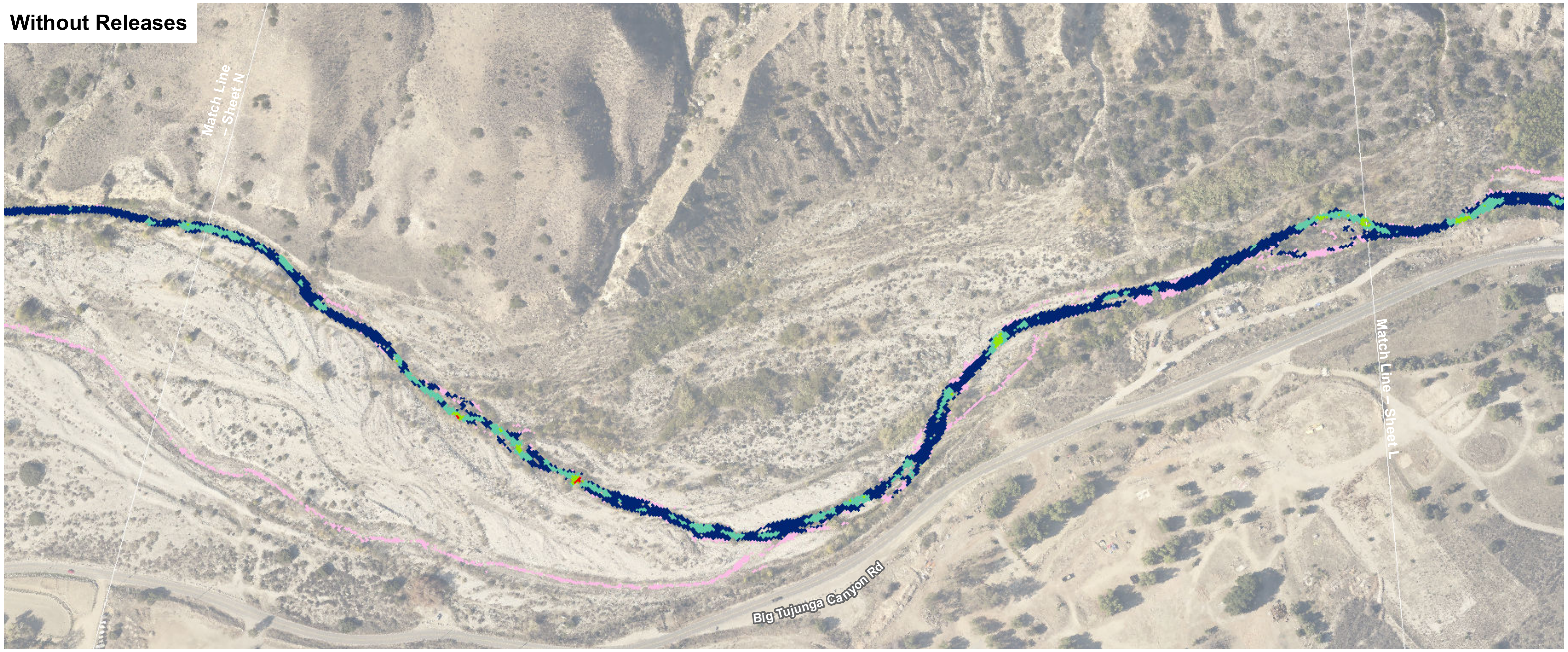
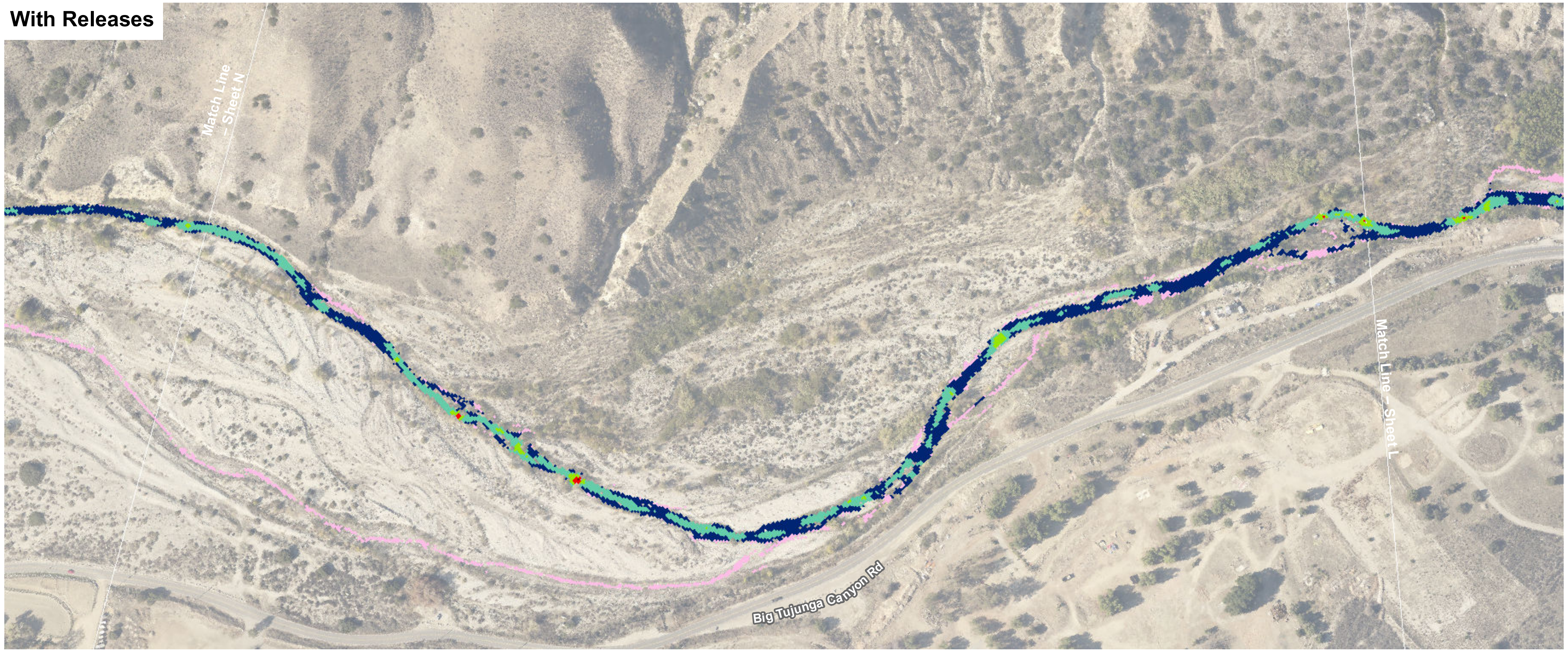
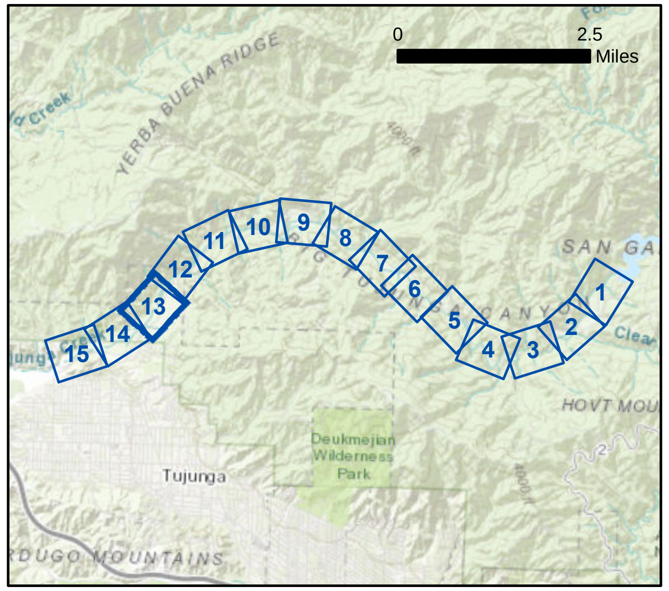
Without Releases



With Releases





Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5
- 2.5 - 3.2
- 3.2 - 3.8

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16

Average Velocity (April) Sheet 13

Big Tujunga Dam HCP

PSOMAS

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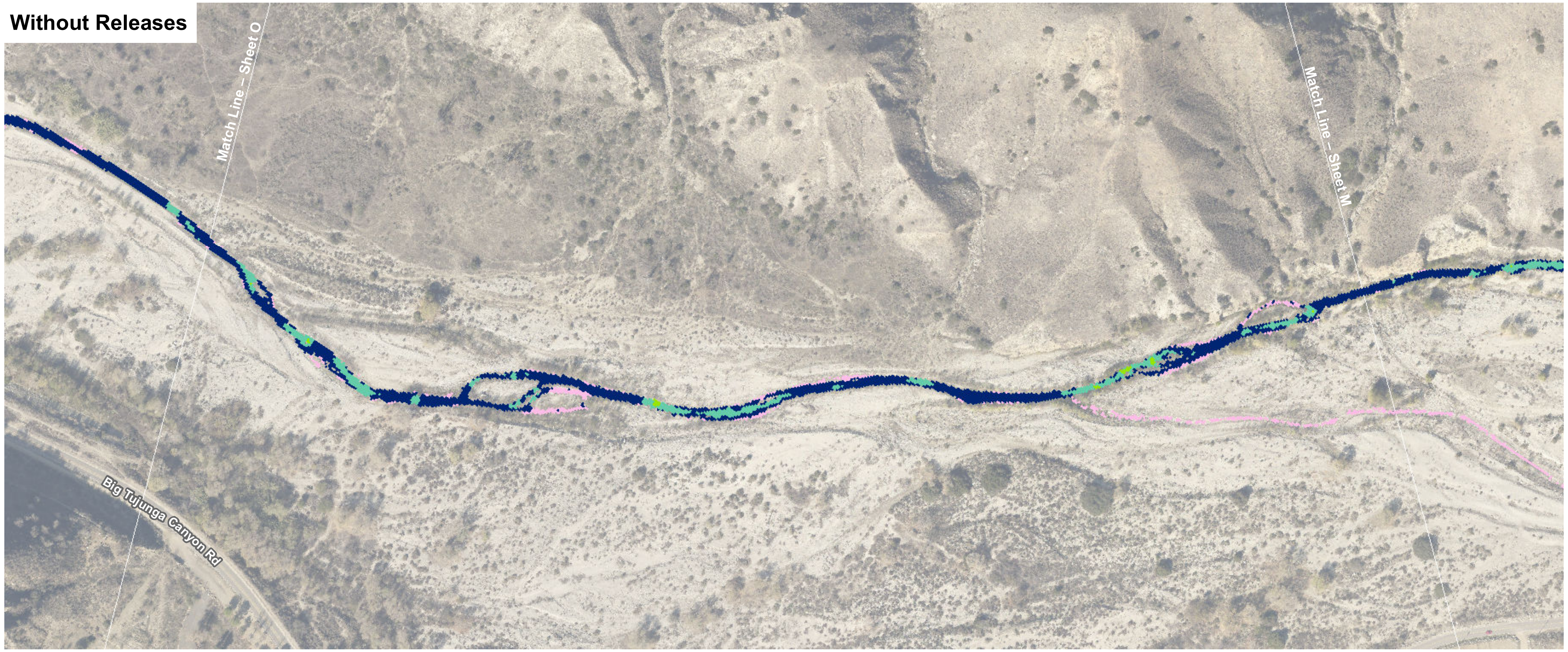
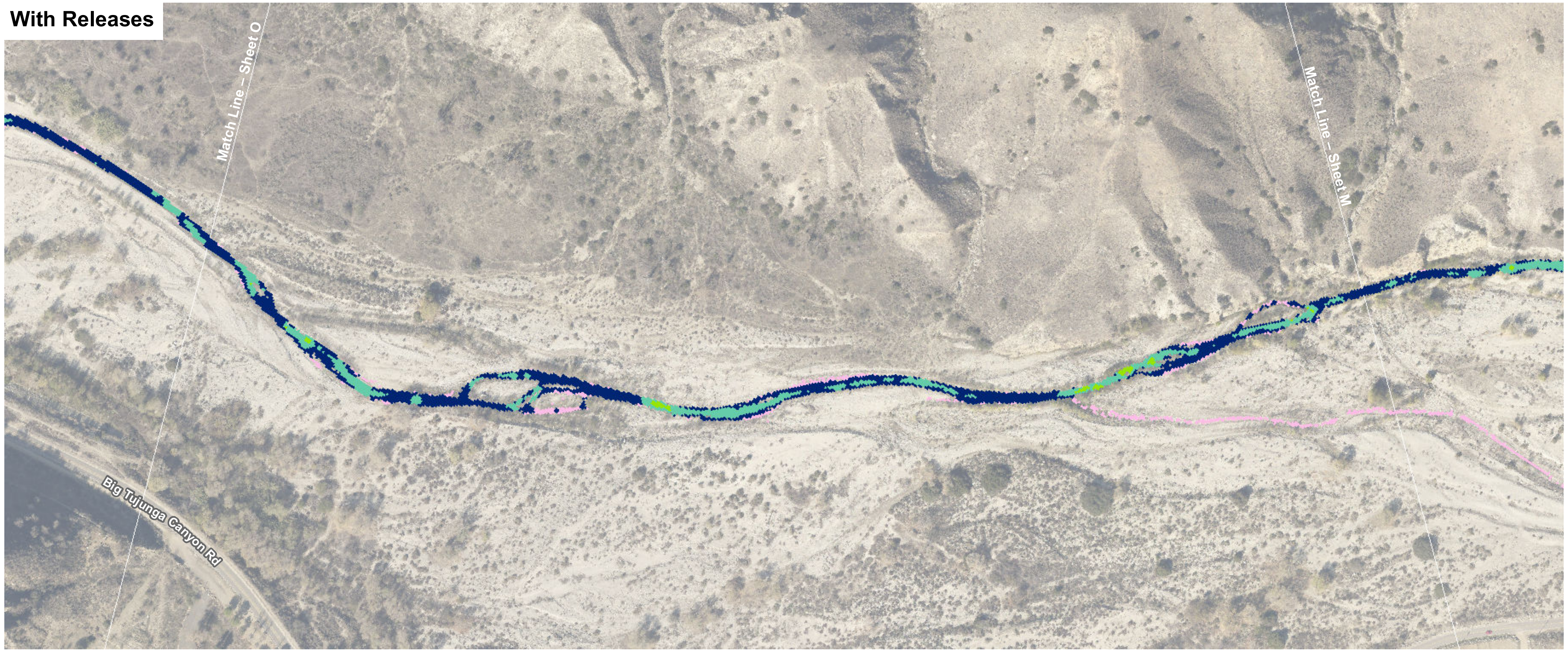
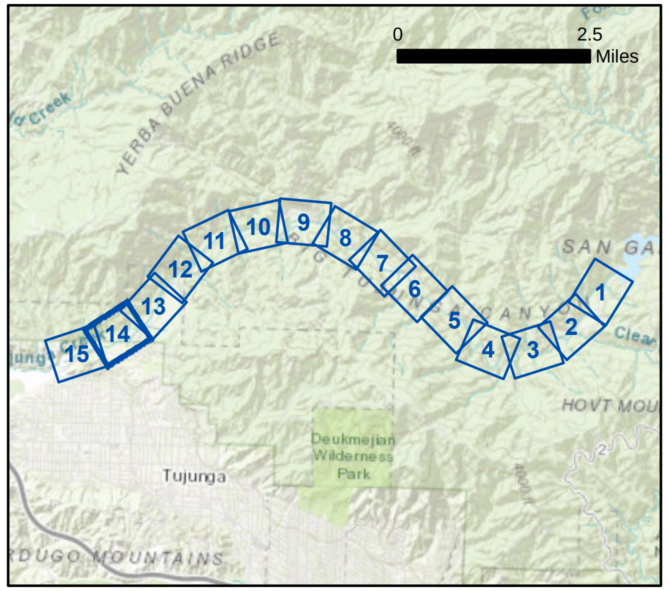
D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd







Average Velocity (feet per second)

- 0 - 0.6
- 0.6 - 1.3
- 1.3 - 1.9
- 1.9 - 2.5

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Sheet 14

Average Velocity (April)

Big Tujunga Dam HCP

PSOMAS

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Average Velocity (feet per second)

(pink)	0 - 0.6
(dark blue)	0.6 - 1.3
(teal)	1.3 - 1.9
(light green)	1.9 - 2.5
(red)	2.5 - 3.2

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 16
Sheet 15

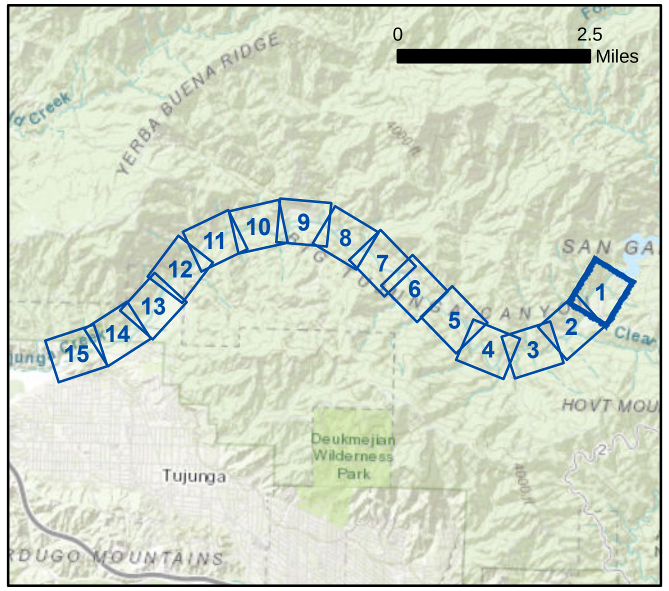
Average Velocity (April)

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd



Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4
- 2.4 - 2.9

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

Average Velocity (Spetember) Sheet 1

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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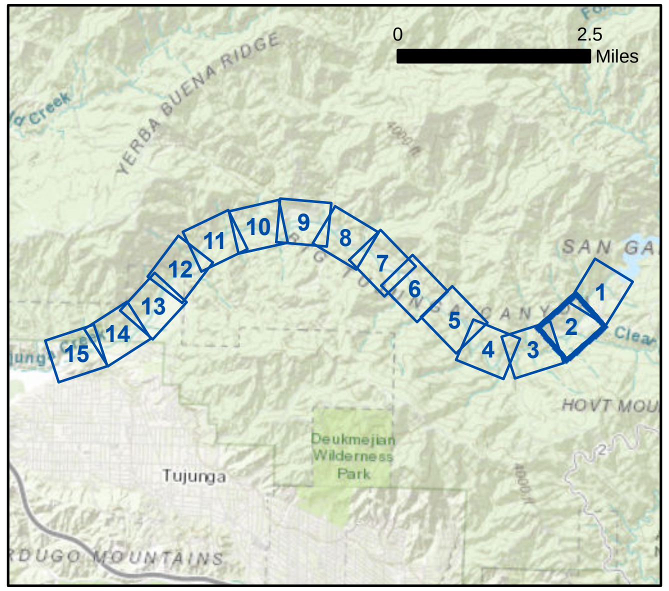
Without Releases

With Releases



Average Velocity (feet per second)

(pink)	0 - 0.5
(dark blue)	0.5 - 1.0
(teal)	1.0 - 1.4
(light green)	1.4 - 1.9
(red)	1.9 - 2.4
(dark red)	2.4 - 2.9

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

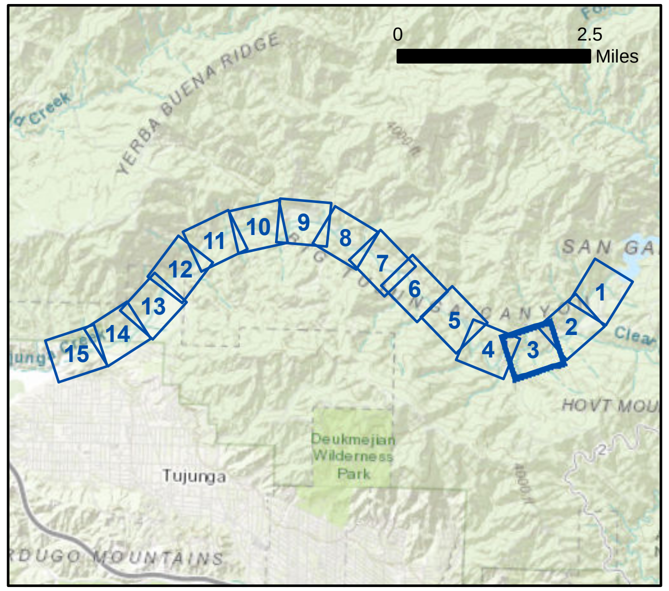
Average Velocity (Spetember) Sheet 2

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd



Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

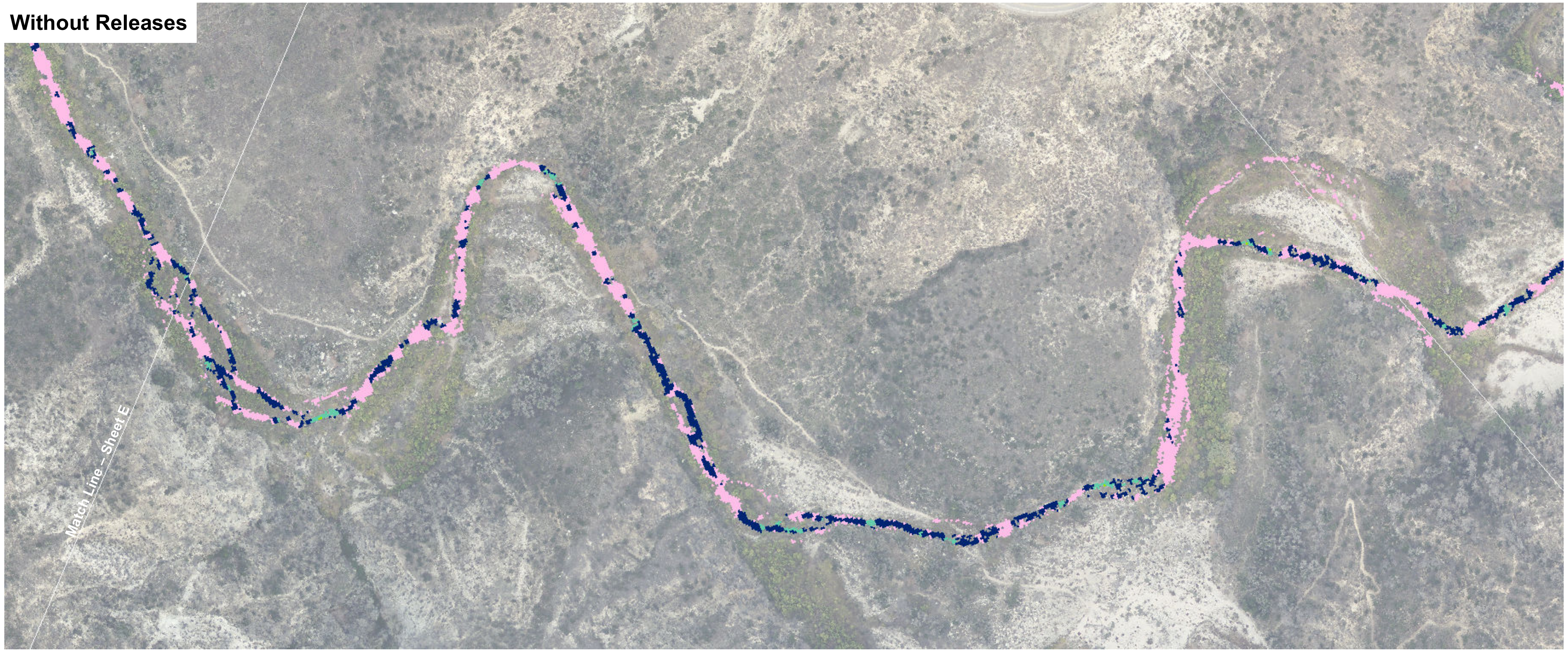
Exhibit 17
Average Velocity (Spetember) Sheet 3
Big Tujunga Dam HCP

PSOMAS

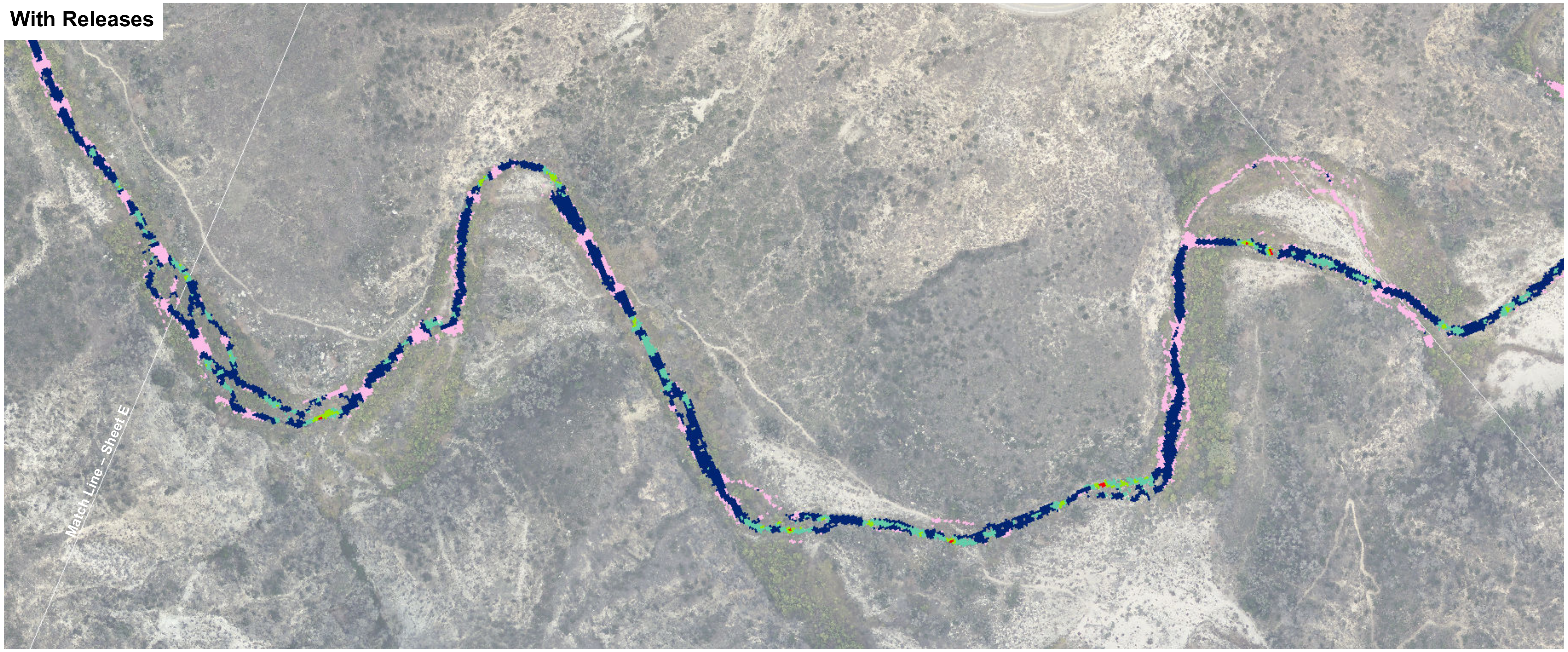
(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

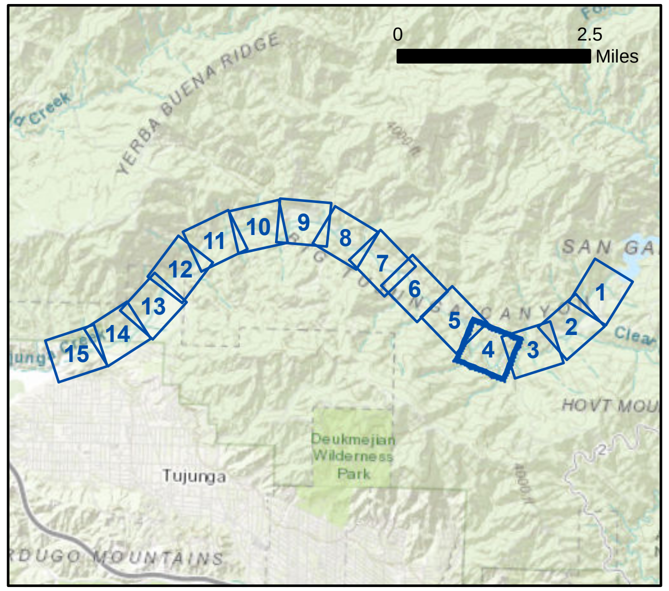
D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd

Without Releases



With Releases





Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

Average Velocity (Spetember) Sheet 4

Big Tujunga Dam HCP

PSOMAS

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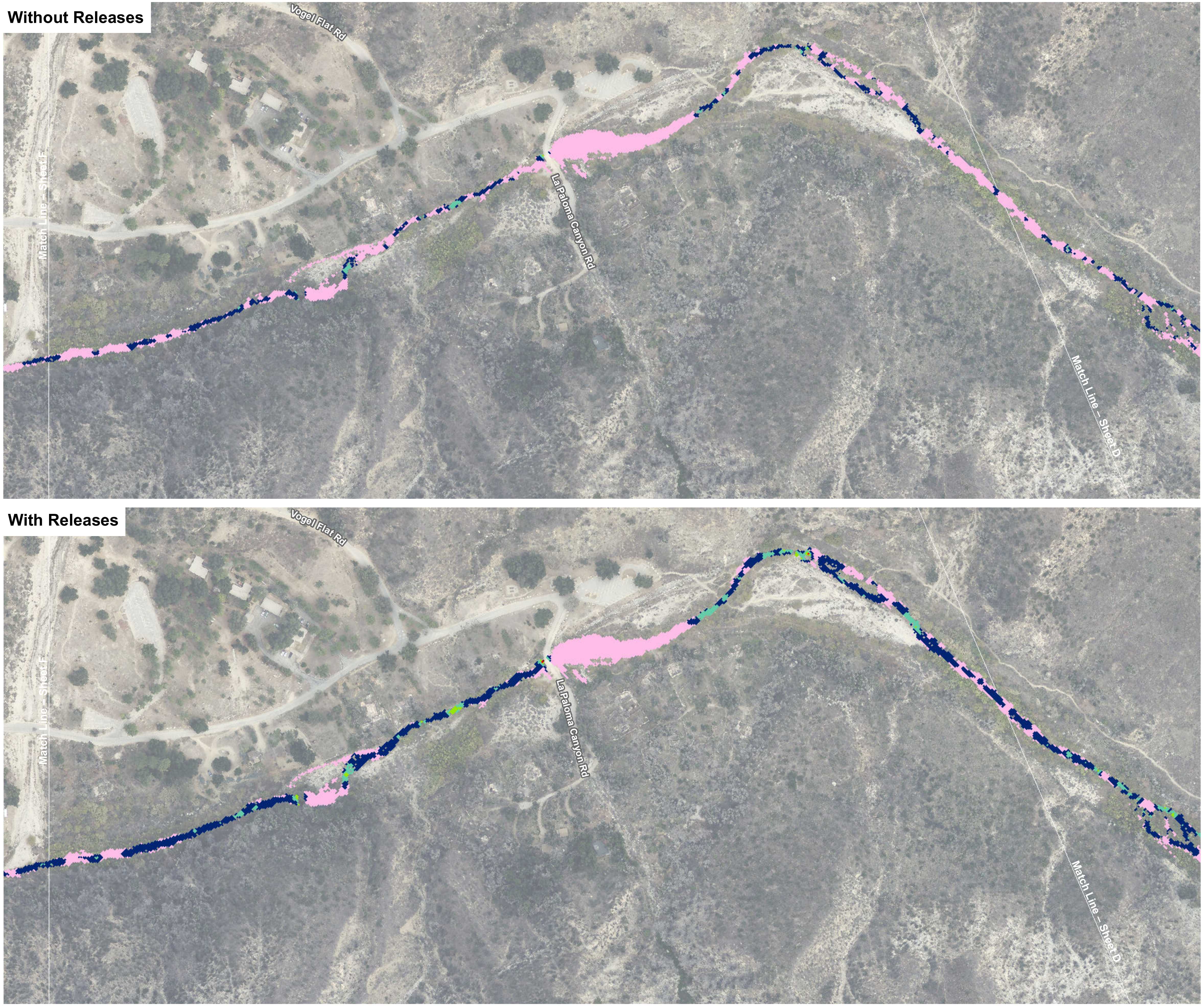
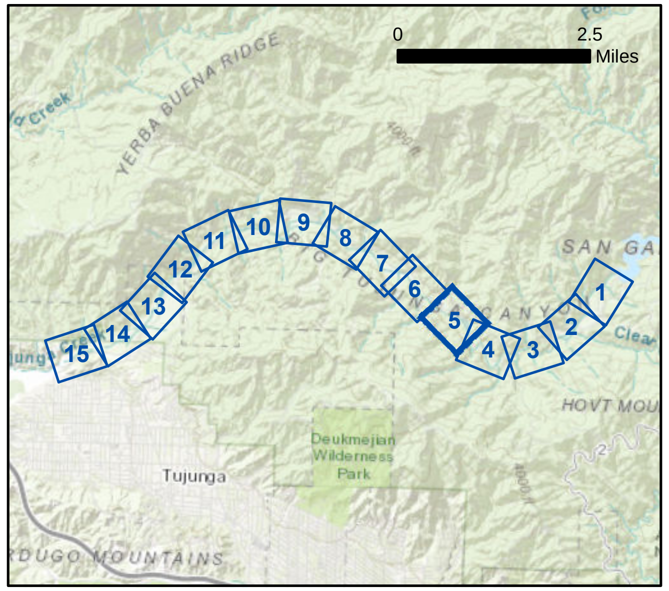
D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd





Average Velocity (feet per second)

Pink	0 - 0.5
Dark blue	0.5 - 1.0
Teal	1.0 - 1.4
Light green	1.4 - 1.9
Red	1.9 - 2.4
Dark red	2.4 - 2.9

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

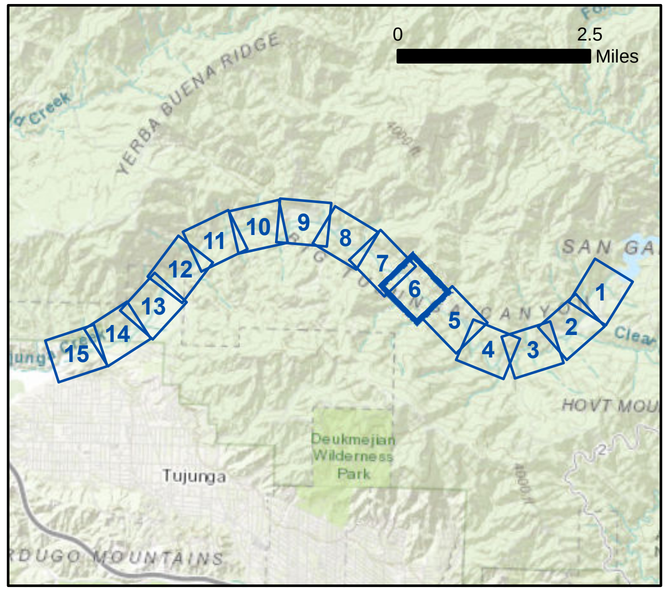
Average Velocity (Spetember) Sheet 5

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

D:\Projects\COLADPW\U282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd



Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

Average Velocity (Spetember) Sheet 6

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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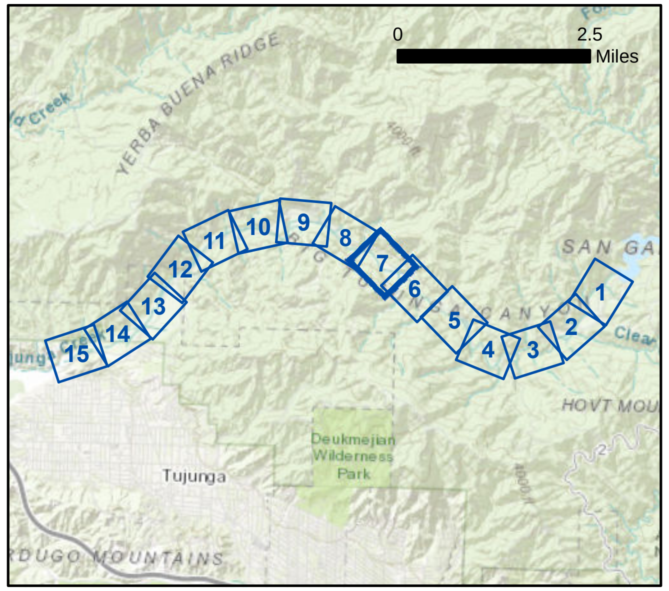
Without Releases

With Releases



Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

Average Velocity (Spetember) Sheet 7

Big Tujunga Dam HCP

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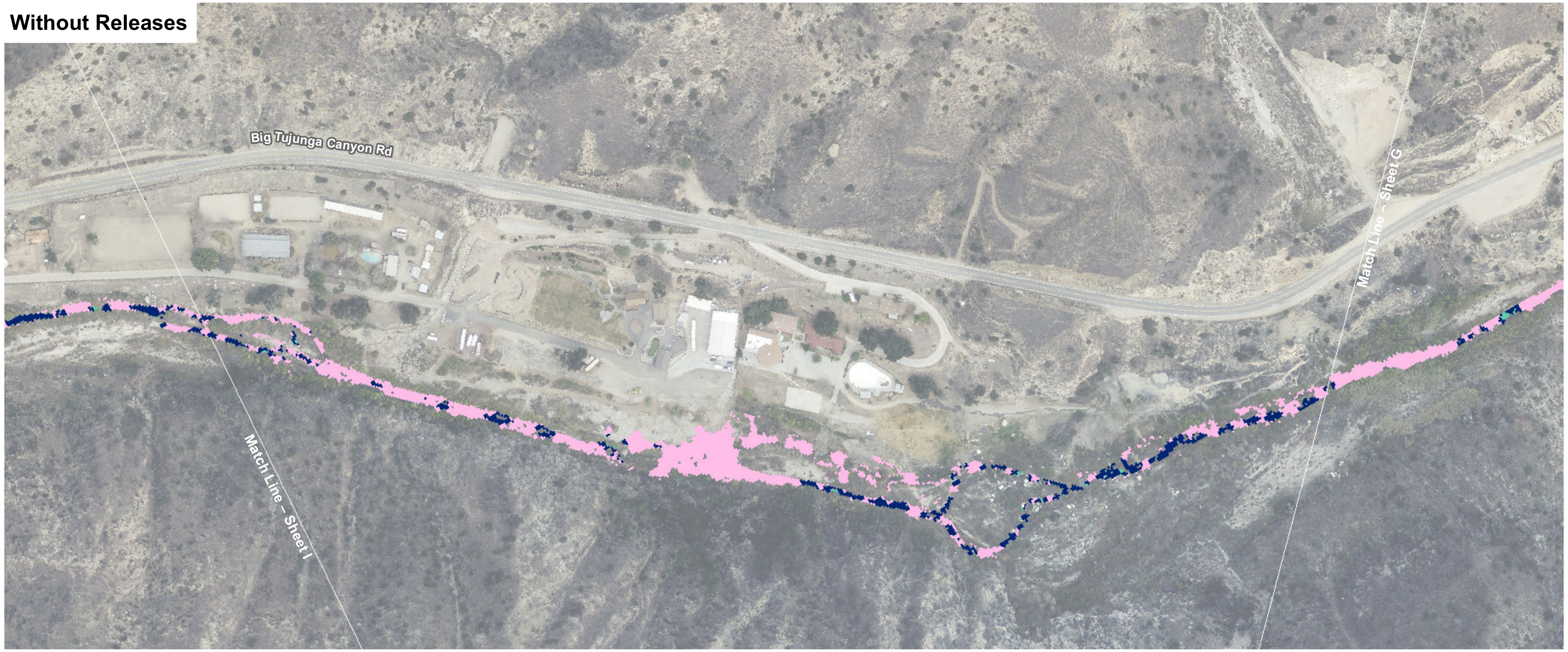
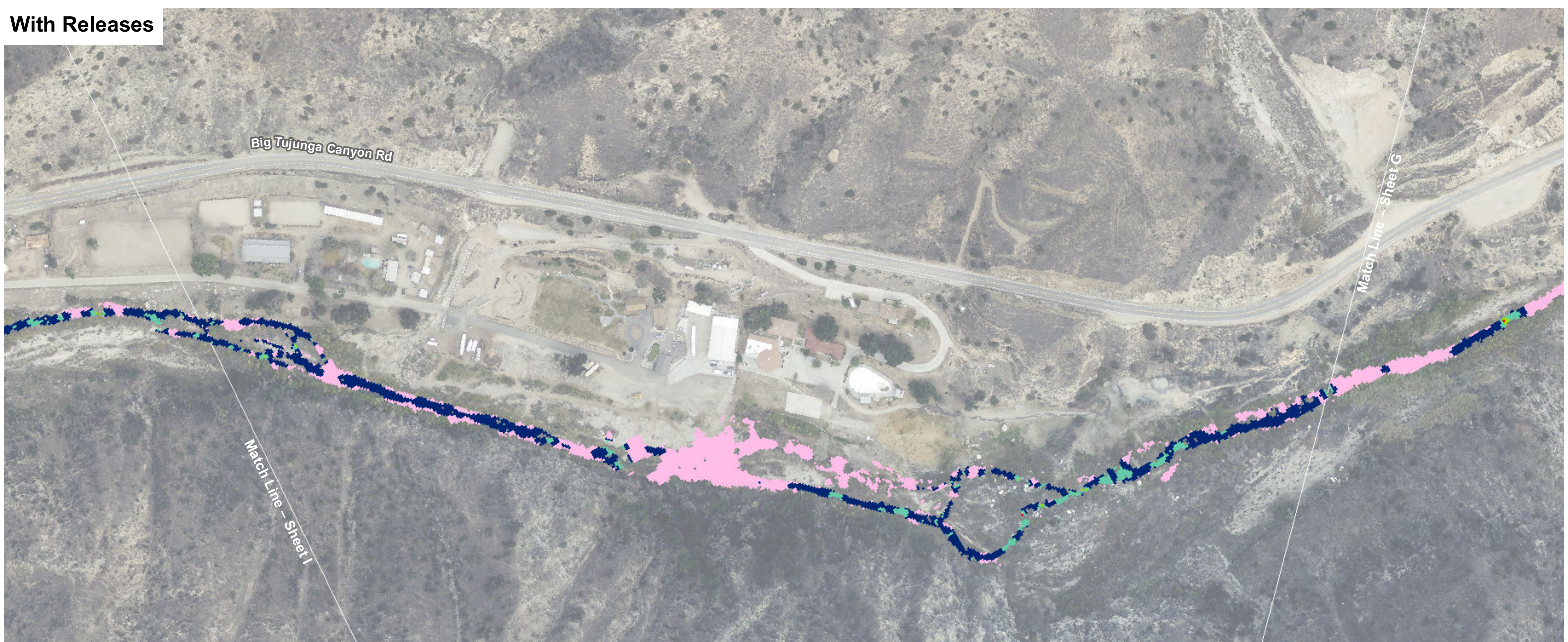
D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd

Without Releases



With Releases



Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

Average Velocity (Spetember) Sheet 8

Big Tujunga Dam HCP

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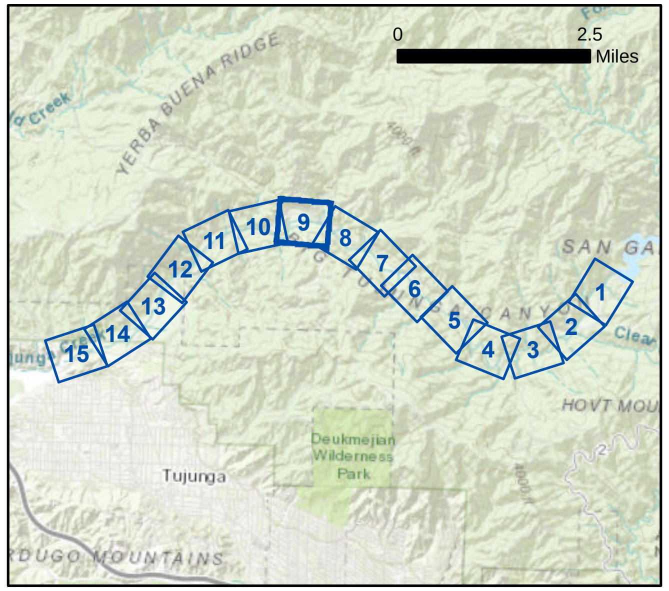
Without Releases

With Releases



Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

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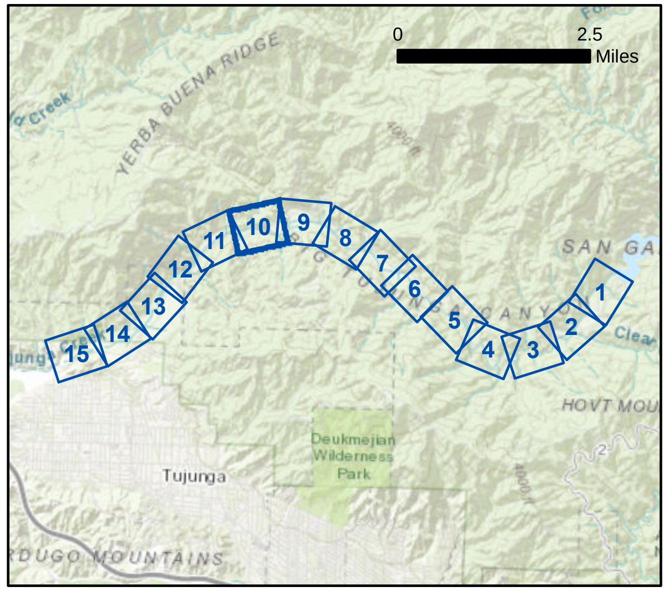
Exhibit 17
Average Velocity (Spetember) Sheet 9

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\



Average Velocity (feet per second)

(pink)	0 - 0.5
(dark blue)	0.5 - 1.0
(teal)	1.0 - 1.4
(light green)	1.4 - 1.9
(red)	1.9 - 2.4
(dark red)	2.4 - 2.9

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 17
Average Velocity (Spetember) Sheet 10

Big Tujunga Dam HCP

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Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9

300 150 0 300
Feet

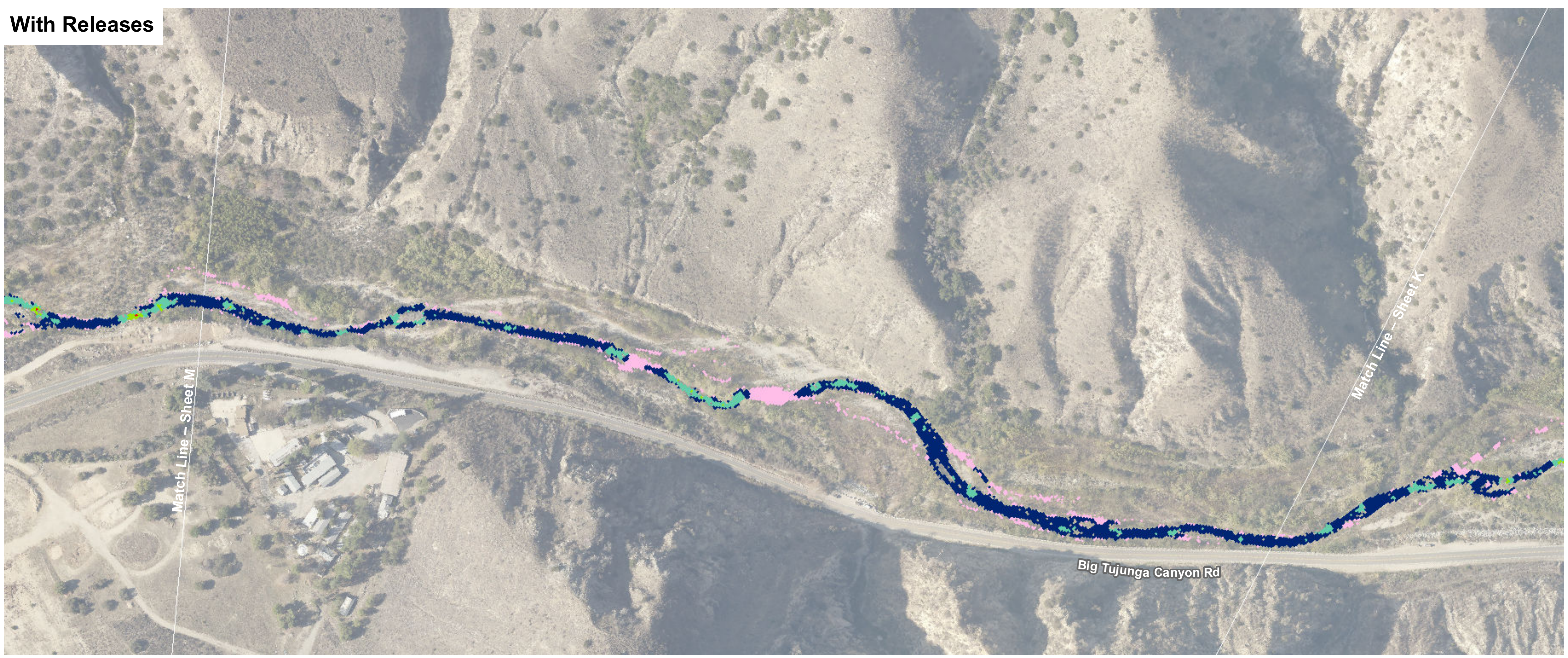
Aerial Source: LAR-IAC 2014

Exhibit 17
Average Velocity (Spetember) Sheet 11
Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd



Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 17
Average Velocity (Spetember) Sheet 12
Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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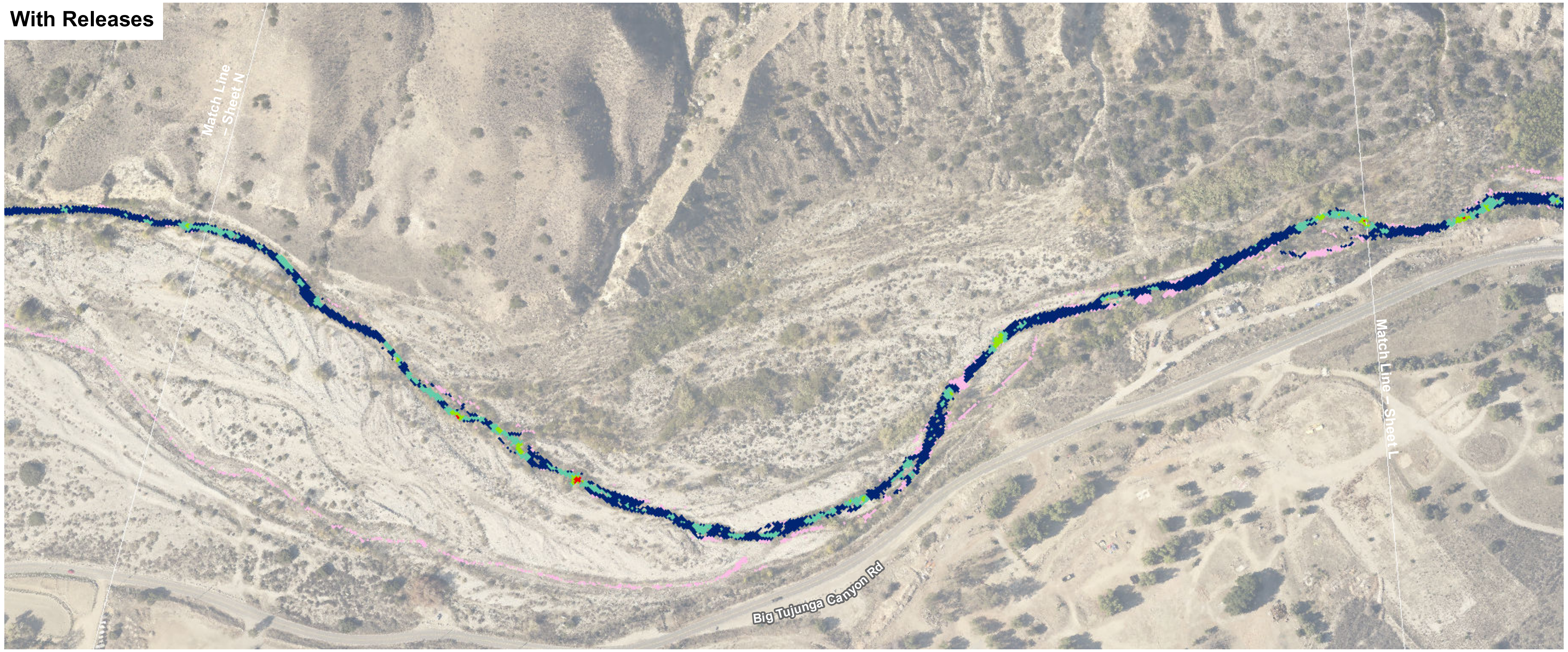
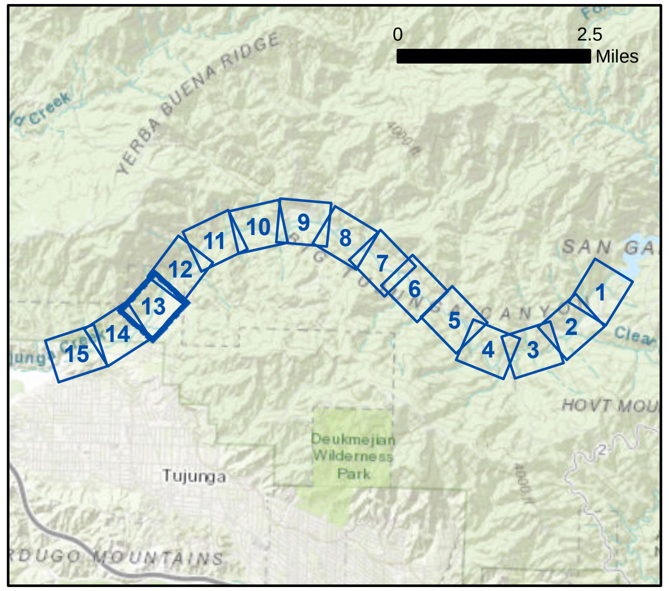




Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

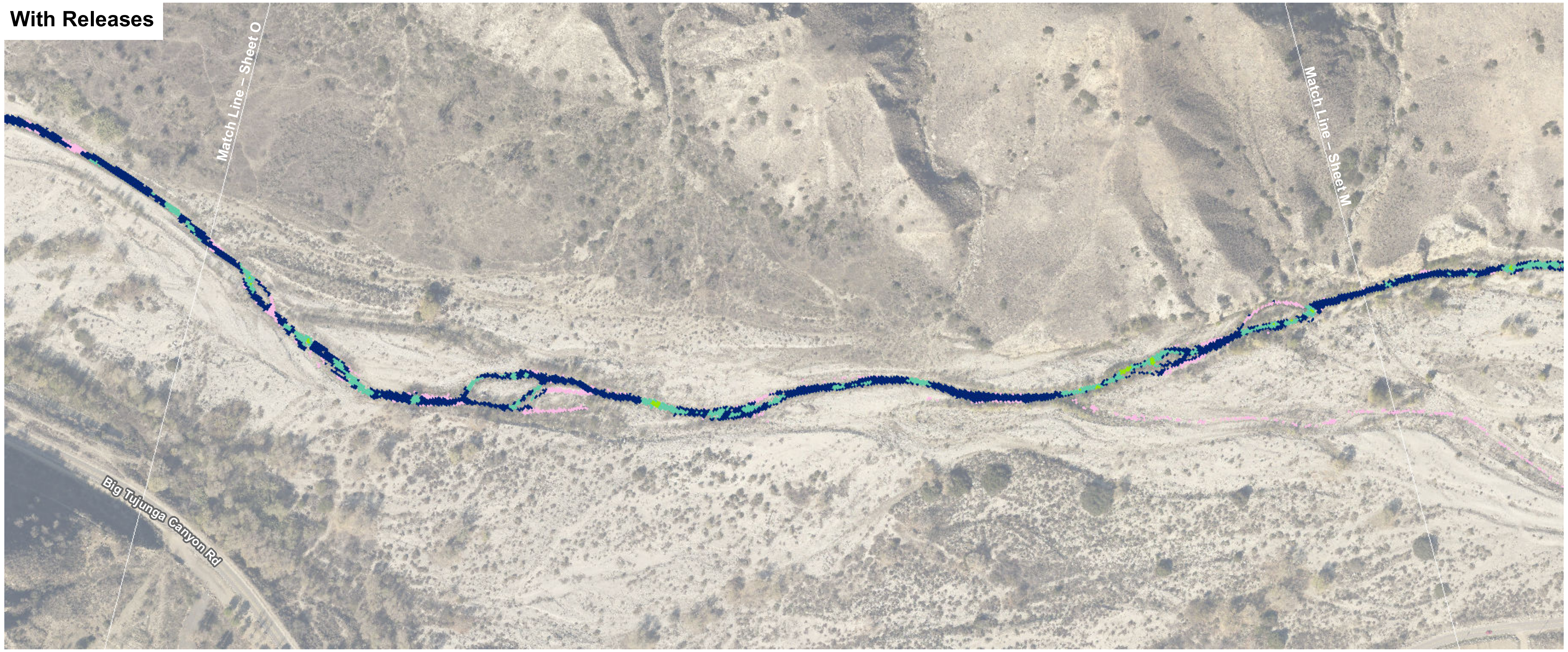
Average Velocity (Spetember) Sheet 13

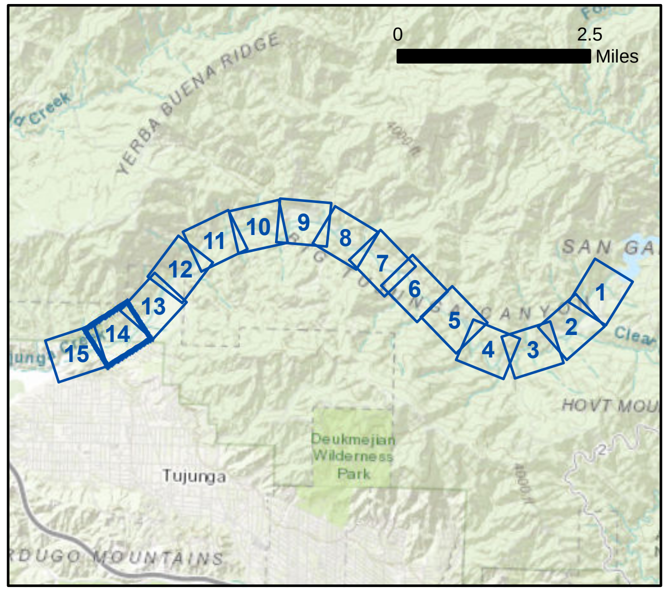
Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

D:\Projects\COLADPW\J282\MXD\HECRAS_Supplemental\Report_Exhibits\Ex_comparison_maps_20190904.mxd





Average Velocity (feet per second)

Pink	0 - 0.5
Dark blue	0.5 - 1.0
Teal	1.0 - 1.4
Light green	1.4 - 1.9

300 150 0 300
Feet

Aerial Source: LAR-IAC 2014

Exhibit 17
Average Velocity (Spetember) Sheet 14
Big Tujunga Dam HCP

PSOMAS

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Without Releases

With Releases

Average Velocity (feet per second)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.4
- 1.4 - 1.9
- 1.9 - 2.4

300 150 0 300 Feet

Aerial Source: LAR-IAC 2014

Exhibit 17

Average Velocity (Spetember) Sheet 15

Big Tujunga Dam HCP

PSOMAS

(Rev: 09/05/2019 RMB) R:\Projects\DPW\3DPW028201\Graphics\HCP\

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TABLE 15
AREA OF INUNDATION WITH AND WITHOUT SUPPLEMENTAL RELEASES[1]

Month	Median Q (cfs) without Supplemental Releases	Median Q (cfs) with Supplemental Releases	Area of Inundation without Supplemental Releases (acres)	Area of Inundation with Supplemental Releases (acres)	Difference (acres)	Percent change (%)
April 15 – May 14	16.4	21.4	41.37	44.04	2.67	6.1
May 15 – June 14	9.7	14.7	36.93	40.58	3.65	9.0
June 15 – July 14	6.4	11.4	34.13	38.47	4.34	11.3
July 15 – August 14	5.0	10.0	32.62	37.44	4.82	12.9
August 15 – September 14	2.8	7.8	29.59	35.66	6.07	17.0
September 15 – October 14	2.6	7.6	29.21	35.48	6.27	17.7

Q; Flow (release rate)

[1] The study area for the Supplemental Release Study extended from the plunge pool to upstream of the Oro Vista Avenue (Psomas 2020b).

TABLE 16
ADDITIONAL AREAS WETTED BY SUPPLEMENTAL RELEASES[1]

Month	Median Q (cfs) without Supplemental Releases	Median Q (cfs) with Supplemental Releases	Additional Wetted Area (acres)	Average Velocity for Additional Wetted Area (feet per second)	Average Depth for Additional Wetted Area (feet)
April 15 – May 14	16.4	21.4	2.67	0.69	0.05
May 15 – June 14	9.7	14.7	3.65	0.63	0.06
June 15 – July 14	6.4	11.4	4.34	0.60	0.07
July 15 – August 14	5.0	10.0	4.82	0.60	0.08
August 15 – September 14	2.8	7.8	6.07	0.58	0.09
September 15 – October 14	2.6	7.6	6.27	0.57	0.10
Average (whole time series)	N/A	N/A	4.64	0.61	0.08

Q; Flow (release rate)

[1] The study area for the Supplemental Release Study extended from the plunge pool to upstream of the Oro Vista Avenue (Psomas 2020b).

TABLE 17
AVERAGE DEPTH WITH AND WITHOUT SUPPLEMENTAL RELEASES[1]

Month	Median Q (cfs) without Supplemental Releases	Median Q (cfs) with Supplemental Releases	Average Depth without Supplemental Releases (feet)	Average Depth with Supplemental Releases (feet)	Difference (feet)	Percent change (%)
April 15 – May 14	16.4	21.4	0.64	0.69	0.05	7.2
May 15 – June 14	9.7	14.7	0.57	0.63	0.06	9.5
June 15 – July 14	6.4	11.4	0.53	0.59	0.06	10.2
July 15 – August 14	5.0	10.0	0.51	0.58	0.07	12.1
August 15 – September 14	2.8	7.8	0.47	0.55	0.08	14.5
September 15 – October 14	2.6	7.6	0.46	0.55	0.09	16.4
Average (whole time series)	N/A	N/A	0.53	0.60	0.07	11.7

Q; Flow (release rate)

[1] The study area for the Supplemental Release Study extended from the plunge pool to upstream of the Oro Vista Avenue (Psomas 2020b).

TABLE 18
AVERAGE VELOCITY WITH AND WITHOUT SUPPLEMENTAL RELEASES[1]

Month	Median Q (cfs) without Supplemental Releases	Median Q (cfs) with Supplemental Releases	Average Velocity without Supplemental Releases (feet per second)	Average Velocity with Supplemental Releases (feet per second)	Difference (feet per second)	Percent change (%)
April 15 – May 14	16.4	21.4	0.81	0.90	0.09	10.0
May 15 – June 14	9.7	14.7	0.66	0.77	0.11	14.3
June 15 – July 14	6.4	11.4	0.55	0.70	0.15	21.4
July 15 – August 14	5.0	10.0	0.50	0.66	0.16	24.2
August 15 – September 14	2.8	7.8	0.39	0.60	0.21	35.0
September 15 – October 14	2.6	7.6	0.38	0.59	0.21	35.6
Average (whole time series)	N/A	N/A	0.54	0.70	0.20	28.6

Q; Flow (release rate)

[1] The study area for the Supplemental Release Study extended from the plunge pool to upstream of the Oro Vista Avenue (Psomas 2020b).

Storage of water in the Reservoir for supplemental releases (up to 1,500 af) would cause the Reservoir level to be higher and, thus, would reduce the amount of stream-like habitat available at the upper end of the Reservoir. Minimum pool elevation is 2,225 feet; adding 1,500 af of water would bring the Reservoir elevation to 2,256.7 feet (Zargaryan 2019b). Therefore, storage of supplemental release would add 30.7 acres of inundation over 0.73 stream mile in the Reservoir (Exhibit 15). As water is released over the non-storm season, the Reservoir level would subside, exposing more stream-like habitat.

4.1.4 MAINTENANCE PROJECTS

As described in Section 3, Dam and Reservoir maintenance is necessary to continue to operate the Dam and to keep the facility safe and functional. Typical maintenance projects are described below and are grouped based on their frequency of occurrence and the duration of the maintenance projects. When the Reservoir level must be adjusted to accomplish required maintenance, efforts are made to conduct multiple maintenance projects at the same time for efficiency. When the Reservoir level must be adjusted to perform maintenance activities during the non-storm season, flow rates would be ramped as they are with water conservation releases during the Santa Ana sucker breeding season per MAIN-1.

4.1.4.1 INSPECTIONS/TESTING

The Dam undergoes regular inspections and testing to ensure it is functioning safely and properly. As described in Section 3, these include facility inspections, Dam safety inspections, valve and slide gate safety testing, and Reservoir topographical surveys.

Facility Inspections/Dam Safety Inspections/Valve and Slide Gate Testing/Reservoir Topographical Surveys

Routine facility inspection, safety inspections, and valve and slide gate testing would not involve physical disturbance; and the Reservoir level would not need to be lowered. However, the valves may be opened and closed, which would temporarily release water or stop the release of water during the inspection.

Valve and slide gate testing are scheduled twice per year, at the transition from the storm season to the non-storm season and from the non-storm season to the storm season. Valve and slide gate testing involves opening and closing each valve/gate, one at a time, which takes from 12 to 30 minutes per valve/gate. Valve tests are limited to a maximum release of 250 cfs; during this release, the flows in the wash downstream would be expected to be substantially less than those shown on Exhibit 14 for water conservation releases up to 250 cfs. The downstream stream flows during a valve test would be less than those of a water conservation release because the release of 250 cfs would occur for only a few minutes, whereas Exhibit 14 shows the stream flows at equilibrium (i.e., 36 hours of 250 cfs release).

An emergency safety inspection (e.g., following an earthquake) may involve lowering the Reservoir or closing the valves to view a structure on the Dam. Because emergency safety inspections cannot be planned, they may interfere with storage of water for the supplemental releases. In rare instances, the inspection may involve viewing an intake structure, which may require a complete drawdown (dewatering) to view the structure. Any noted deficiencies must be addressed and could require water releases to draw down the Reservoir to facilitate the inspection or repair. If a major problem is noted, the Reservoir may need to be completely dewatered until the repair is completed. Since the Dam was constructed, this has not occurred.

Reservoir topographical surveys would not involve physical disturbance, but the Reservoir level may need to be lowered temporarily to expose the upper Reservoir if the surveys are done using aerial photography.

4.1.4.2 REGULAR SHORT-TERM, SMALL-SCALE MAINTENANCE

Regular short-term, small-scale maintenance activities occur annually or multiple times per year and are limited in extent and duration. As described in Section 3, these activities include boat launch maintenance and trash booming and removal. These activities would not interfere with the availability of water for supplemental releases.

Boat Launch Maintenance

Re-grading of the boat ramp and access road upstream of the Reservoir would impact approximately 5.67 acres (2.98 acres annual brome grassland, 0.33 acre open water, 2.34 acres disturbed, and 0.02 acre developed/ornamental; Table 19, Exhibit 18). The impact on open water is an artifact of mapping. The boat ramp would be graded only to the water's edge. The footprint shown on Exhibit 18 reflects the area that could be disturbed when the Reservoir is low. Maintenance would typically be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation.

Trash Booming and Removal

Removal of debris from the trash boom would affect approximately 0.85 acre of open water (Table 19, Exhibit 18). Debris would typically be removed by boat but may occasionally involve use of an onshore crane. Debris would be placed on the peninsula or on the boat launch ramp, within the same impact area described above for boat launch maintenance (5.67 acres). The Reservoir may be lowered or held steady to aid in the trash booming activities.

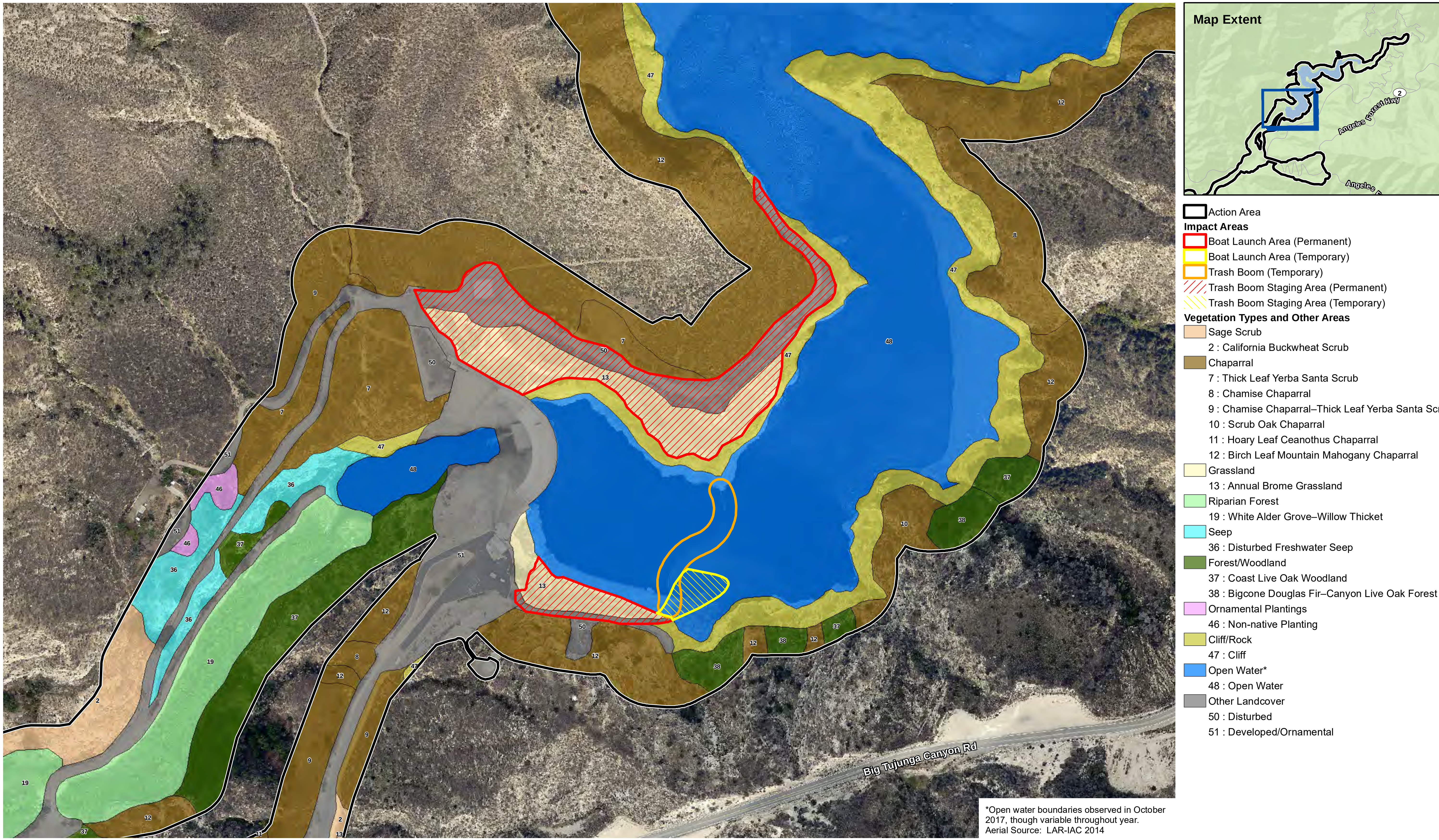
TABLE 19
REGULAR SHORT-TERM, SMALL-SCALE MAINTENANCE IMPACTS

Vegetation Type or Landcover	Code	Boat Ramp		Trash Booming		Total Regular Short-Term, Small-Scale Maintenance		
		Permanent (acres)	Temporary (acres)	Permanent (acres)	Temporary (acres)	Permanent (acres)	Temporary (acres)	Total (acres) [a]
Grassland		**2.98**	**0.00**	**2.98**	**0.00**	**2.98**	**0.00**	**2.98**[a]
Annual Brome Grassland	13	2.98	0.00	2.98	0.00	2.98	0.00	2.98[a]
Open Water		**0.00**	**0.33**[b]	**0.00**	**0.85**	**0.00**	**0.85**	**0.85**[a]
Open Water	48	0.00	0.33[b]	0.00	0.85	0.00	0.85	0.85[a]
Other Landcover		**2.36**	**0.00**	**2.36**	**0.00**	**2.36**	**0.00**	**2.36**[a]
Disturbed	50	2.34	0.00	2.34	0.00	2.34	0.00	2.34[a]
Developed/Ornamental	51	0.02	0.00	0.02	0.00	0.02	0.00	0.02[a]
Total		**5.34**	**0.33**	**5.34**	**0.85**	**5.34**	**0.85**	**6.19**[a]

[a] Boat ramp and trash booming areas overlap; therefore, the total column shows the total extent of area affected accounting for the overlap.
[b] The impact on open water for boat ramp impacts is an artifact of mapping. The boat ramp would only be graded to the water's edge. The footprint shown on Exhibit 18 reflects the area that could be disturbed when the Reservoir is lower.

4.1.4.3 INFREQUENT SHORT-TERM, SMALL-SCALE MAINTENANCE

Infrequent short-term, small-scale maintenance activities occur once every several years and are limited in extent and duration. These activities include repair or painting of trash racks/penstocks;



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Regular Short-Term, Small-Scale Maintenance Impacts

Exhibit 18

Big Tujunga Dam HCP

N W E S

300 150 0 300 Feet

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repair, replacement, or installation of leakage points, piezometers, or other instrumentation or gages; repair of gunite and erosion protection measures; repair of downstream stream gages; repair of downstream stream channels; repair of the downstream access road; rockfall hazard measures for access roads, and geotechnical exploration. Maintenance would typically be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation.

4.1.4.3.1 Maintenance on Dam/Rockfall Hazard for Access Roads

Repair or Painting of Trash Racks/Penstocks

Trash racks and penstocks are located on the Dam structure. Repair of trash racks and penstocks would impact 1.17 acres of developed/ornamental (Exhibit 19a, Table 20). Repair of trash racks may require drawing the Reservoir down to an elevation that exposes the trash racks to allow for repair work to occur. Flow through the affected penstock would be temporarily stopped to allow for repair work.

Repair, Replacement, or Installation of Leakage Points, Piezometers, or Other Instrumentation and Gages

Leakage points, piezometers, instrumentations, and gages are located on the Dam structure or immediately adjacent to the structure. Repair, replacement, or installation of leakage points, piezometers, or other instrumentation and gages would impact 2.64 acres (0.11 acre cliff and 2.53 acres developed/ornamental; Exhibit 19a, Table 20). Note that some of the developed/ornamental areas overlap with repair or painting of trash racks/penstocks. The Reservoir may need to be lowered to allow the installation of an instrument. Some instruments are located at the base of the Dam, and the well or leakage point may have artesian flow;[45] lowering the Reservoir lessens that pressure and would allow the instrument to be serviced or installed properly. Depending on the location of the instrument, workers may be required to rappel down the Dam face on ropes; therefore, the flow through the penstocks may be temporarily stopped to provide for their safety during the work.

Repair of Gunite and Erosion Protection Measures

Gunite and erosion control measures are located on the slopes adjacent to the existing structure. Repair of gunite and erosion protection would impact 3.04 acres (0.02 acre birch leaf mountain mahogany chaparral, 0.28 acre annual brome grassland, 0.22 acre cliff, 0.18 acre open water, 0.25 acre disturbed, and 2.09 acres developed/ornamental; Exhibit 19a, Table 20). Note that some of the cliff and developed/ornamental areas overlap with areas impacted by repair of leakage points, piezometers, or other instruments and stream gages. Depending on the location of the repairs, workers may be required to rappel down the cliff faces adjacent to the Dam on ropes; therefore, the flow through the valves may be temporarily stopped to provide for their safety during the work.

4.1.4.3.2 Downstream Maintenance

Repair of Downstream Stream Gages

In addition to the gages located on the Dam structure and associated slopes, a stream gage is located approximately 0.6 mile downstream of the plunge pool. Repair of the downstream stream gage would impact 0.07 acre white alder grove–willow thicket (Exhibit 19b, Table 20). Note that

45 Artesian flow is water that flows to the surface without pumping due to the pressure of confining the water between impermeable surfaces.

this area overlaps with repair of downstream stream channel. Dam valves may need to be closed temporarily to minimize flows during the work to provide for the safety of crews working downstream of the Dam. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. If necessary for the repairs, stream flow would be diverted around the work area using BMPs.

Repair of Downstream Stream Channel

Repair of the stream channel may include removal of debris or repair of slopes. As it is unknown which part of the slope above the stream channel may fail in the future, the whole slope was assumed to be potentially impacted. Repair of the downstream stream channel could impact up to 30.73 acres (0.30 acre California buckwheat scrub, 0.11 acre laurel sumac scrub, 0.03 acre thick leaf yerba santa scrub, 0.13 acre chamise chaparral, 13.71 acres annual brome grassland, 0.37 acre Russian thistle field, 2.62 acres white alder grove–willow thicket, 0.49 acre cliff, 3.67 acres disturbed, and 9.30 acres developed/ornamental; Exhibit 19b, Table 20). Note that some of these areas overlap with repair of the downstream stream gages and repair of downstream access roads. Dam valves may need to be closed temporarily to minimize flows during the work to provide for the safety of crews working downstream of the Dam. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. If necessary for the repairs, stream flow would be diverted around the work area using BMPs.

Repair of the Downstream Access Road

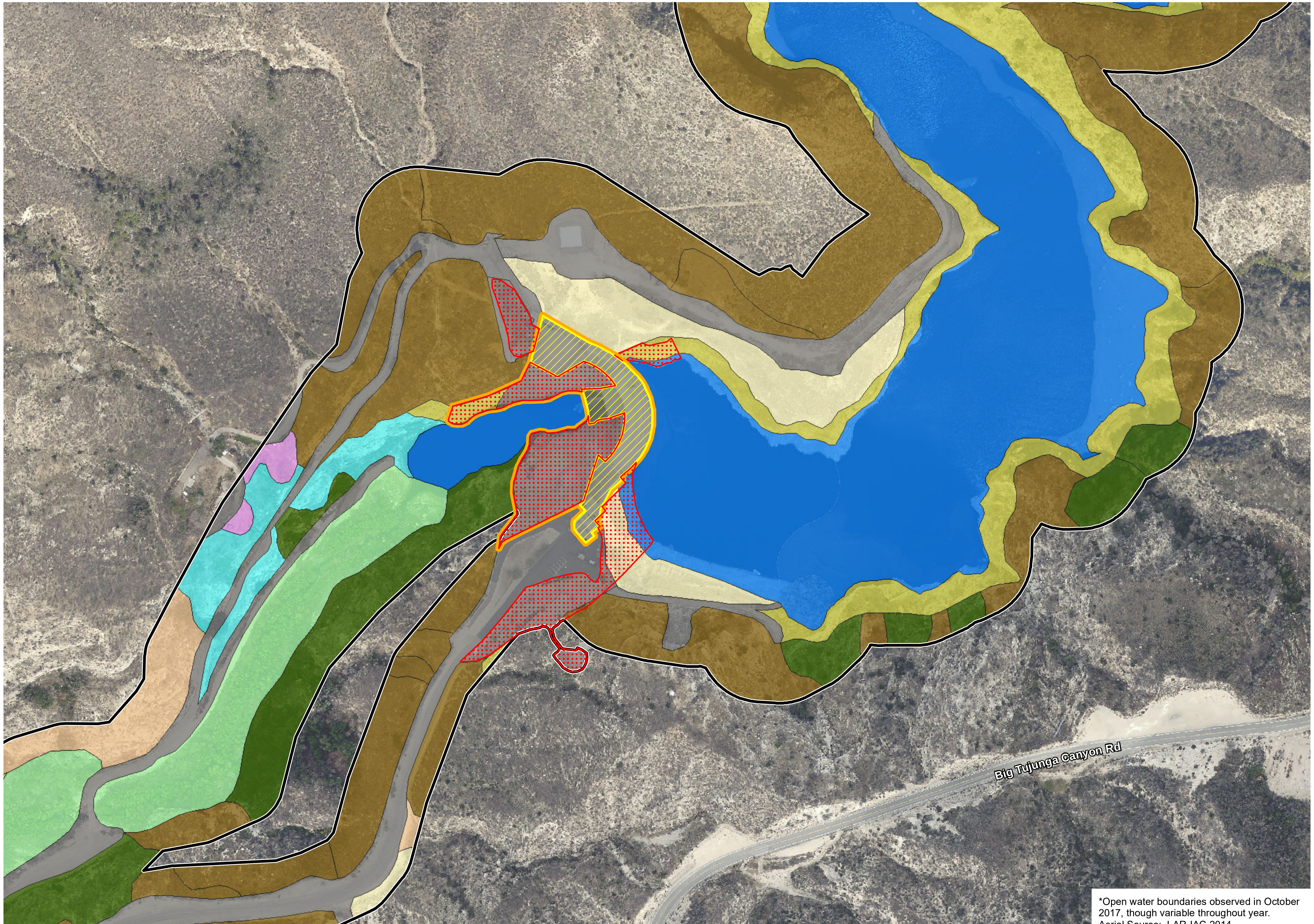
Downstream of the Dam, an access road crosses Big Tujunga Creek to allow vehicle traffic to access the western abutment of the Dam and the plunge pool area. If road replacement is necessary, the road/stream crossing design would continue to allow aquatic organisms passage. Repair of the downstream stream channel would impact 12.02 acres (0.05 acre white alder grove–willow thicket, 0.24 acre disturbed, and 11.73 acres developed/ornamental; Exhibit 19b, Table 20). Note that some of these areas overlap with repair of downstream stream channel. Dam valves may need to be closed temporarily to minimize flows to provide for the safety of crews working downstream of the Dam. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. If necessary for the repairs, stream flow would be diverted around the work area using BMPs.

Rockfall Hazard Measures for Access Roads

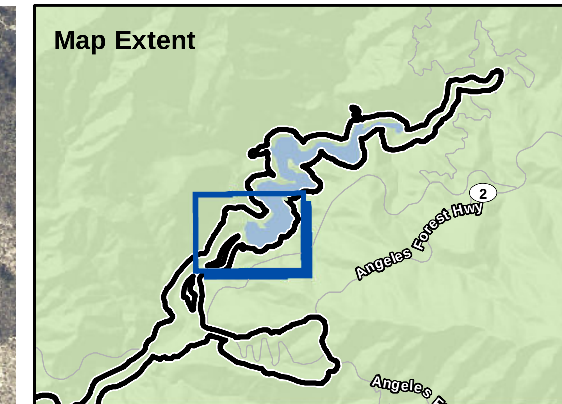
Rockfall curtains would be constructed along the cliffs above the access roads to protect the roads from falling rock. Repair of the rockfall curtains would impact 4.71 acres (1.18 acres of California buckwheat scrub, 0.85 acre thick leaf yerba santa scrub, 1.20 acres birch leaf mountain mahogany chaparral, 0.82 acre disturbed freshwater seep, 0.29 acre non-native plantings, 0.15 acre disturbed, and 0.22 acre developed/ornamental; Exhibit 19c, Table 20). Dam valves would not need to be closed, and the Reservoir level would not be affected by maintenance of rockfall hazard measures.

4.1.4.3.3 Geotechnical Exploration

Geotechnical exploration would involve minor exploration in the vicinity of the Dam (e.g., using a drill rig to drill holes) to investigate extent of damage/repairs needed following an earthquake or landslide. The specific location of the work would depend on the event that triggers the geotechnical exploration. Disturbance as a result of geotechnical exploration is expected to be limited in extent (i.e., cores of less than 24 inches diameter [< 0.0001 acre], trenches less than



Map Extent



Action Area

Impact Areas

- Repair/Painting of Trash Racks/Penstocks (Temporary)
- Repair, Replacement, or Installation of Leakage Points, Piezometers, or Other Instrumentation & Gages (Permanent)
- Repair of Gunite and Erosion Protection Measures (Permanent)

Vegetation Types and Other Areas

- Sage Scrub
  - 2 : California Buckwheat Scrub
- Chaparral
  - 7 : Thick Leaf Yerba Santa Scrub
  - 8 : Chamise Chaparral
  - 9 : Chamise Chaparral–Thick Leaf Yerba Santa Scrub
  - 10 : Scrub Oak Chaparral
  - 11 : Hoary Leaf Ceanothus Chaparral
  - 12 : Birch Leaf Mountain Mahogany Chaparral
- Grassland
  - 13 : Annual Brome Grassland
- Riparian Forest
  - 19 : White Alder Grove–Willow Thicket
- Seep
  - 36 : Disturbed Freshwater Seep
- Forest/Woodland
  - 37 : Coast Live Oak Woodland
  - 38 : Bigcone Douglas Fir–Canyon Live Oak Forest
- Ornamental Plantings
  - 46 : Non-native Planting
- Cliff/Rock
  - 47 : Cliff
- Open Water*
  - 48 : Open Water
- Other Landcover
  - 50 : Disturbed
  - 51 : Developed/Ornamental

Infrequent Short-Term, Small-Scale Maintenance Impacts (Maintenance on Dam Structure)

Exhibit 19a

Big Tujunga Dam HCP

N W E S

250 125 0 250 Feet

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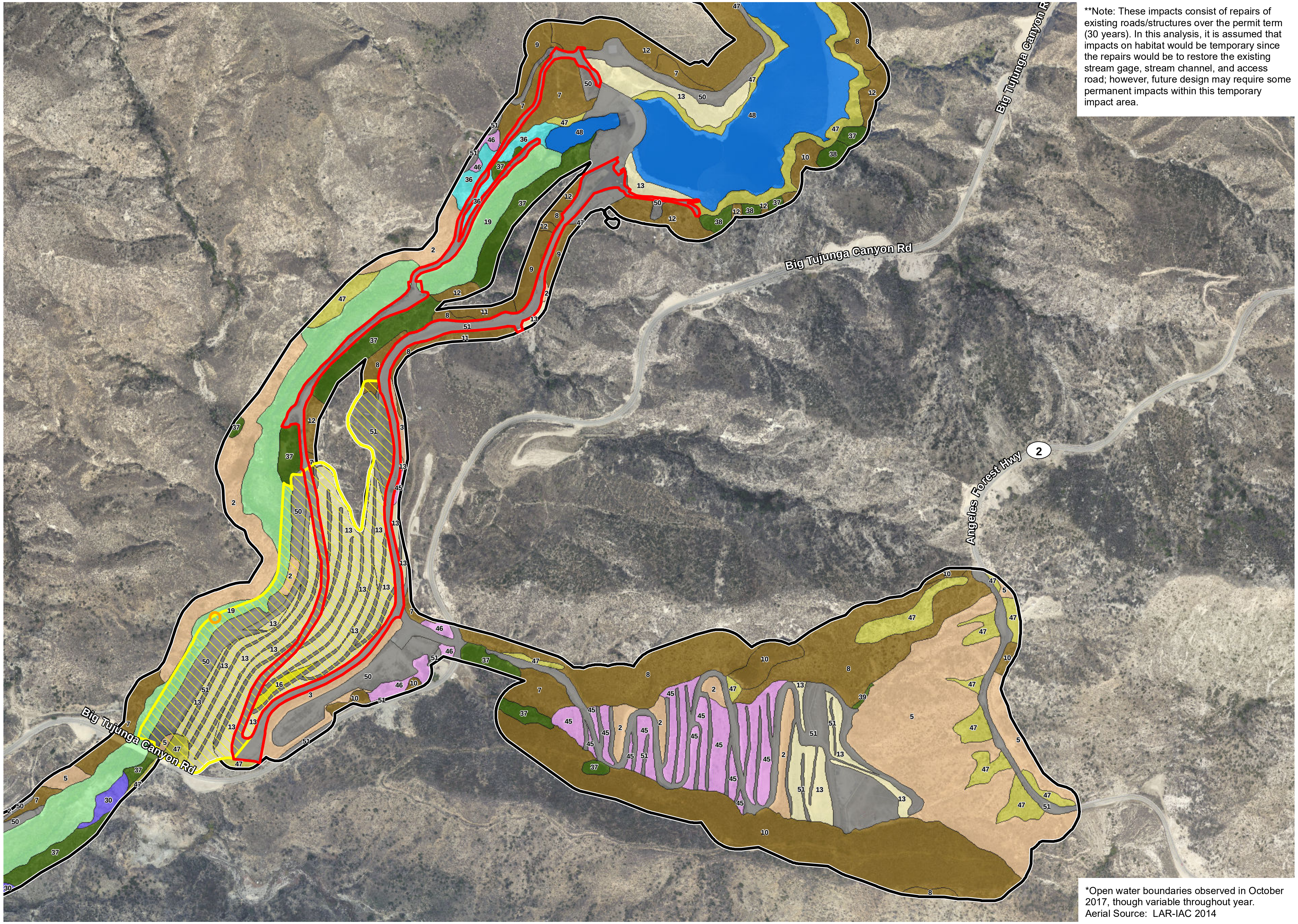
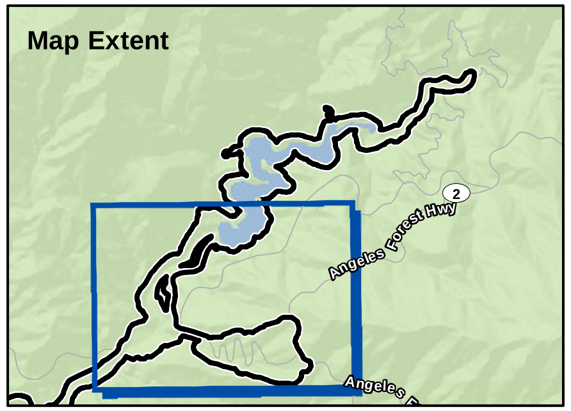


**Note: These impacts consist of repairs of existing roads/structures over the permit term (30 years). In this analysis, it is assumed that impacts on habitat would be temporary since the repairs would be to restore the existing stream gage, stream channel, and access road; however, future design may require some permanent impacts within this temporary impact area.

*Open water boundaries observed in October 2017, though variable throughout year.
Aerial Source: LAR-IAC 2014

Map Extent



Action Area

Impact Areas**

Repair of Downstream Stream Gages (Temporary)
Repair of Downstream Stream Channel (Temporary)
Repair of Downstream Access Roads (Temporary)

Vegetation Types and Other Areas

Sage Scrub
2 : California Buckwheat Scrub
3 : Disturbed California Buckwheat Scrub
5 : Laurel Sumac Scrub
Chaparral
7 : Thick Leaf Yerba Santa Scrub
8 : Chamise Chaparral
9 : Chamise Chaparral–Thick Leaf Yerba Santa Scrub
10 : Scrub Oak Chaparral
11 : Hoary Leaf Ceanothus Chaparral
12 : Birch Leaf Mountain Mahogany Chaparral
Grassland
13 : Annual Brome Grassland
Ruderal
16 : Russian Thistle Field
Riparian Forest
19 : White Alder Grove–Willow Thicket
Riparian Scrub
30 : Mulefat Thicket
Seep
36 : Disturbed Freshwater Seep
Forest/Woodland
37 : Coast Live Oak Woodland
38 : Bigcone Douglas Fir–Canyon Live Oak Forest
39 : California Sycamore Woodland
Ornamental Plantings
45 : Native Planting
46 : Non-native Planting
Cliff/Rock
47 : Cliff
Open Water*
48 : Open Water
Other Landcover
50 : Disturbed
51 : Developed/Ornamental

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Infrequent Short-Term, Small-Scale Maintenance Impacts (Downstream Maintenance)

Exhibit 19b

Big Tujunga Dam HCP

N W E S

600 300 0 600
Feet

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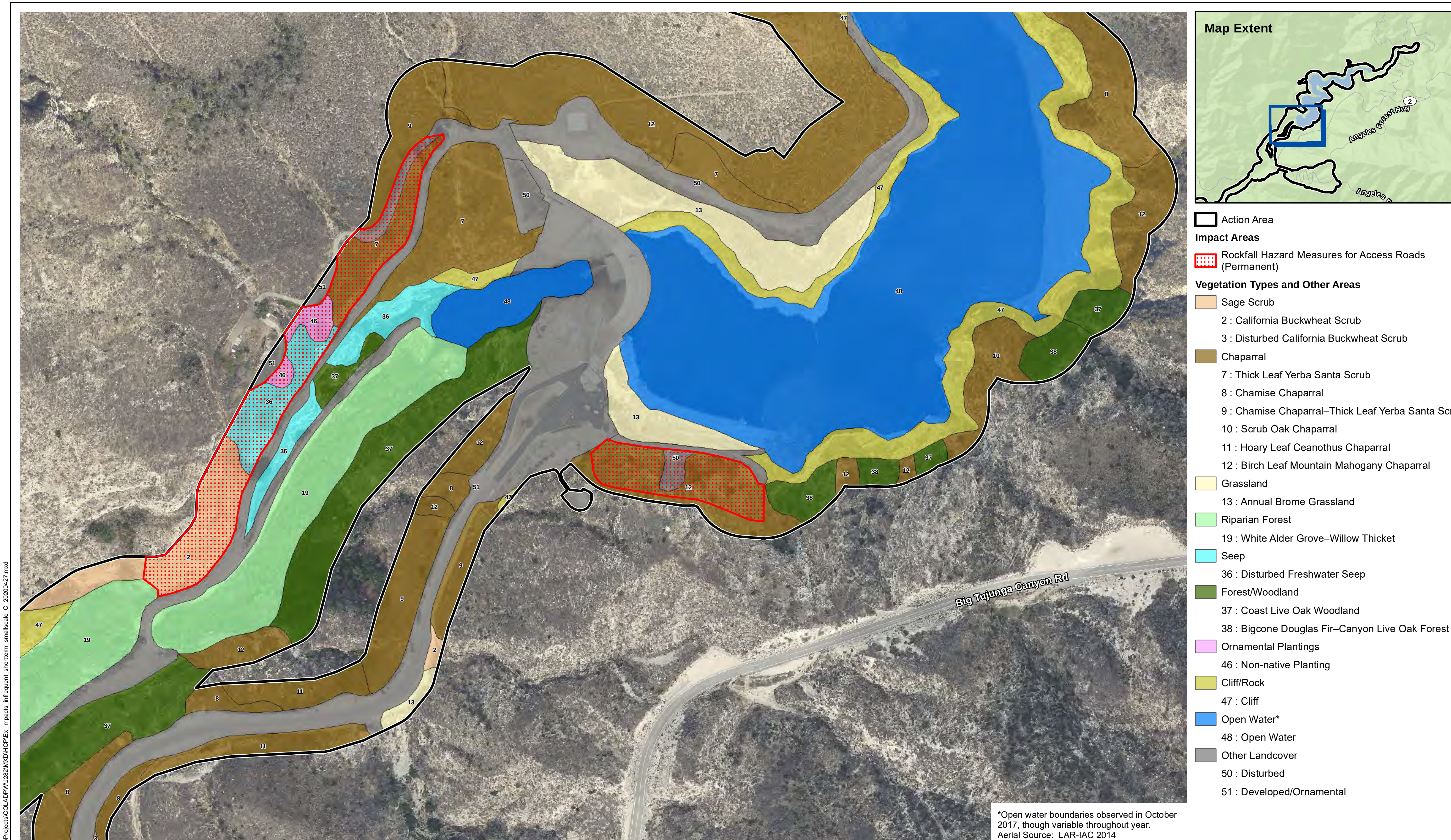

Infrequent Short-Term, Small-Scale Maintenance Impacts (Rockfall Hazard Measures for Access Road)

Exhibit 19c

Big Tujunga Dam HCP

N W E S

250 125 0 250 Feet

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0.01 acre) and would be expected to be placed in upland habitats (i.e., outside riparian habitats). The areas disturbed would likely occur within areas identified as impacted during other maintenance projects and have not been calculated separately. Dam valves may need to be closed temporarily to allow a drill rig to drill downstream of the Dam or to allow a Geologist to safely investigate the area. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur.

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TABLE 20
INFREQUENT SHORT-TERM, SMALL-SCALE MAINTENANCE IMPACTS

Vegetation Type or Landcover	Code	Maintenance on Dam			Downstream			Rockfall Hazard Measures for Access Roads - Permanent Impacts[c] (acres)	Total Infrequent Short-Term, Small-Scale Maintenance Impacts		
		Repair or Painting of Trash Racks - Temporary Impacts (acres)	Repair, Replacement, or Installation of Leakage Points, Piezometers, or Other Instrumentation and Gages - Permanent Impacts (acres)	Repair of Gunite and Erosion Protection Measures - Permanent Impacts (acres)	Repair of Downstream Stream Gages - Temporary Impacts[b] (acres)	Repair of Downstream Stream Channel - Temporary Impacts[b] (acres)	Repair of the Downstream Access Road - Temporary Impacts[b] (acres)		Permanent (acres)[d]	Temporary (acres)[d]	Total (acres)[a]
Sage Scrub		**0.00**	**0.00**	**0.00**	**0.00**	**0.41**	**0.00**	**1.18**	**1.18**	**0.41**	**1.59**
California Buckwheat Scrub	2	0.00	0.00	0.00	0.00	0.30	0.00	1.18	1.18	0.30	1.48
Laurel Sumac Scrub	5	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.11	0.11
Chaparral		**0.00**	**0.00**	**0.02**	**0.00**	**0.16**	**0.00**	**2.05**	**2.07**	**0.16**	**2.23**
Thick Leaf Yerba Santa Scrub	7	0.00	0.00	0.00	0.00	0.03	0.00	0.85	0.85	0.03	0.88
Chamise Chaparral	8	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.13	0.13
Birch Leaf Mountain Mahogany Chaparral	12	0.00	0.00	0.02	0.00	0.00	0.00	1.20	1.22	0.00	1.22
Grassland		**0.00**	**0.00**	**0.28**	**0.00**	**14.08**	**0.00**	**0.00**	**0.28**	**14.08**	**14.36**
Annual Brome Grassland	13	0.00	0.00	0.28	0.00	13.71	0.00	0.00	0.28	13.71	13.99
Russian Thistle Field	16	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.37
Riparian Forest		**0.00**	**0.00**	**0.00**	**0.07**	**2.62**	**0.05**	**0.00**	**0.00**	**2.69**	**2.69**[a]
White Alder Grove–Willow Thicket	19	0.00	0.00	0.00	0.07	2.62	0.05	0.00	0.00	2.69	2.69[a]
Seep		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.82**	**0.82**	**0.00**	**0.82**
Disturbed Freshwater Seep	36	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.82	0.00	0.82
Ornamental Plantings		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.29**	**0.29**	**0.00**	**0.29**
Non-native Planting	46	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.29	0.00	0.29
Rock/Cliff		**0.00**	**0.11**	**0.22**	**0.00**	**0.49**	**0.00**	**0.00**	**0.22**	**0.49**	**0.71**[a]
Cliff	47	0.00	0.11	0.22	0.00	0.49	0.00	0.00	0.22	0.49	0.71[a]
Open Water		**0.00**	**0.00**	**0.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0.18**	**0.00**	**0.18**
Open Water	48	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.18	0.00	0.18
Other Landcover		**1.17**	**2.53**	**2.34**	**0.00**	**12.97**	**11.97**	**0.37**	**3.87**	**23.04**	**26.91**[a]
Disturbed	50	0.00	0.00	0.25	0.00	3.67	0.24	0.15	0.40	3.91	4.31
Developed/Ornamental	51	1.17	2.53	2.09	0.00	9.30	11.73	0.22	3.47	19.13	22.60[a]
Total		**1.17**	**2.64**	**3.04**	**0.07**	**30.73**	**12.02**	**4.71**	**8.91**	**40.87**	**49.78**[a]

[a] Infrequent short-term, small-scale maintenance impacts overlap; therefore, the total column shows the total extent of area affected accounting for the overlap.
[b] These impacts consist of repairs of existing roads/structures over the permit term (30 years). In this analysis, it is assumed that impacts on habitat would be temporary since the repairs would be to restore the existing stream gage, stream channel, and access road; however, future design may require some permanent impacts within this temporary impact area.
[c] This impact would involve the placement of permanent netting over the cliff face; however, vegetation would be able to grow through the netting.
[d] Where permanent and temporary impacts overlap for these projects, they are counted as permanent impacts.

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4.1.4.4 INFREQUENT LONG-TERM, LARGE-SCALE MAINTENANCE

Sediment Removal

Sediment removal projects would remove sediment from Big Tujunga Reservoir and place the sediment at Maple Canyon SPS; some of the boulders and cobble removed may be stockpiled for re-use on other construction or stream enhancement projects in the Angeles National Forest. Sediment removal and placement at the SPS would impact 102.09 acres (14.14 acres laurel sumac scrub, 2.49 acres chamise chaparral, 3.83 acres scrub oak chaparral, 0.13 acre birch leaf mountain mahogany chaparral, 3.26 acres annual brome grassland, 0.06 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 0.23 acre arroyo willow thicket, 0.46 acre mulefat thicket, 2.29 acres smartweed–cocklebur patch, 0.01 acre freshwater seep, 0.04 acre disturbed freshwater seep, 0.21 acre coast live oak woodland [oak canopy extends over access roads], 0.08 acre California sycamore woodland, 0.11 acre non-native plantings, 1.85 acres cliff, 43.35 acres open water, 3.08 acres dry wash, 5.37 acres disturbed, and 20.93 acres developed/ornamental) (Exhibit 20).

Sediment-removal projects may require approximately five years of working throughout the non-storm season (work does not occur during the storm season). While work is occurring during the non-storm season, Public Works would not have the ability to make releases from the Dam because no water would be retained within the Reservoir. During the non-storm season, a HDPE creekflow bypass line would be constructed to allow natural flows from the upstream Big Tujunga Creek to bypass construction activities. During the storm seasons preceding sediment removal activities, supplemental water would not be held in the Reservoir and supplemental releases could not be made during the non-storm season.

A sediment removal project is currently pending; the Reservoir currently contains a substantial amount of sediment that washed in following the 2009 Station Fire as well as sediment that has accumulated over time. Once the sediment removal is completed, the capacity of the Reservoir to hold water for flood control and water conservation would be restored.

Subsurface Grouting/Concrete Repair

The physical extent of the impact footprint and the duration of subsurface grouting and concrete repair projects would be less than that described above for sediment removal projects. These projects would impact 40.64 acres (3.20 acres annual brome grassland, 0.04 acre disturbed freshwater seep, 1.32 acres cliff, 19.09 acres open water, 2.69 acres disturbed, and 14.30 acres developed/ornamental) (Exhibit 21). Subsurface grouting may require holding the Reservoir at a drawn-down elevation to allow a grouting program to be conducted and may require the complete dewatering of the Reservoir. Concrete repairs may require the drawdown of the Reservoir to an elevation that would allow access to a repair site. If the area requiring repair is on the upstream side of the Dam, it may require complete dewatering if a major repair is needed. If the area requiring repair is on the downstream face of the Dam, valves may be temporarily closed to facilitate the work.

Subsurface grouting and concrete repair are considered major efforts and would likely take an entire non-storm season to complete. If complete dewatering is needed to accomplish subsurface grouting/concrete repairs, a HDPE creekflow bypass line would be constructed to allow natural flows from the upstream Big Tujunga Creek to bypass construction activities. For these projects, the diversion structure and bypass line would be installed within the Reservoir footprint, closer to the work area, rather than at the upper end of the Reservoir. During the storm season preceding a complete drawdown, supplemental water would not be held in the Reservoir, and supplemental releases could not be made during the non-storm season.

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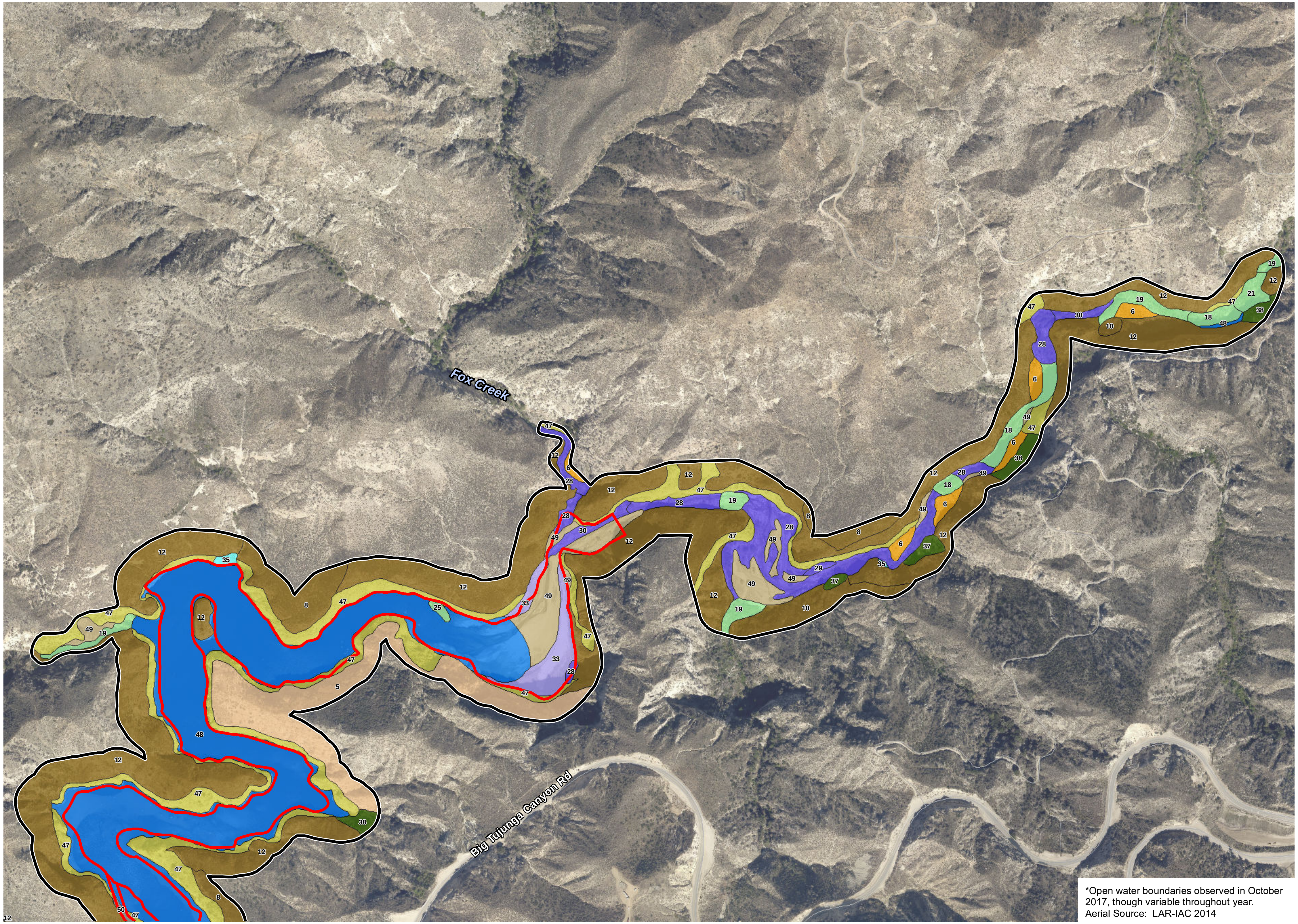
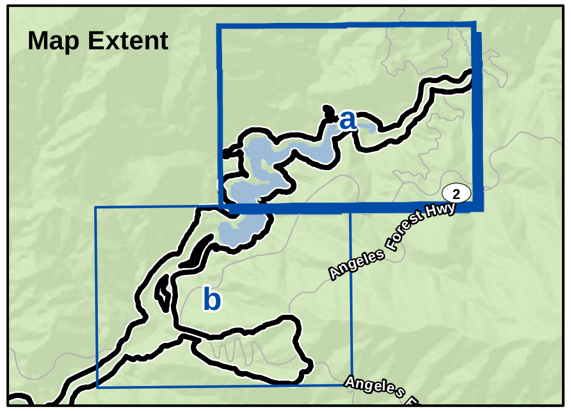


*Open water boundaries observed in October 2017, though variable throughout year.
Aerial Source: LAR-IAC 2014



Action Area

Impact Areas

Sediment Removal

Vegetation Types and Other Areas

Sage Scrub
- 5 : Laurel Sumac Scrub

Alluvial Scrub
- 6 : Scale Broom Scrub

Chaparral
- 8 : Chamise Chaparral
- 10 : Scrub Oak Chaparral
- 12 : Birch Leaf Mountain Mahogany Chaparral

Riparian Forest
- 18 : White Alder Grove–California Sycamore Woodland
- 19 : White Alder Grove–Willow Thicket
- 21 : California Sycamore Woodland–Red Willow Thicket
- 25 : Black Willow Thicket

Riparian Scrub
- 28 : Arroyo Willow Thicket
- 29 : Sandbar Willow Thicket
- 30 : Mulefat Thicket

Riparian Herb
- 33 : Smartweed–Cocklebur Patch

Seep
- 35 : Freshwater Seep

Forest/Woodland
- 37 : Coast Live Oak Woodland
- 38 : Bigcone Douglas Fir–Canyon Live Oak Forest

Cliff/Rock
- 47 : Cliff

Open Water
- 48 : Open Water

Alluvium
- 49 : Dry Wash

Other Landcover
- 50 : Disturbed

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Infrequent Long-Term, Large-Scale Maintenance Impacts (Sediment Removal)

Exhibit 20a

Big Tujunga Dam HCP

N W E S

600 300 0 600 Feet

PSOMAS

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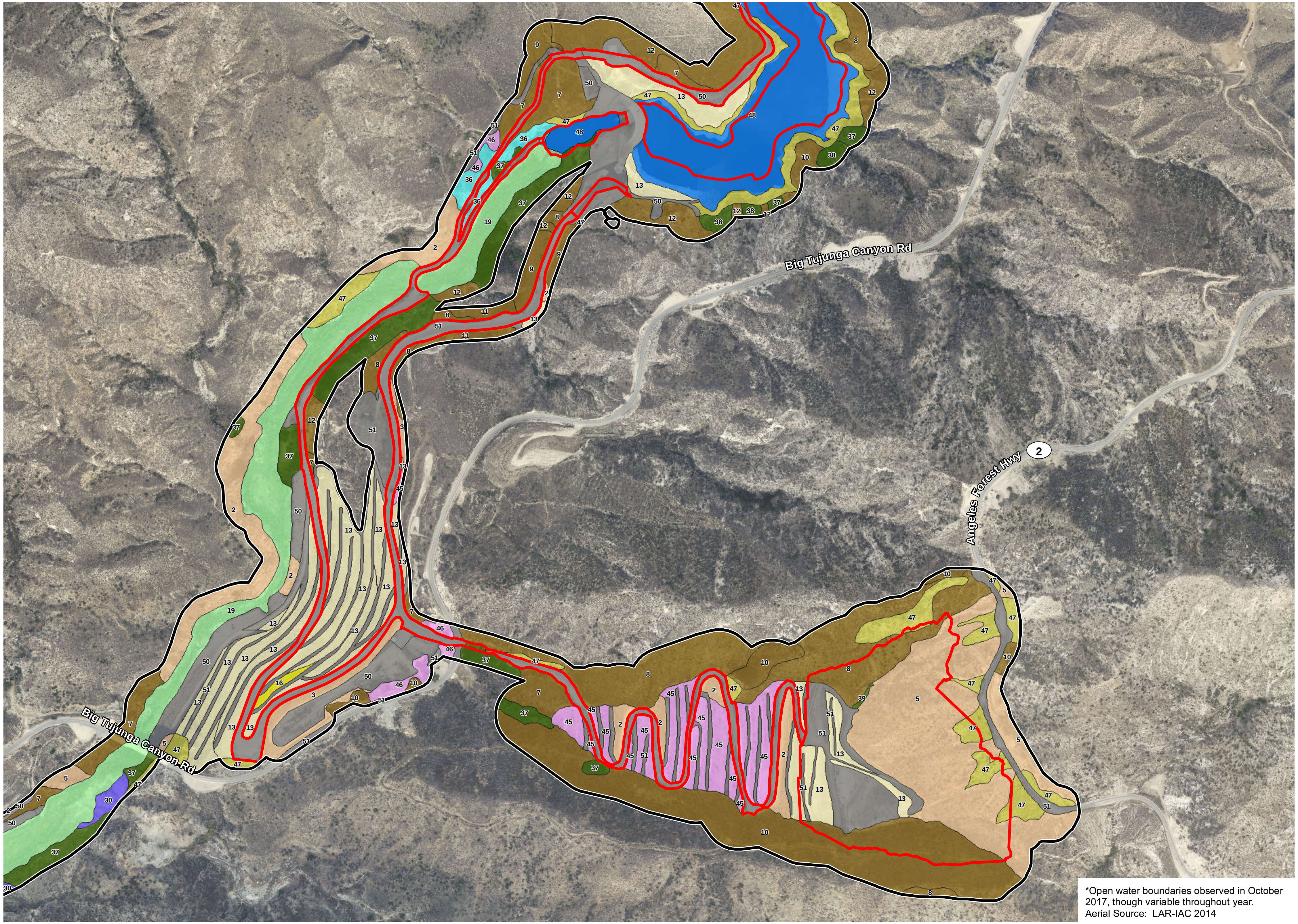
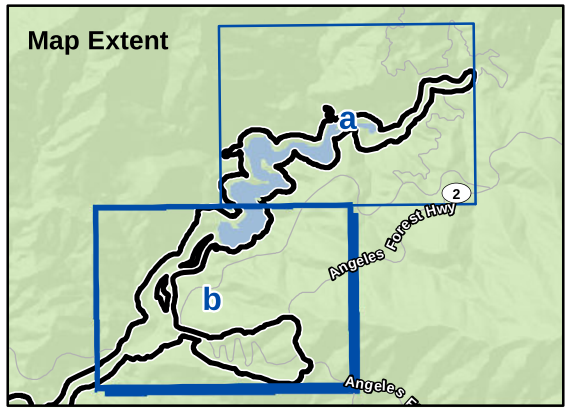


*Open water boundaries observed in October 2017, though variable throughout year.
Aerial Source: LAR-IAC 2014



Action Area

Impact Areas

Sediment Removal

Vegetation Types and Other Areas

Sage Scrub
- 2 : California Buckwheat Scrub
- 3 : Disturbed California Buckwheat Scrub
- 5 : Laurel Sumac Scrub

Chaparral
- 7 : Thick Leaf Yerba Santa Scrub
- 8 : Chamise Chaparral
- 9 : Chamise Chaparral–Thick Leaf Yerba Santa Scrub
- 10 : Scrub Oak Chaparral
- 11 : Hoary Leaf Ceanothus Chaparral
- 12 : Birch Leaf Mountain Mahogany Chaparral

Grassland
- 13 : Annual Brome Grassland

Ruderal
- 16 : Russian Thistle Field

Riparian Forest
- 19 : White Alder Grove–Willow Thicket

Riparian Scrub
- 30 : Mulefat Thicket

Seep
- 36 : Disturbed Freshwater Seep

Forest/Woodland
- 37 : Coast Live Oak Woodland
- 38 : Bigcone Douglas Fir–Canyon Live Oak Forest
- 39 : California Sycamore Woodland

Ornamental Plantings
- 45 : Native Planting
- 46 : Non-native Planting

Cliff/Rock
- 47 : Cliff

Open Water
- 48 : Open Water

Other Landcover
- 50 : Disturbed
- 51 : Developed/Ornamental

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Infrequent Long-Term, Large-Scale Maintenance Impacts (Sediment Removal)

Exhibit 20b

Big Tujunga Dam HCP

N W E S

600 300 0 600
Feet

PSOMAS

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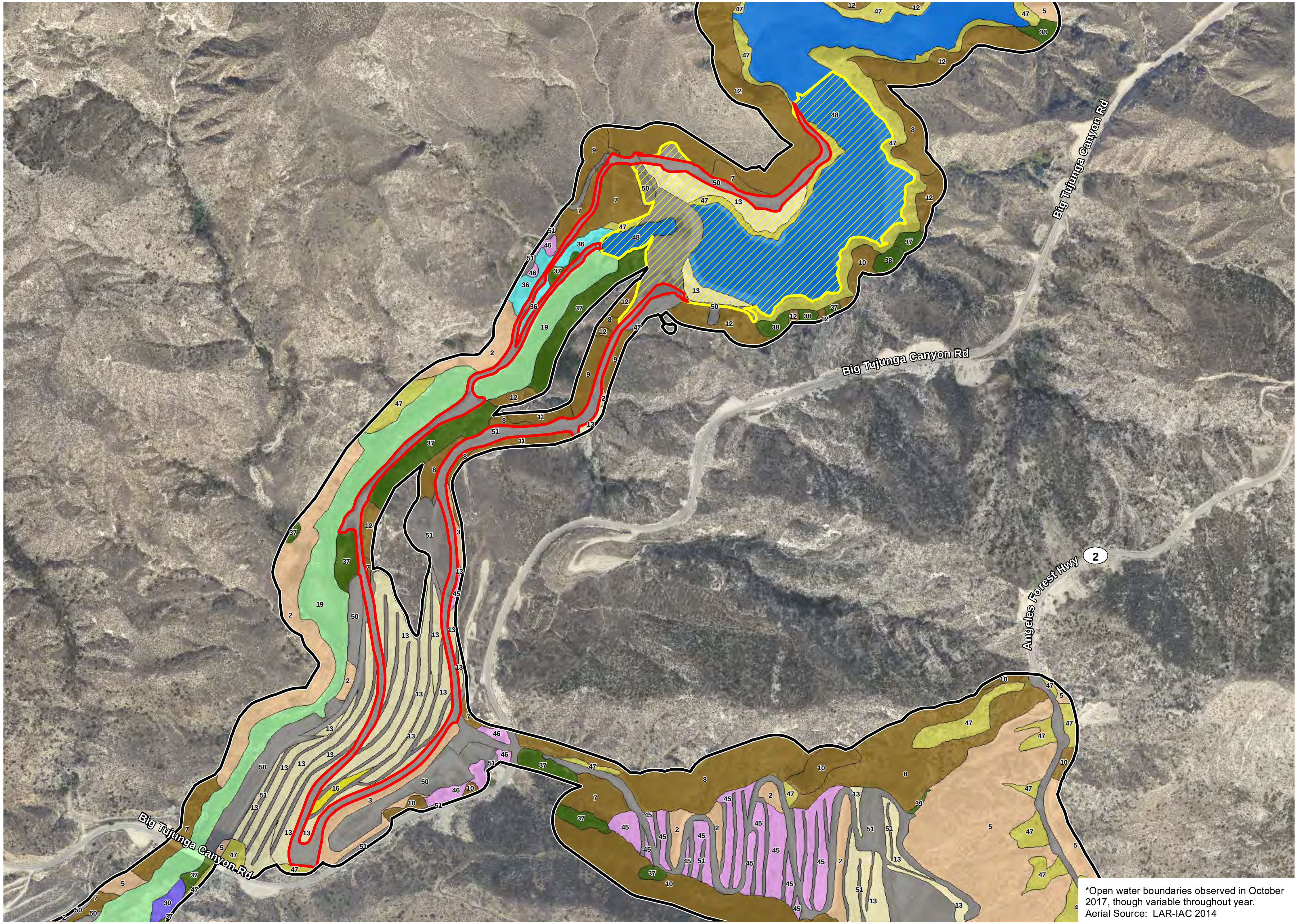

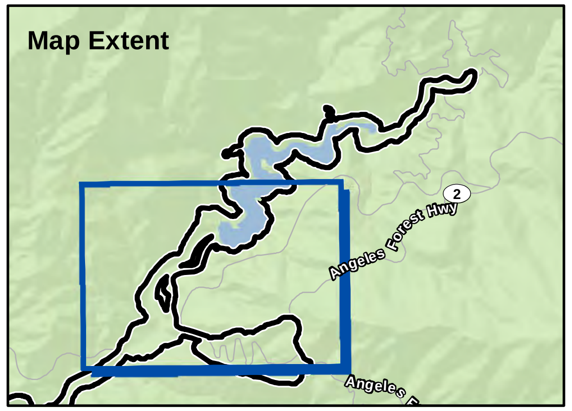

Action Area
Impact Areas
Access Roads/Boat Launch (Permanent)
Subsurface Grouting/Concrete Repair (Temporary)
Vegetation Types and Other Areas
Sage Scrub
2 : California Buckwheat Scrub
3 : Disturbed California Buckwheat Scrub
5 : Laurel Sumac Scrub
Chaparral
7 : Thick Leaf Yerba Santa Scrub
8 : Chamise Chaparral
9 : Chamise Chaparral–Thick Leaf Yerba Santa Scrub
10 : Scrub Oak Chaparral
11 : Hoary Leaf Ceanothus Chaparral
12 : Birch Leaf Mountain Mahogany Chaparral
Grassland
13 : Annual Brome Grassland
Ruderal
16 : Russian Thistle Field
Riparian Forest
19 : White Alder Grove–Willow Thicket
Riparian Scrub
30 : Mulefat Thicket
Seep
36 : Disturbed Freshwater Seep
Forest/Woodland
37 : Coast Live Oak Woodland
38 : Bigcone Douglas Fir–Canyon Live Oak Forest
39 : California Sycamore Woodland
Ornamental Plantings
45 : Native Planting
46 : Non-native Planting
Cliff/Rock
47 : Cliff
Open Water*
48 : Open Water
Other Landcover
50 : Disturbed
51 : Developed/Ornamental

*Open water boundaries observed in October 2017, though variable throughout year.
Aerial Source: LAR-IAC 2014

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Infrequent Long-Term, Large-Scale Maintenance Impacts (Subsurface Grouting/Concrete Repair)

Exhibit 21

Big Tujunga Dam HCP

N S W E
600 300 0 600
Feet

PSOMAS

(Rev: 05/07/2020 MMD) R:\Projects\DPW\3DPW028201\Graphics\HCP\

TABLE 21
INFREQUENT LONG-TERM, LARGE-SCALE MAINTENANCE IMPACTS

Vegetation Type or Landcover	Code	Sediment Removal				Subsurface Grouting/Concrete Repair			Total for Infrequent Long-Term, Large-Scale Maintenance		
		Sediment Removal/Reservoir Access Ramp-Temporary Impacts (acres)	Access Roads/Staging Areas/Slope Protection - Permanent Impacts (acres)	Sediment Placement Site-Permanent Impacts (acres)	Total (acres)	Permanent (acres)	Temporary (acres)	Total (acres)	Permanent (acres)	Temporary (acres)	Total (acres)[a]
Sage Scrub		**0.00**	**0.00**	**14.14**	**14.14**	**0.00**	**0.00**	**0.00**	**14.14**	**0.00**	**14.14**
Laurel Sumac Scrub	5	0.00	0.00	14.14	14.14	0.00	0.00	0.00	14.14	0.00	14.14
Chaparral		**0.13**	**0.00**	**6.32**	**6.45**	**0.00**	**0.00**	**0.00**	**6.32**	**0.13**	**6.45**
Chamise Chaparral	8	0.00	0.00	2.49	2.49	0.00	0.00	0.00	2.49	0.00	2.49
Scrub Oak Chaparral	10	0.00	0.00	3.83	3.83	0.00	0.00	0.00	3.83	0.00	3.83
Birch Leaf Mountain Mahogany Chaparral	12	0.13	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.13	0.13
Grassland		**0.58**	**0.00**	**2.68**	**3.26**	**0.00**	**3.20**	**3.20**	**2.68**	**3.20**	**5.88[a]**
Annual Brome Grassland	13	0.58	0.00	2.68	3.26	0.00	3.20	3.20	2.68	3.20	5.88[a]
Riparian Forest		**0.23**	**0.00**	**0.00**	**0.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.23**	**0.23**
White Alder Grove–Willow Thicket	19	0.06	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.06	0.06
Black Willow Thicket	25	0.17	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.17	0.17
Riparian Scrub		**0.69**	**0.00**	**0.00**	**0.69**	**0.00**	**0.00**	**0.00**	**0.00**	**0.69**	**0.69**
Arroyo Willow Thicket	28	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.23
Mulefat Thicket	30	0.46	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.46	0.46
Riparian Herb		**2.29**	**0.00**	**0.00**	**2.29**	**0.00**	**0.00**	**0.00**	**0.00**	**2.29**	**2.29**
Smartweed–Cocklebur Patch	33	2.29	0.00	0.00	2.29	0.00	0.00	0.00	0.00	2.29	2.29
Seep		**0.03**	**0.02**	**0.00**	**0.05**	**0.02**	**0.02**	**0.04**	**0.02**	**0.03**	**0.05[a]**
Freshwater Seep	35	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Disturbed Freshwater Seep	36	0.02	0.02	0.00	0.04	0.02	0.02	0.04	0.02	0.02	0.04[a]
Forest/Woodland		**0.11**	**0.10**	**0.08**	**0.29[b]**	**0.00**	**0.00**	**0.00**	**0.18**	**0.11**	**0.29**
Coast Live Oak Woodland	37	0.11	0.10	0.00	0.21[b]	0.00	0.00	0.00	0.10	0.11	0.21
California Sycamore Woodland	39	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.08	0.00	0.08
Ornamental Plantings		**0.00**	**0.11**	**0.00**	**0.11**	**0.00**	**0.00**	**0.00**	**0.11**	**0.00**	**0.11**
Non-native Planting	46	0.00	0.11	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.11
Rock/Cliff		**0.62**	**0.01**	**1.22**	**1.85**	**0.00**	**1.32**	**1.32**	**1.22**	**1.94**	**3.16[a]**
Cliff	47	0.62	0.01	1.22	1.85	0.00	1.32	1.32	1.22	1.94	3.16[a]
Open Water		**43.35**	**0.00**	**0.00**	**43.35**	**0.00**	**19.09**	**19.09**	**0.00**	**48.03**	**48.03[a]**
Open Water	48	43.35	0.00	0.00	43.35	0.00	19.09	19.09	0.00	48.03	48.03[a]
Alluvium		**3.08**	**0.00**	**0.00**	**3.08**	**0.00**	**0.00**	**0.00**	**0.00**	**3.08**	**3.08**
Dry Wash	49	3.08	0.00	0.00	3.08	0.00	0.00	0.00	0.00	3.08	3.08
Other Landcover		**0.31**	**20.76**	**5.23**	**26.30**	**12.75**	**4.24**	**16.99**	**26.27**	**3.98**	**30.25[a]**
Disturbed	50	0.18	5.19	0.00	5.37	1.89	0.80	2.69	5.19	0.56	5.75[a]
Developed/Ornamental	51	0.13	15.57	5.23	20.93	10.86	3.44	14.30	21.08	3.42	24.50[a]
Total		**51.42**	**21.00**	**29.67**	**102.09**	**12.77**	**27.87**	**40.64**	**50.94**	**63.71**	**114.65[a]**

[a] Subsurface regrouting and concrete repair project footprints overlap with the sediment removal footprint; therefore, the total column shows the total extent of area affected accounting for the overlap.
[b] The impact boundary and associated calculations show impacts to coast live oak woodland, however, the map is reflecting the oak tree canopy over the existing access road. These trees would not be removed, although they may need to be trimmed prior to or during projects to allow construction equipment to use the access road.

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4.1.5 SPILLWAY IMPROVEMENT PROJECT

The physical disturbance for the Spillway Improvement Project would be on the existing Dam structure and existing disturbed areas (e.g., access roads). The project would impact 21.59 acres (1.13 acres annual brome grassland, 0.02 acre disturbed freshwater seep, 0.11 acre coast live oak woodland, 0.11 acre non-native planting, 0.11 acre cliff, 1.16 acres open water, 3.97 acres disturbed, and 14.98 acres developed/ornamental) (Exhibit 22).

Construction of the Spillway Improvement Project would not require complete dewatering of the Reservoir; the Reservoir would be dewatered to the level of bedrock at elevation 2,250 feet. It is estimated that it would take two non-storm seasons to construct. Construction of the Spillway Improvement Project would reduce the availability of water for supplemental releases, but some supplemental releases could still occur.

Once the spillway is raised, the Reservoir would be capable of holding water up to 2,298 feet. Public Works expects the raised elevation to be used infrequently during large storms (e.g., 10-year storms and greater) and that the water would be held only until the spreading grounds downstream can accept water conservation releases. The Spillway Improvement Project would add 719 af of capacity to the Reservoir over 7.20 acres, which would impact 0.26 acre of laurel sumac scrub, 0.07 acre scale broom scrub, 0.51 acre thick leaf yerba santa scrub, 0.01 acre chamise chaparral, 0.17 acre scrub oak chaparral, 2.09 acres birch leaf mountain mahogany chaparral, 0.55 acre annual brome grassland, 0.28 acre white alder grove–willow thicket, 0.95 acre arroyo willow thicket, 0.13 acre sandbar willow thicket, 0.03 acre smartweed–cocklebur patch, 0.03 acre freshwater seep, 0.13 acre coast live oak woodland, 0.11 acre bigcone Douglas fir–canyon live oak forest, 1.13 acres cliff, 0.03 acre open water, 0.14 acre dry wash, 0.55 acre disturbed, and 0.03 acre developed/ornamental.

As discussed in Section 4.1.1, periodic disturbance of habitat is needed to maintain a mosaic of habitat types downstream. Raising the spillway 8 feet would increase the capacity of the Reservoir by 719 af, which would allow the Dam to capture more stormwater for water conservation purposes during more sizable events, which occur infrequently (i.e., approximately once every 10 years). Raising the spillway would not change operations or substantially increase the capacity to control storm flows that could go to spillway (i.e., inflows greater than 3,000 cfs), which occur about once every 25 years. Therefore, the downstream ecosystem would still be expected to experience floods that overtop the spillway approximately once every 25 years. For inflows from 500 cfs to 3,000 cfs, raising the spillway would not change the maximum flow rate released from Big Tujunga Dam, which would continue to be 500 cfs.

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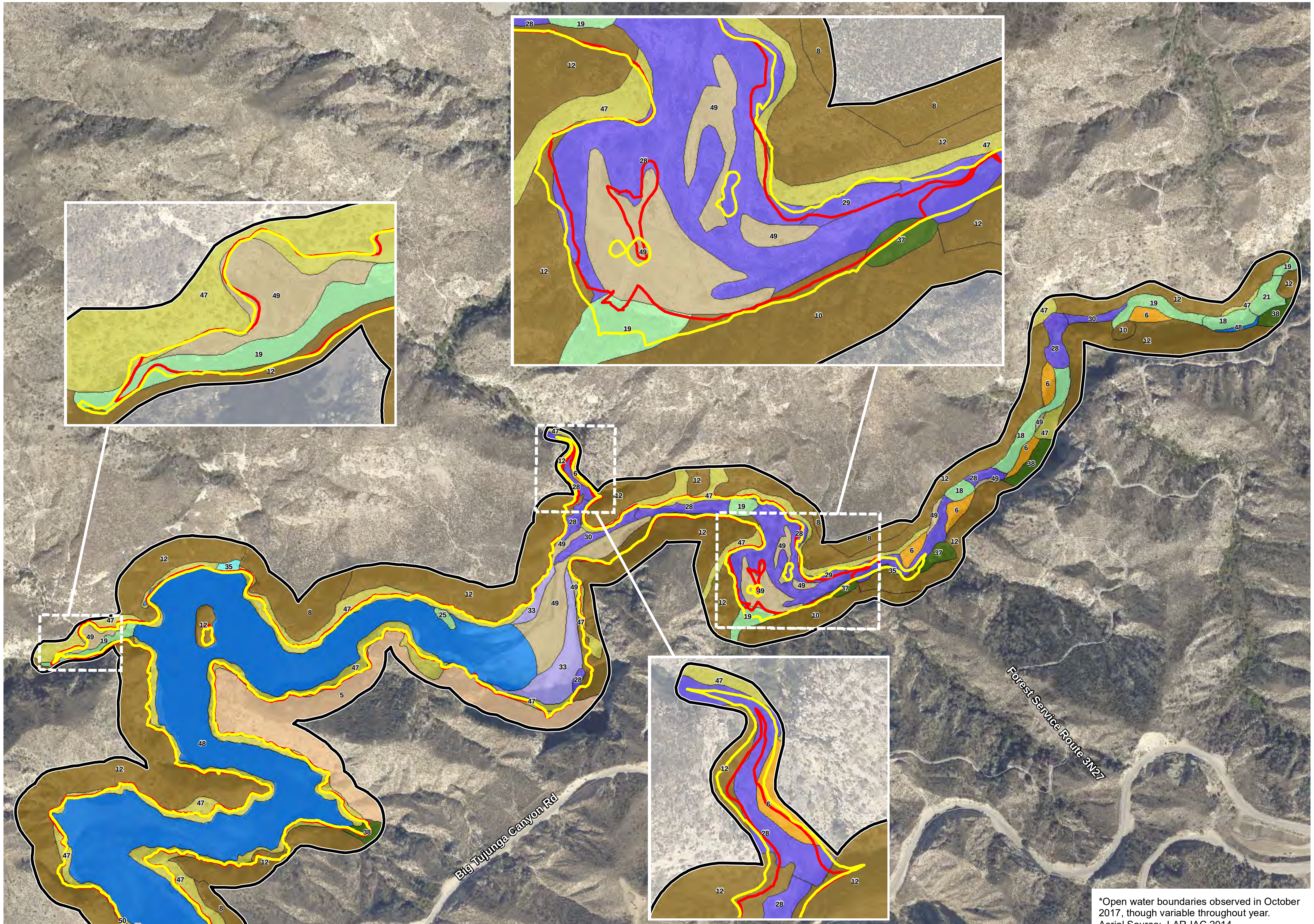

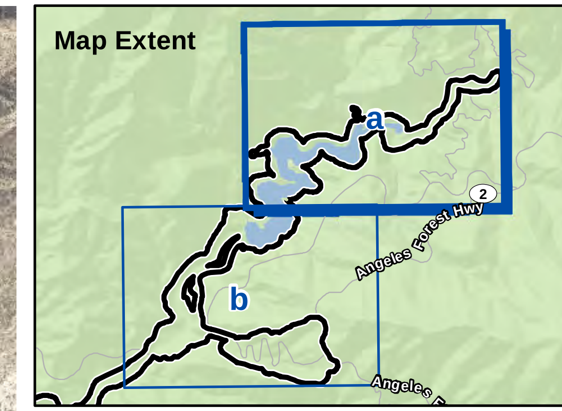

Action Area

Impact Areas

Existing Reservoir Footprint (Temporary Impact up to 2,290 feet)

Reservoir Footprint Following Spillway Improvement Project (Temporary Impact up to 2,298 feet)

Vegetation Types and Other Areas

Sage Scrub
5 : Laurel Sumac Scrub

Alluvial Scrub
6 : Scale Broom Scrub

Chaparral
8 : Chamise Chaparral
10 : Scrub Oak Chaparral
12 : Birch Leaf Mountain Mahogany Chaparral

Riparian Forest
18 : White Alder Grove–California Sycamore Woodland
19 : White Alder Grove–Willow Thicket
21 : California Sycamore Woodland–Red Willow Thicket
25 : Black Willow Thicket

Riparian Scrub
28 : Arroyo Willow
29 : Sandbar Willow Thicket
30 : Mulefat Thicket

Riparian Herb
33 : Smartweed–Cocklebur Patch

Seep
35 : Freshwater Seep

Forest/Woodland
37 : Coast Live Oak Woodland
38 : Bigcone Douglas Fir–Canyon Live Oak Forest

Cliff/Rock
47 : Cliff

Open Water*
48 : Open Water

Alluvium
49 : Dry Wash

Other Landcover
50 : Disturbed

*Open water boundaries observed in October 2017, though variable throughout year.
Aerial Source: LAR-IAC 2014

Spillway Improvement Project Impacts

Exhibit 22a

Big Tujunga Dam HCP

N W E S

600 300 0 600
Feet

PSOMAS

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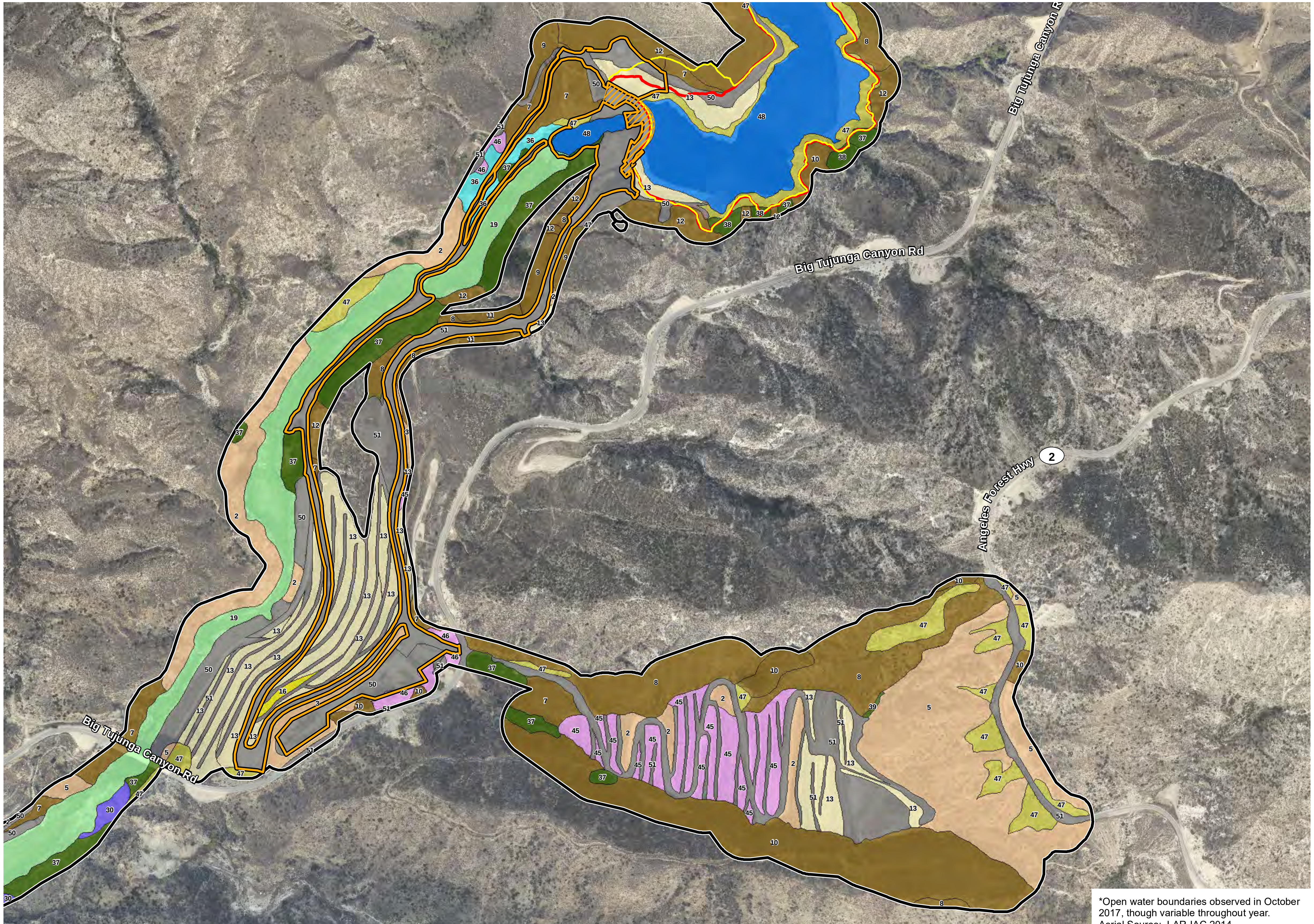

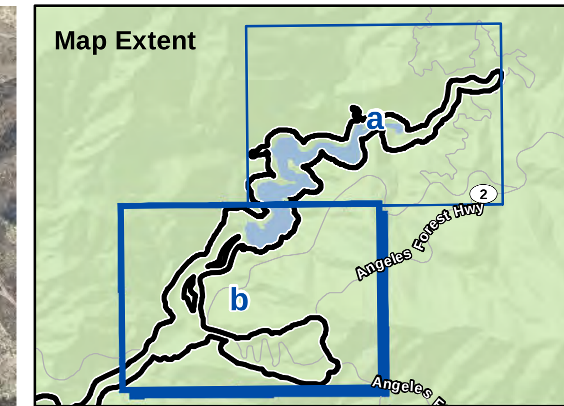

Action Area

Impact Areas

Existing Reservoir Footprint (Temporary Impact up to 2,290 feet)

Reservoir Footprint Following Spillway Improvement Project (Temporary Impact up to 2,298 feet)

Spillway Improvement Project Construction (Permanent)

Spillway Improvement Project Construction (Temporary)

Vegetation Types and Other Areas

Sage Scrub
- 2 : California Buckwheat Scrub
- 3 : Disturbed California Buckwheat Scrub
- 5 : Laurel Sumac Scrub

Chaparral
- 7 : Thick Leaf Yerba Santa Scrub
- 8 : Chamise Chaparral
- 9 : Chamise Chaparral–Thick Leaf Yerba Santa Scrub
- 10 : Scrub Oak Chaparral
- 11 : Hoary Leaf Ceanothus Chaparral
- 12 : Birch Leaf Mountain Mahogany Chaparral

Grassland
- 13 : Annual Brome Grassland

Ruderal
- 16 : Russian Thistle Field

Riparian Forest
- 19 : White Alder Grove–Willow Thicket

Riparian Scrub
- 30 : Mulefat Thicket

Seep
- 36 : Disturbed Freshwater Seep

Forest/Woodland
- 37 : Coast Live Oak Woodland
- 38 : Bigcone Douglas Fir–Canyon Live Oak Forest
- 39 : California Sycamore Woodland

Ornamental Plantings
- 45 : Native Planting
- 46 : Non-native Planting

Cliff/Rock
- 47 : Cliff

Open Water*
- 48 : Open Water

Other Landcover
- 50 : Disturbed
- 51 : Developed/Ornamental

Spillway Improvement Project Impacts

Big Tujunga Dam HCP

600 300 0 600 Feet

Exhibit 22b

PSOMAS

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TABLE 22
SPILLWAY IMPROVEMENT PROJECT IMPACTS

Vegetation Type or Landcover	Code	Spillway Improvement Construction		Additional Reservoir Footprint - Temporary Impacts (acres)	Total Spillway Improvement Project		
		Permanent (acres)	Temporary (acres)		Permanent (acres)	Temporary (acres)	Total (acres) [a]
Sage Scrub		**0.00**	**0.00**	**0.26**	**0.00**	**0.26**	**0.26**
Disturbed California Buckwheat Scrub	3	0.00	0.00	0.00	0.00	0.00	0.00
Laurel Sumac Scrub	5	0.00	0.00	0.26	0.00	0.26	0.26
Alluvial Scrub		**0.00**	**0.00**	**0.07**	**0.00**	**0.07**	**0.07**
Scale Broom Scrub	6	0.00	0.00	0.07	0.00	0.07	0.07
Chaparral		**0.00**	**0.00**	**2.78**	**0.00**	**2.78**	**2.78**
Thick Leaf Yerba Santa Scrub	7	0.00	0.00	0.51	0.00	0.51	0.51
Chamise Chaparral	8	0.00	0.00	0.01	0.00	0.01	0.01
Scrub Oak Chaparral	10	0.00	0.00	0.17	0.00	0.17	0.17
Birch Leaf Mountain Mahogany Chaparral	12	0.00	0.00	2.09	0.00	2.09	2.09
Grassland		**0.00**	**1.13**	**0.55**	**0.00**	**1.29**	**1.29**[a]
Annual Brome Grassland	13	0.00	1.13	0.55	0.00	1.29	1.29[a]
Riparian Forest		**0.00**	**0.00**	**0.28**	**0,00**	**0.28**	**0.28**
White Alder Grove–Willow Thicket	19	0.00	0.00	0.28	0.00	0.28	0.28
Riparian Scrub		**0.00**	**0.00**	**1.08**	**0.00**	**1.08**	**1.08**
Arroyo Willow Thicket	28	0.00	0.00	0.95	0.00	0.95	0.95
Sandbar Willow Thicket	29	0.00	0.00	0.13	0.00	0.13	0.13
Riparian Herb		**0.00**	**0.00**	**0.03**	**0.00**	**0.03**	**0.03**
Smartweed–Cocklebur Patch	33	0.00	0.00	0.03	0.00	0.03	0.03
Seep		**0.00**	**0.02**	**0.03**	**0.00**	**0.05**	**0.05**
Freshwater Seep	35	0.00	0.00	0.03	0.00	0.03	0.03
Disturbed Freshwater Seep	36	0.00	0.02	0.00	0.00	0.02	0.02
Forest/Woodland		**0.00**	**0.11**[b]	**0.24**	**0.00**	**0.35**	**0.35**[b]
Coast Live Oak Woodland	37	0.00	0.11[b]	0.13	0.00	0.24	0.24[b]
Bigcone Douglas Fir–Canyon Live Oak Forest	38	0.00	0.00	0.11	0.00	0.11	0.11
Ornamental Plantings		**0.00**	**0.11**	**0.00**	**0.00**	**0.11**	**0.11**
Non-native Planting	46	0.00	0.11	0.00	0.00	0.11	0.11
Rock/Cliff		**0.00**	**0.11**	**1.13**	**0.00**	**1.24**	**1.24**
Cliff	47	0.00	0.11	1.13	0.00	1.24	1.24
Open Water		**0.00**	**1.16**	**0.03**	**0.00**	**1.19**	**1.19**
Open Water	48	0.00	1.16	0.03	0.00	1.19	1.19
Alluvium		**0.00**	**0.00**	**0.14**	**0.00**	**0.14**	**0.14**
Dry Wash	49	0.00	0.00	0.14	0.00	0.14	0.14
Other Landcover		**1,17**	**17.78**	**0.58**	**1.17**	**18.10**	**19.27**[a]
Disturbed	50	0.00	3.97	0.55	0.00	4.29	4.29[a]
Developed/Ornamental	51	1.17	13.81	0.03	1.17	13.81	14.98[a]
Total		**1.17**	**20.42**	**7.20**	**1.17**	**26.97**	**28.14**[a]

[a] Spillway improvement project and additional reservoir impacts overlap; therefore, the total column shows the total extent of area affected accounting for the overlap.
[b] The impact boundary and associated calculations show impacts to coast live oak woodland, however, the map is reflecting the oak tree canopy over the existing access road. These trees would not be removed, although they may need to be trimmed prior to or during projects to allow construction equipment to use the access road.

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4.1.6 FUTURE TRANSLOCATION

The future translocation of Covered Fish species by another entity would not involve physical disturbance; however, the Reservoir footprint would change during normal operations described in Sections 4.1.1 to 4.1.3 and when the Reservoir needs to be adjusted to complete maintenance projects described in Section 4.1.4. The total Reservoir footprint is currently 85.70 acres (up to elevation 2,290 feet) and would be 92.90 acres following construction of the Spillway Improvement Project (up to elevation 2,298 feet) (Table 23). The length of stream within the Reservoir footprint that would be affected by Reservoir fluctuation is 2.06 stream miles (i.e., Dam to elevation 2,298 feet at the upper end of the Reservoir) (Exhibit 23).

TABLE 23
FUTURE TRANSLOCATION IMPACT AREA WITHIN RESERVOIR FOOTPRINT

Vegetation Type or Landcover	Code	Existing Reservoir Footprint - Temporary Impacts (acres)	Additional Reservoir Footprint Impact Following Spillway Improvement Project- Temporary Impacts (acres)	Total Future Translocation Impact (acres)
Sage Scrub		**0.33**	**0.26**	**0.59**
Laurel Sumac Scrub	5	0.33	0.26	0.59
Alluvial Scrub		**0.07**	**0.07**	**0.14**
Scale Broom Scrub	6	0.07	0.07	0.14
Chaparral		**3.00**	**2.78**	**5.78**
Thick Leaf Yerba Santa Scrub	7	0.00	0.51	0.51
Chamise Chaparral	8	0.02	0.01	0.03
Scrub Oak Chaparral	10	0.16	0.17	0.33
Birch Leaf Mountain Mahogany Chaparral	12	2.82	2.09	4.91
Grassland		**2.32**	**0.55**	**2.87**
Annual Brome Grassland	13	2.32	0.55	2.87
Riparian Forest		**0.99**	**0.28**	**1.27**
White Alder Grove–Willow Thicket	19	0.82	0.28	1.10
Black Willow Thicket	25	0.17	0.00	0.17
Riparian Scrub		**5.37**	**1.08**	**6.45**
Arroyo Willow Thicket	28	4.74	0.95	5.69
Sandbar Willow Thicket	29	0.03	0.13	0.16
Mulefat Thicket	30	0.60	0.00	0.60
Riparian Herb		**2.67**	**0.03**	**2.70**
Smartweed–Cocklebur Patch	33	2.67	0.03	2.70
Seep		**0.01**	**0.03**	**0.04**
Freshwater Seep	35	0.01	0.03	0.04
Forest/Woodland		**0.41**	**0.24**	**0.65**
Coast Live Oak Woodland	37	0.10	0.13	0.23
Bigcone Douglas Fir–Canyon Live Oak Forest	38	0.31	0.11	0.42

TABLE 23
FUTURE TRANSLOCATION IMPACT AREA WITHIN RESERVOIR FOOTPRINT

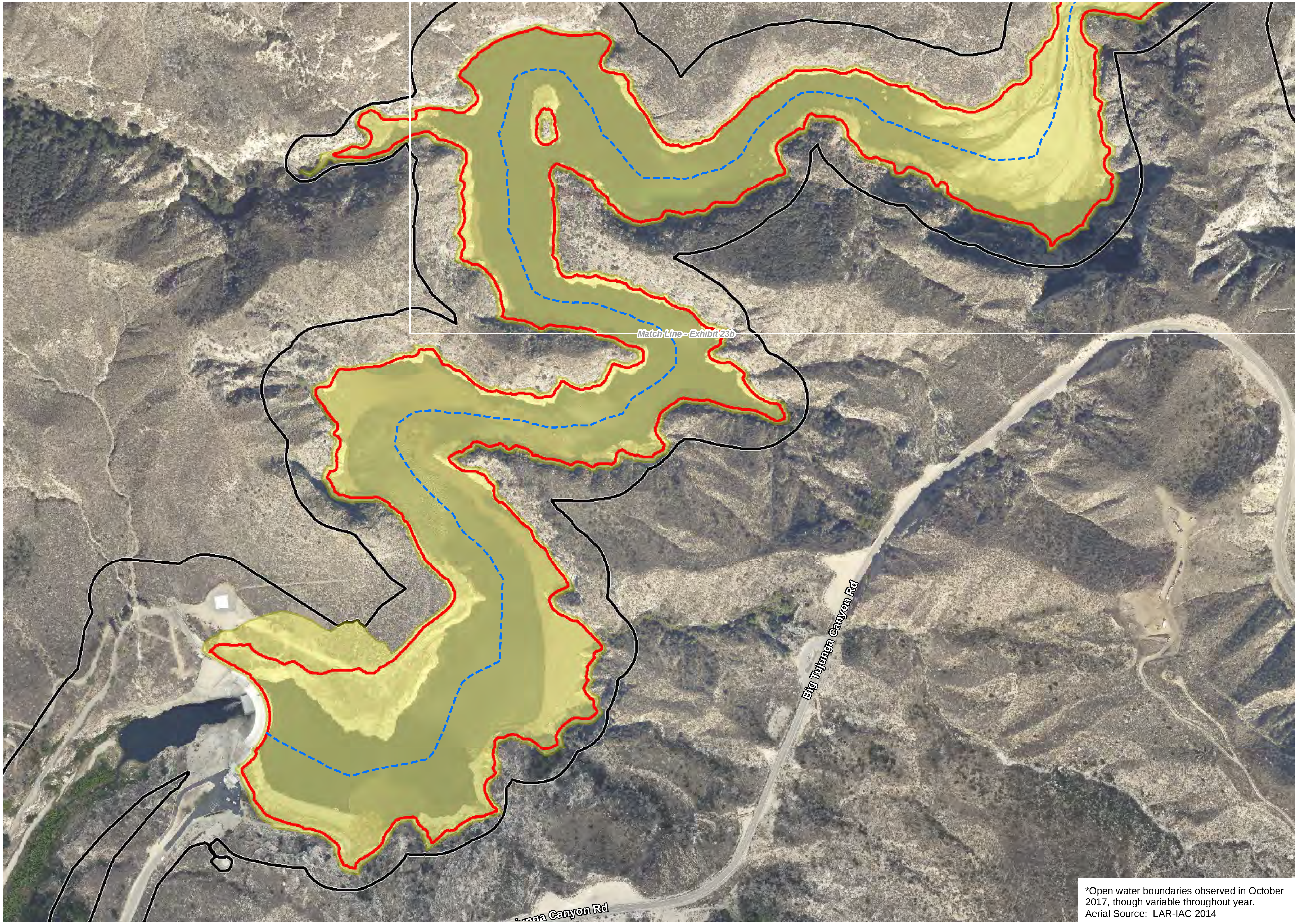
Vegetation Type or Landcover	Code	Existing Reservoir Footprint - Temporary Impacts (acres)	Additional Reservoir Footprint Impact Following Spillway Improvement Project-Temporary Impacts (acres)	Total Future Translocation Impact (acres)
Rock/Cliff		**12.18**	**1.13**	**13.31**
Cliff	47	12.18	1.13	13.31
Open Water		**51.52**	**0.03**	**51.55**
Open Water	48	51.52	0.03	51.55
Alluvium		**5.50**	**0.14**	**5.64**
Dry Wash	49	5.50	0.14	5.64
Other Landcover		**1.33**	**0.58**	**1.91**
Disturbed	50	1.17	0.55	1.72
Developed/Ornamental	51	0.16	0.03	0.19
Total		**85.70**	**7.20**	**92.90**

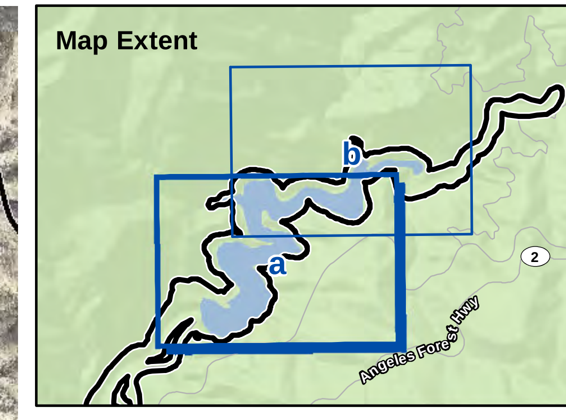
4.1.7 MITIGATION PROGRAM EFFECTS

The mitigation program involves monitoring species populations and the associated biological community to inform Adaptive Management (i.e., OPER-4; see Section 5). There is no plan to conduct revegetation or enhancement at a specific mitigation site. Avoidance and minimization measures would all occur within the impact areas identified above for each project. Therefore, there is no additional area of physical disturbance attributable to mitigation program effects.

4.1.8 SUMMARY OF PHYSICAL EFFECTS

Many of the Covered Activities described in this section overlap. Table 24 summarizes the physical impact of each project, and Exhibit 24 shows the total footprint of all projects combined; where permanent and temporary impacts overlap, impacts are counted as permanent.





Action Area

Impact Areas

Existing Reservoir Footprint (Temporary up to 2,290 feet)

Reservoir Footprint Following Spillway Improvement Project (Temporary up to 2,298 feet)

*Open water boundaries observed in October 2017, though variable throughout year.
Aerial Source: LAR-IAC 2014

Future Translocation Impacts

Exhibit 23a

Big Tujunga Dam HCP

N W E S

400 200 0 400 Feet

PSOMAS

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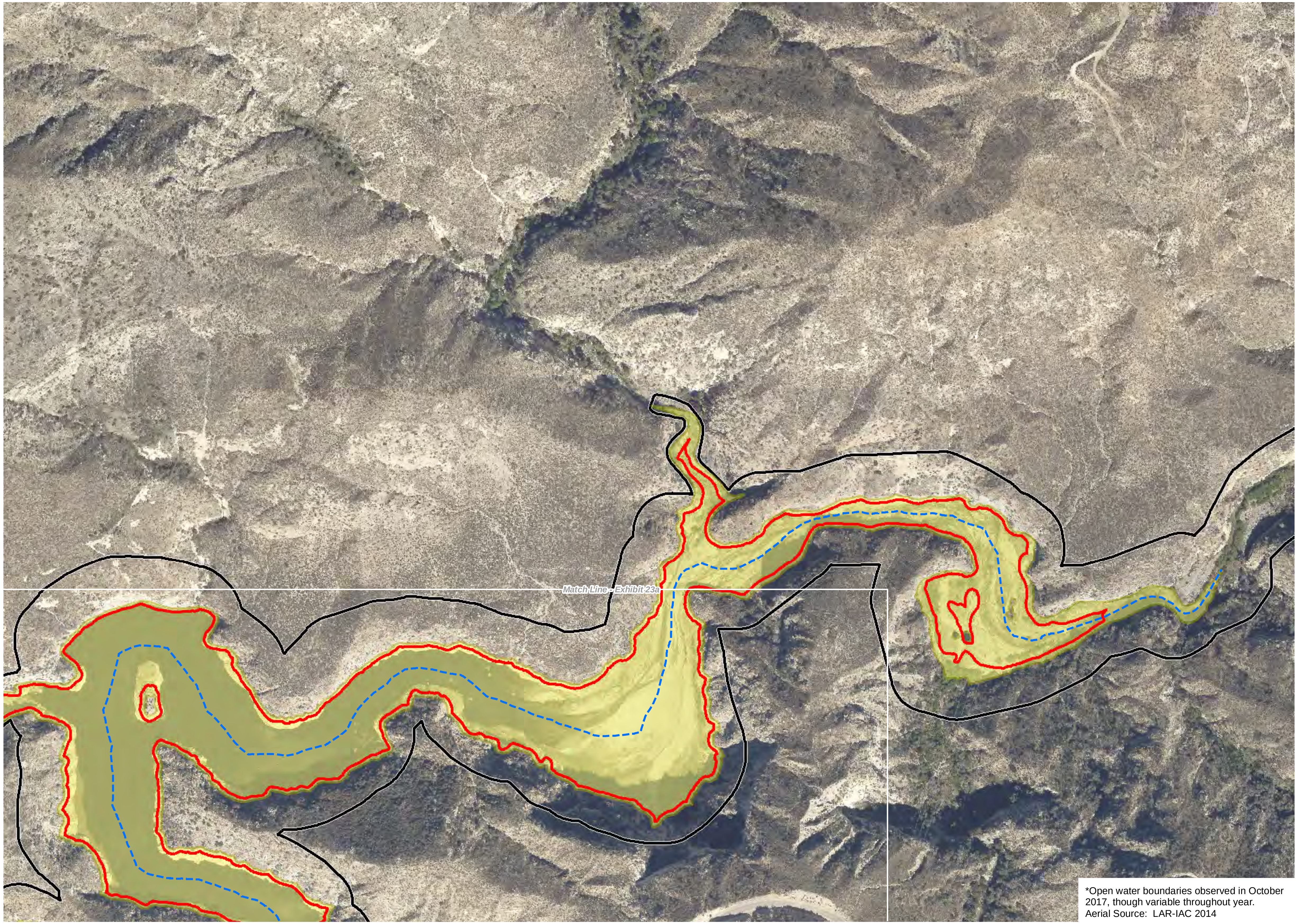

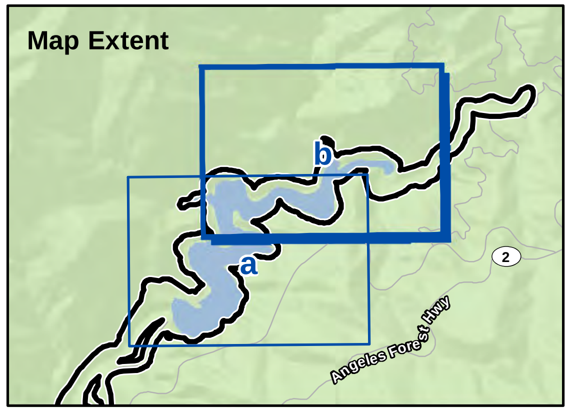

Action Area

Impact Areas

Existing Reservoir Footprint
(Temporary up to 2,290 feet)

Reservoir Footprint Following Spillway Improvement Project
(Temporary up to 2,298 feet)

*Open water boundaries observed in October 2017, though variable throughout year.
Aerial Source: LAR-IAC 2014

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Future Translocation Impacts

Exhibit 23b

Big Tujunga Dam HCP

N W E S

400 200 0 400
Feet

PSOMAS

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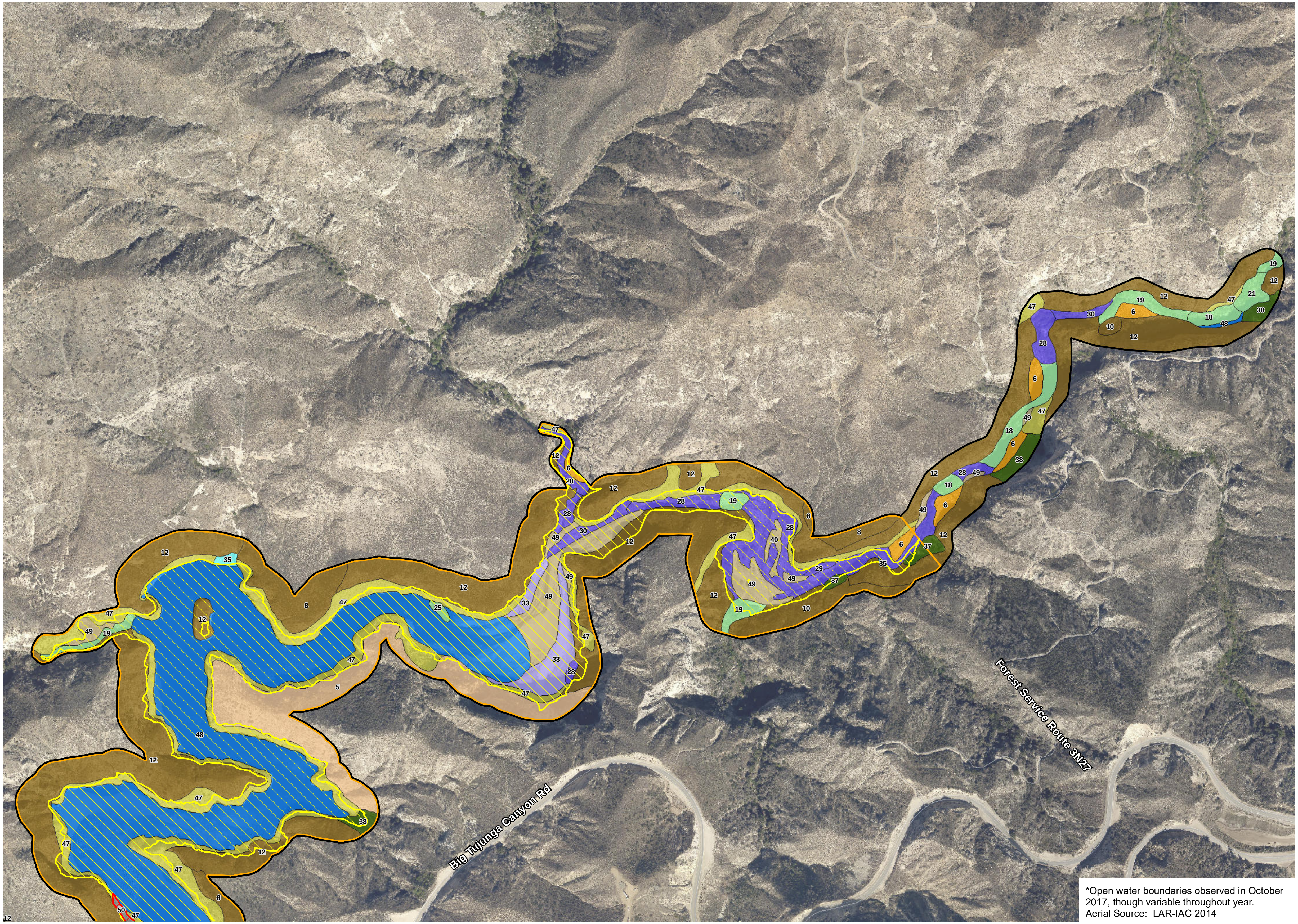

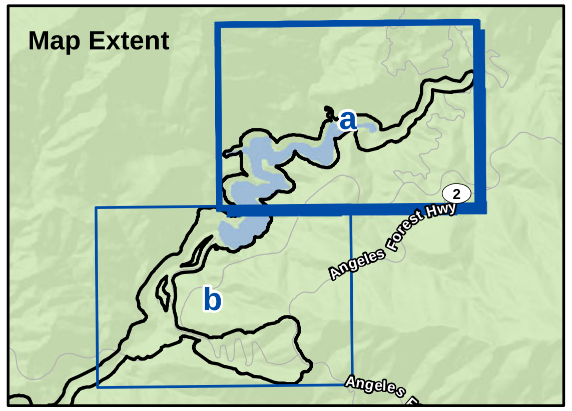

- HCP Study Area
- Action Area

Impact Areas

- Permanent Impacts
- Temporary Impacts

Vegetation Types and Other Areas

- Sage Scrub
  - 5 : Laurel Sumac Scrub
- Alluvial Scrub
  - 6 : Scale Broom Scrub
- Chaparral
  - 8 : Chamise Chaparral
  - 10 : Scrub Oak Chaparral
  - 12 : Birch Leaf Mountain Mahogany Chaparral
- Riparian Forest
  - 18 : White Alder Grove–California Sycamore Woodland
  - 19 : White Alder Grove–Willow Thicket
  - 21 : California Sycamore Woodland–Red Willow Thicket
  - 25 : Black Willow Thicket
- Riparian Scrub
  - 28 : Arroyo Willow
  - 29 : Sandbar Willow Thicket
  - 30 : Mulefat Thicket
- Riparian Herb
  - 33 : Smartweed–Cocklebur Patch
- Seep
  - 35 : Freshwater Seep
- Forest/Woodland
  - 37 : Coast Live Oak Woodland
  - 38 : Bigcone Douglas Fir–Canyon Live Oak Forest
- Cliff/Rock
  - 47 : Cliff
- Open Water*
  - 48 : Open Water
- Alluvium
  - 49 : Dry Wash
- Other Landcover
  - 50 : Disturbed

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Project Impacts (All Maintenance Projects and Spillway Improvement Project)

Exhibit 24a

Big Tujunga Dam HCP

N W E S

600 300 0 600 Feet

PSOMAS

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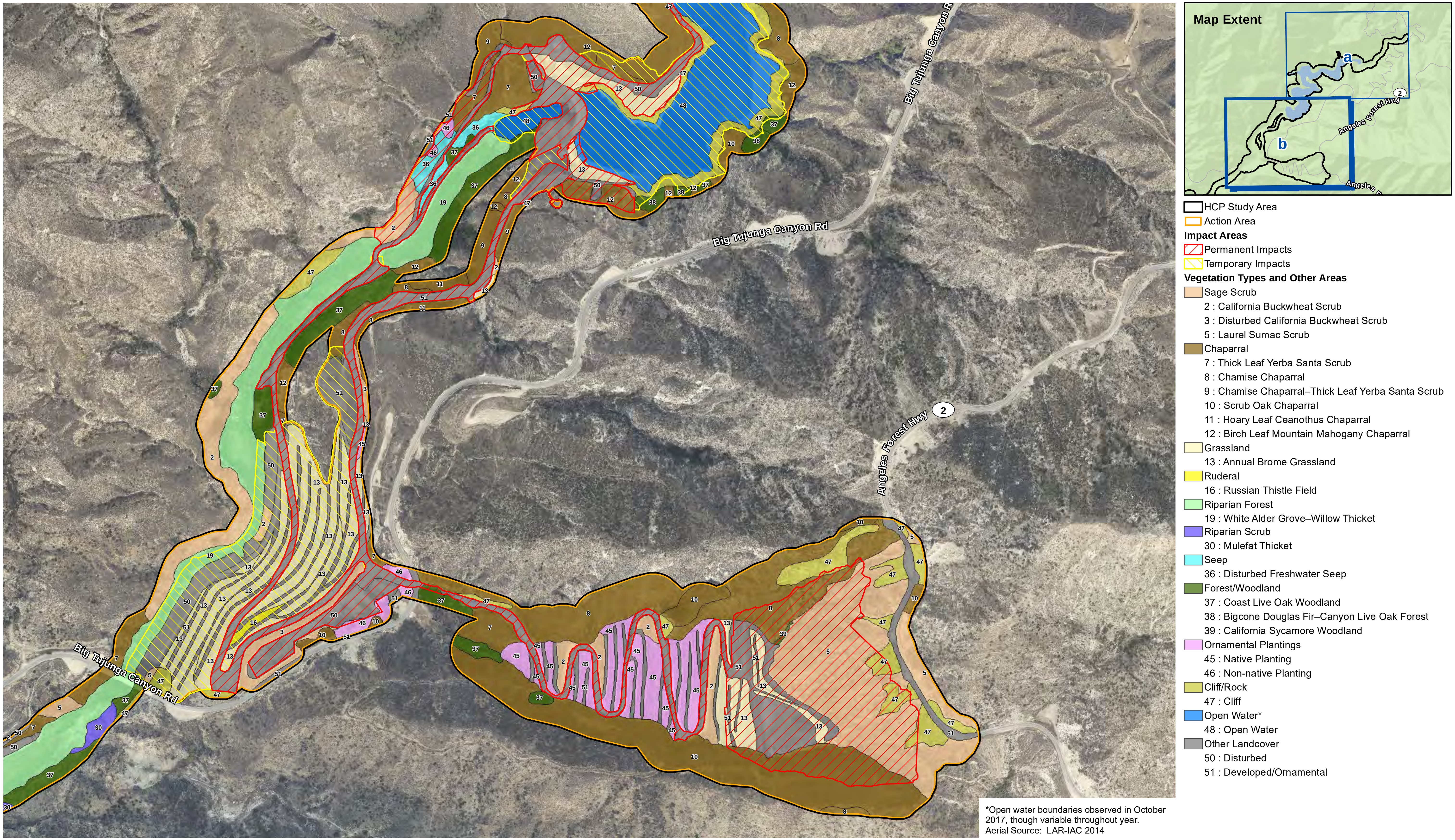

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Project Impacts (All Maintenance Projects and Spillway Improvement Project)

Exhibit 24b

Big Tujunga Dam HCP

N W E S

600 300 0 600

Feet

PSOMAS

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TABLE 24
SUMMARY OF PHYSICAL DISTURBANCE

Vegetation Type or Landcover	Code	Existing Vegetation in the Study Area (acres)	Total Regular Short-Term, Small-Scale Maintenance		Total Infrequent Short-Term, Small-Scale Maintenance		Total Infrequent Long-Term, Large-Scale Maintenance		Total Spillway Improvement Project/ Additional Reservoir Footprint		Future Translocation Area		Grand Total Impact		
			Permanent Impacts (acres)	Temporary Impacts (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Existing Reservoir Temporary Impacts (acres)	Additional Reservoir After Spillway Improvement Project Temporary Impacts (acres)	Permanent (acres)[a]	Temporary (acres)[a]	Total (acres)[a]
Sage Scrub		**207.22**	**0.00**	**0.00**	**1.18**	**0.41**	**14.14**	**0.00**	**0.00**	**0.26**	**0.33**	**0.26**	**15.32**	**1.00**	**16.32[a]**
California Buckwheat Scrub	2	20.30	0.00	0.00	1.18	0.30	0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.30	1.48
Disturbed California Buckwheat Scrub	3	2.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Laurel Sumac Scrub	5	127.89	0.00	0.00	0.00	0.11	14.14	0.00	0.00	0.26	0.33	0.26	14.14	0.70	14.84[a]
Alluvial Scrub		**493.72**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.07**	**0.07**	**0.00**	**0.14**	**0.14**
Scale Broom Scrub	6	493.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.07	0.00	0.14	0.14
Chaparral		**154.15**	**0.00**	**0.00**	**2.07**	**0.16**	**6.32**	**0.13**	**0.00**	**2.78**	**3.00**	**5.78**	**8.39**	**5.77**	**14.16[a]**
Thick Leaf Yerba Santa Scrub	7	20.28	0.00	0.00	0.85	0.03	0.00	0.00	0.00	0.51	0.00	0.51	0.85	0.54	1.39[a]
Chamise Chaparral	8	25.80	0.00	0.00	0.00	0.13	2.49	0.00	0.00	0.01	0.02	0.01	2.49	0.16	2.65[a]
Scrub Oak Chaparral	10	25.12	0.00	0.00	0.00	0.00	3.83	0.00	0.00	0.17	0.16	0.17	3.83	0.33	4.16[a]
Birch Leaf Mountain Mahogany Chaparral	12	78.98	0.00	0.00	1.22	0.00	0.00	0.13	0.00	2.09	2.82	2.09	1.22	4.74	5.96[a]
Grassland		**49.98**	**2.98**	**0.00**	**0.28**	**14.08**	**2.68**	**3.20[a]**	**0.00**	**1.29**	**2.32**	**0.55**	**5.87**	**14.09**	**19.96[a]**
Annual Brome Grassland	13	33.61	2.98	0.00	0.28	13.71	2.68	3.20[a]	0.00	1.29	2.32	0.55	5.87	13.72	19.59[a]
Russian Thistle Field	16	1.67	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.37
Riparian Forest		**690.71**	**0.00**	**0.00**	**0.00**	**2.69**	**0.00**	**0.23**	**0.00**	**0.28**	**0.99**	**0.28**	**0.00**	**4.00**	**4.00[a]**
White Alder Grove–Willow Thicket	19	66.59	0.00	0.00	0.00	2.69	0.00	0.06	0.00	0.28	0.82	0.28	0.00	3.83	3.83[a]
Black Willow Thicket	25	236.57	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.17	0.00	0.00	0.17	0.17[a]
Riparian Scrub		**142.48**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.69**	**0.00**	**1.08**	**5.37**	**1.08**	**0.00**	**6.45**	**6.45[a]**
Arroyo Willow Thicket	28	7.67	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.95	4.74	0.95	0.00	5.69	5.69[a]
Sandbar Willow Thicket	29	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.13	0.00	0.16	0.16[a]
Mulefat Thicket	30	35.21	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.60	0.00	0.00	0.60	0.60[a]
Riparian Herb		**2.71**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.29**	**0.00**	**0.03**	**2.67**	**0.03**	**0.00**	**2.70**	**2.70[a]**
Smartweed–Cocklebur Patch	33	2.71	0.00	0.00	0.00	0.00	0.00	2.29	0.00	0.03	2.67	0.03	0.00	2.70	2.70[a]
Seep		**2.05**	**0.00**	**0.00**	**0.82**	**0.00**	**0.02**	**0.03[a]**	**0.00**	**0.05**	**0.01**	**0.03**	**0.84**	**0.06**	**0.90[a]**
Freshwater Seep	35	0.23	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.03	0.00	0.04	0.04[a]
Disturbed Freshwater Seep	36	1.82	0.00	0.00	0.82	0.00	0.02	0.02[a]	0.00	0.02	0.00	0.00	0.84	0.02	0.86[a]
Forest/Woodland		**96.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.18**	**0.11**	**0.00**	**0.35**	**0.41**	**0.24**	**0.18**	**0.76**	**0.94[a]**
Coast Live Oak Woodland	37	84.04	0.00	0.00	0.00	0.00	0.10	0.11	0.00	0.24	0.10	0.13	0.10	0.34	0.44[a]
Bigcone Douglas Fir–Canyon Live Oak Forest	38	9.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.31	0.11	0.00	0.42	0.42[a]

TABLE 24
FUTURE TRANSLOCATION IMPACT AREA WITHIN RESERVOIR FOOTPRINT

Vegetation Type or Landcover	Code	Existing Vegetation in the Study Area (acres)	Total Regular Short-Term, Small-Scale Maintenance		Total Infrequent Short-Term, Small-Scale Maintenance		Total Infrequent Long-Term, Large-Scale Maintenance		Total Spillway Improvement Project/ Additional Reservoir Footprint		Future Translocation Area		Grand Total Impact		
			Permanent Impacts (acres)	Temporary Impacts (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Existing Reservoir Temporary Impacts (acres)	Additional Reservoir After Spillway Improvement Project Temporary Impacts (acres)	Permanent (acres)[a]	Temporary (acres)[a]	Total (acres)[a]
California Sycamore Woodland	39	2.68	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08
Ornamental Plantings		**19.55**	**0.00**	**0.00**	**0.29**	**0.00**	**0.11**	**0.00**	**0.00**	**0.11**	**0.00**	**0.00**	**0.40**	**0.00**	**0.40**[a]
Non-native Planting	46	10.00	0.00	0.00	0.29	0.00	0.11	0.00	0.00	0.11	0.00	0.00	0.40	0.00	0.40[a]
Rock/Cliff		**35.70**	**0.00**	**0.00**	**0.22**[a]	**0.49**[a]	**1.22**	**1.94**[a]	**0.00**	**1.24**	**12.18**	**1.13**	**1.44**	**13.69**	**15.13**[a]
Cliff	47	35.70	0.00	0.00	0.22[a]	0.49[a]	1.22	1.94[a]	0.00	1.24	12.18	1.13	1.44	13.69	15.13[a]
Open Water		**91.85**		**0.85**	**0.18**	**0.00**	**0.00**	**48.03**[a]	**0.00**	**1.19**	**51.52**	**0.03**	**0.19**	**52.54**	**52.73**[a]
Open Water	48	91.85		0.85	0.18	0.00	0.00	48.03[a]	0.00	1.19	51.52	0.03	0.19	52.54	52.73[a]
Alluvium		**10.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.08**	**0.00**	**0.14**	**5.50**	**0.14**	**0.00**	**5.64**	**5.64**[a]
Dry Wash	49	10.12	0.00	0.00	0.00	0.00	0.00	3.08	0.00	0.14	5.50	0.14	0.00	5.64	5.64[a]
Other Landcover		**321.94**	**2.36**	**0.00**	**4.07**[a]	**22.85**[a]	**26.27**	**3.98**[a]	**0.00**	**18.10**	**1.33**	**0.58**	**30.31**	**12.01**	**42.32**[a]
Disturbed	50	54.27	2.34	0.00	0.40[a]	3.91[a]	5.19	0.56[a]	0.00	4.29	1.17	0.55	5.83	3.75	9.58[a]
Developed/Ornamental	51	267.67	0.02	0.00	3.47[a]	19.13[a]	21.08	3.42	1.17	13.81	0.16	0.03	24.48	8.26	32.74[a]
Total		**2,334.09**	**5.34**	**0.85**	**8.91**[a]	**40.87**[a]	**50.94**	**63.71**	**1.17**	**26.96**	**85.70**	**7.20**	**62.94**	**118.85**	**181.79**[a]

[a] Project impacts overlap; therefore, the total column shows the total extent of area affected accounting for the overlap. Where permanent and temporary impacts for different projects overlap, the table shows it as permanent; refer to the earlier tables for details.

4.2 BIOLOGICAL EFFECTS TO COVERED FISH SPECIES

4.2.1 FLOOD CONTROL OPERATIONS

Santa Ana sucker, arroyo chub, and Santa Ana speckled dace are adapted to Southern California river systems with highly variable flows during the rainy season and have persisted over time despite repeated flood events. Since these Covered Fish withstand high flows under natural storm conditions, flood control releases are not expected to substantially affect these species by moving them downstream. During storms and associated flood control releases, adult and juvenile fish would be expected to find refuge in edgewater or under boulders while high flows are occurring and emerge once flows have subsided. Recent studies on Santa Ana sucker have shown that they select flows of 0.7 to 5.25 fps, while arroyo chub select flows of 0.6 to 1.9 fps (Brown et al. 2019). The study did not include Santa Ana speckled dace because the species does not occur in the area where the study was conducted (i.e., Santa Ana River); however, dace typically prefer habitat similar to Santa Ana sucker. HEC-RAS results for a 600-cfs modeled flow release show that stream edgewater velocity is approximately 1 fps with most of the stream less than 4 fps, which would provide ample refuge for adult and juvenile fish of all three species (Exhibit 12). Under current operation, flood control releases are typically limited to a maximum of 500 cfs so that flows do not overtop the downstream Oro Vista Avenue crossing; thus, actual flows would be less than shown on Exhibit 12. Combined with natural runoff from other tributaries during larger storm events, individuals could be displaced by high flows and washed downstream. However, following storm events, they would be expected to move upstream or downstream to find areas of suitable habitat.

Storms generally occur in the fall and winter, outside the breeding season; adult and juvenile fish would be able to persist through high flows as described above. However, a spring storm could occur during the early breeding season (March/April) and would have the potential to affect breeding. High flows could dislodge eggs and/or fry and carry them downstream into habitat that is not suitable. If storm flows subside quickly, eggs and/or fry could be stranded in drying pools. Additionally, silt carried in storm flows could be deposited onto eggs, which could harm them. High flows during flood control releases would be a result of natural stream conditions as outflow is comparable to inflow up to 500 cfs. Moderate-sized spring storms (inflow 500 to 3,000 cfs) would generally be controlled by the Dam. In these instances, the Dam would have a beneficial effect by attenuating flows that could affect eggs/fry; however, eggs/fry may still be affected by releases up to 500 cfs. Storms greater than 3,000 cfs may go to spillway (depending on the duration of flows and the available capacity of the Reservoir at the time of the storm), in which case they would not be controlled by the Dam. Flood control releases associated with spring storms of any size would be due to natural rainfall events. It is expected that Covered Fish would not begin breeding until high flows subside for the year. In the event that breeding begins prior to a large spring storm, eggs and fry could be lost. However, Covered Fish can spawn multiple times through the breeding season, as long as conditions remain suitable, fish are in good health, and fish have enough energy to reproduce. Therefore, although a spring storm could cause the loss of some eggs and fry, it would not be expected to impact all young of the year because if flows are high, conditions would likely be suitable for continued breeding. Any loss of eggs/fry would be the result of natural weather conditions; flood control operations would decrease the potential loss of eggs/fry by reducing the peak flows.

Long-term monitoring along Big Tujunga Creek has shown that periodic flooding is necessary to maintain habitat quality for Covered Fish. In the absence of flushing flows, vegetation encroaches, causing stream velocities to decrease and the amount of riffle habitat (preferred by Santa Ana sucker and Santa Ana speckled dace) to decrease. This decreases the amount of available foraging habitat. When stream velocities decrease, sediment settles and increases the embeddedness of the gravel (i.e., causes it to be buried in sediment) and reduces the surface area available for growth of algae, which Santa Ana sucker feeds upon. Embeddedness also reduces interstitial spaces that provide habitat for benthic macroinvertebrates that other Covered Fish feed upon. Additionally, when stream velocities slow, the water tumbles over rocks less and dissolved oxygen also decreases. Higher dissolved oxygen correlates with higher numbers of Santa Ana sucker (Psomas 2019b). Over the latter half of the ten-year long-term monitoring study, there were multiple consecutive years of below-average rainfall and a lack of storm events to create flows to scour Big Tujunga Creek. Vegetation along the sampled reaches became increasingly dense, and habitat quality declined substantially over the latter half of the ten-year long-term monitoring study (Psomas 2019b). Over the ten-year long-term monitoring study, the highest numbers of all three Covered Fish species followed years of high rainfall in 2010-2011 when habitat quality was the highest (Psomas 2019b). Habitat quality is anticipated to improve following the high rainfall in 2018-2019; however, improvement in habitat conditions and populations of Covered Fish species will not be quantified because the ten-year study has ended (Psomas 2019c).

The timing of flow events is critical ecologically because the life cycles of many aquatic and riparian fish species are timed to either avoid or exploit flows of variable magnitudes (Poff et al. 1997). For example, the natural timing of high or low stream flows provides environmental cues for initiating life cycle transitions in fish, such as spawning (Montgomery et al. 1983; Nesler et al. 1988). During flood control operations, releases are made from the Reservoir prior to, during, or immediately following storms, usually within a few days or a few weeks, in order to ensure adequate capacity in the Reservoir for future storms. Thus, the timing of the releases is close to when it would have occurred naturally. Therefore, flood control operations are not expected to affect the timing of breeding.

Flood control operations that mimic inflow conditions to the extent possible, while protecting human life and property, would benefit Covered Fish species by maintaining the natural flood disturbance regime and periodically removing in-stream vegetation and reducing embeddedness. As described in Section 4.1.1., the downstream system experiences up to five-year storm events (500 cfs) as it would in a natural system. However, the Dam reduces the peak flow of intermediate-sized storms (500 cfs to 3,000 cfs) downstream to Stone Canyon. As described in Section 4.1.1., vegetation in this portion of the stream may be disturbed less frequently than it would in a natural system, leading to higher vegetation cover and higher silt and embeddedness, decreasing habitat quality for Covered Fish. The stream is expected to continue to experience natural disturbance events approximately every 25 years when the Dam goes to spillway (greater than 3,000 cfs), clearing substantial amounts of in-stream vegetation and moving sediment to expose cobble substrate. The downstream area that would be indirectly affected within the Dam's Limit of Hydraulic Influence includes approximately 111.20 acres of riparian habitat over 4.8 stream miles (Table 14).

4.2.2 WATER CONSERVATION OPERATIONS

Water conservation releases of 100 to 250 cfs are not expected to substantially affect Covered Fish by moving them downstream. HEC-RAS results for a 250-cfs modeled flow release show that stream edgewater velocity would be approximately 1 fps while most of the stream would be a maximum velocity of 3 fps, which is within the normal stream velocity range for adult and juvenile fish of all three species (Exhibit 14). Under current operations, water conservation releases are often closer to 100 cfs; thus, actual flows would be less than shown on Exhibit 14. Additionally, ramping of water conservation releases during the breeding season, as required by OPER-2, would allow the stream flows to increase and decrease gradually, allowing the adult and juvenile fish the ability to adjust to the changes in flow.

Water conservation releases made during the breeding season for Covered Fish have the potential to affect breeding success. Higher flows could dislodge eggs and/or fry and carry them downstream into habitat that is not suitable. If water conservation flows subside quickly, some eggs and/or fry could be stranded in drying pools and could be lost. These effects are expected to be limited based on the modeling shown in Exhibit 14. Eggs and fry would be expected to occur in the edgewater habitat, which would remain around 1 fps during water conservation releases. Additionally, OPER-2 requires ramping during the breeding season, which would allow the stream flows to increase and decrease gradually to minimize the potential for stranding. Although some loss of eggs and fry could occur, water conservation releases are not expected to impact a substantial amount of young of the year due to the incorporation of OPER-2 (i.e., limiting releases to less than 250 cfs during the breeding season and ramping releases).

At Big Tujunga Dam, water is discharged from the Reservoir at the elevation of the valves (2,202 feet and 2,188 feet), which is approximately 23 feet and 37 feet below minimum pool at 2,225 feet. The deeper waters of a reservoir can be lower in temperature than surface flows and have decreased levels of dissolved oxygen (Green et al. 2015). Large releases of these colder waters in the late spring or summer months have been found to interfere with spawning patterns of some fish (Caissie 2006; USFWS 1995b). Water temperatures downstream along Big Tujunga Creek were measured in mid-September to early October during the ten-year study. No trend of warming from upstream to downstream was observed in any year. In every year, multiple instances of colder reaches were found downstream of warmer reaches. Water temperature varies as a function of depth of the water, amount of shading by overhanging vegetation, and tributary inflow. The range of water temperatures was examined by year and by reach (Tables 25 and 26). Over the ten-year study, water temperatures ranged from 51 to 81 degrees Fahrenheit. However, the highest temperature of 81 degrees Fahrenheit recorded in Reaches 567 and 568 in 2014 seemed to be an anomaly or may have been a measurement error; all other temperatures measured in these reaches over the ten-year study were below 68 degrees Fahrenheit. Median values for each sampled reach over the ten-year period ranged from 60 to 64 degrees Fahrenheit (Table 25). All temperatures recorded during the ten-year monitoring effort were within an acceptable range for the occurrence and breeding of all three fish species (i.e., 50 to 86 degrees Fahrenheit). Therefore, the release of cold water from the lower portion of the Reservoir is not expected to substantially affect Covered Fish species. Alternatively, in this system, release of cool water may provide the beneficial effect of keeping the stream cool through the warm summer months, which would also provide higher levels of dissolved oxygen that would be beneficial for Covered Fish.

TABLE 25
SUMMARY OF WATER TEMPERATURES RECORDED BY REACH (2009–2019)

Reach	2009-2019 Low (F)	2009-2019 High (F)	Median by Reach (F)
567	57	81 (68)[a]	63
568	57	81 (68)[a]	63
578	53	70	64
579	53	67	61
584	59	71	63
585	59	71	62
629	57	68	61
630	57	68	61
631	58	68	63
632	59	68	63
708	60	76	64
709	58	69	63
711	56	69	63
712	56	63	62
725	55	71	61
726	58	76	61
929	51	68	61
930	54	68	61
937	52	65	60
939	54	65	60
965	56	70	64
966	56	70	64
Overall	51	81 (76)[a]	63

[a] The high value of 81 degrees Fahrenheit recorded in Reaches 567 and 568 may have been an anomaly or measurement error. The number in parentheses is the value without the outlier.

TABLE 26
SUMMARY OF WATER TEMPERATURES RECORDED BY YEAR (2009–2019)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Overall
Low (F)	61	53	60	59	58	60	51	56	55	51
High (F)	67	71	76	74	70	81 (76)[a]	75	69	64	81 (76)[a]
Median by Year	63	61	65	63	62	64	61	61	60	63

[a] The high value of 81 degrees Fahrenheit recorded in Reaches 567 and 568 may have been measurement error. The number in parentheses is the value without the outlier.

Reservoirs provide locations for the establishment and spread of non-native wildlife species that can then spread to areas downstream if their eggs, juveniles, or adults are released to downstream areas (Stephenson and Calcarone 1999). Non-native wildlife species are present in Big Tujunga Reservoir and may be released to downstream areas. These non-native species act as predators of all life stages of the Santa Ana sucker, Santa Ana speckled dace, and arroyo chub and could decrease their populations. The monitoring program includes an option for removal of non-native wildlife as a Habitat Enhancement project (see Section 5.5).

4.2.3 SUPPLEMENTAL RELEASES

During the Rehabilitation Project, a low-flow valve was installed in the Dam to allow supplemental releases to be made over the non-storm season for the purpose of enhancing downstream habitat for Covered Fish.

As described in Section 4.1.3, HEC-RAS model results indicate that the supplemental releases add from 2.67 to 6.27 acres of additional wetted areas (Table 15); however, these additional areas are generally limited to flow depths of 1 inch and velocities much less than 1 fps (Table 16). The additional wetted areas added to the stream by the supplemental releases are generally not useable by adult or juvenile fish because they are not deep enough and the velocity is not fast enough to be used by them. However, these additional wetted areas may be used by fry, which occur in quiet edgewater.

HEC-RAS model results indicate that the supplemental releases result in small increases in maximum depth (less than 0.2-foot increase [2.4 inches] for most of the active stream) and small increases in average depth over the whole stream (average depth increase of 0.8 inch) (Table 17). The small increase in depth is expected to be beneficial to Covered Fish.

HEC-RAS model results indicate that the supplemental releases result in a moderate increase in both maximum velocity (0.2 to 0.4 fps for most of the active stream, larger increases in segments) and a moderate increase in average velocity (average 0.2 fps faster) (Table 18, Exhibits 16 and 17). The moderate increases in average and maximum velocity are expected to be the most beneficial effect of the supplemental releases.

Prior to the initiation of supplemental releases in 2012 following the Rehabilitation Project, Big Tujunga Creek would become intermittent over the summer months (depending on rainfall and the water table). Portions of the stream would dry, leaving pools with increasing temperatures and decreasing dissolved oxygen. Supplemental releases provide flow that keeps the stream wetted continuously and provides fresh, cool, oxygenated water to pools, which minimizes fish mortality from high summer temperatures and low dissolved oxygen. Both the continuous and pulsed approach to supplemental releases would be expected to provide these beneficial effects to water quality. The HCP Working Group will continue to discuss the best strategy for supplemental releases per OPER-4.

As described above, prior to the initiation of supplemental releases, portions of the river would become intermittent (depending on rainfall and the water table). Low-level water releases year-round can increase the potential spread of exotic predators into downstream areas that may have otherwise dried in the late summer months (Sweet 1992). Supplemental releases began in 2012 following completion of the Rehabilitation Project. During the ten-year monitoring effort, data on the occurrence of non-native wildlife species (e.g., crayfish, bass, fathead minnow) were recorded beginning in 2011. During the monitoring, non-native wildlife species occurrence increased from 22 percent of sampled reaches in 2011 to 80 to 91 percent of sampled reaches annually from 2015 to 2018 (Psomas 2019b). However, because the time frame of the ten-year monitoring overlapped with recovery from the 2009 Station Fire, it is unknown whether the increase was due to the addition of supplemental releases or return to pre-fire conditions (Psomas 2019c). These non-native species act as predators of all life stages of the Santa Ana sucker, Santa Ana speckled dace, and arroyo chub and could decrease their populations. With the combined effect of making habitat conditions more suitable for non-native predators through the non-storm season and controlling storm flows during the storm season, which would remove some non-native predators from the system, non-native predators may increase to greater populations than they would if they were in an unregulated system that experienced a natural flow regime. The monitoring program includes an option for removal of non-native wildlife as a Habitat Enhancement project (see Section 5.5).

Low-level water releases from dams can result in the development of a dense riparian corridor protected from flood scouring (Sweet 1992). Supplemental releases feed riparian vegetation that would otherwise die back during the summer months. Over the course of the ten-year monitoring, vegetation cover has increased from 22 percent in 2012 to over 80 percent in 2017 and 2018 (Psomas 2019b). However, it is unknown how much of this increase is due to recovery from the Station Fire and the addition of supplemental releases versus the lack of flushing flows over multiple consecutive years of low rainfall (Psomas 2019b). The three factors combined likely contributed and exacerbated the decline in habitat quality. The monitoring program includes an option for removal of in-stream vegetation along the active channel as a Habitat Enhancement project (see Section 5.5).

4.2.4 MAINTENANCE PROJECTS

4.2.4.1 INSPECTIONS/TESTING

No physical disturbance would be associated with these activities; therefore, there would be no direct effect on Covered Fish species.

Routine facility inspection, safety inspections, and valve and slide gate testing would not involve lowering the Reservoir; however, the valves may be opened and closed, which would temporarily release water or stop the release of water during the inspection. Reservoir topographical surveys may involve lowering the Reservoir level temporarily to expose the upper Reservoir. Releases during the breeding season (March 1 to July 31) would be limited to 250 cfs and would be ramped per MAIN-1. Exhibit 14 shows modeled flows expected during a multiple-day release of 250 cfs; however, valve testing is a limited release that takes less than one hour. Therefore, flows expected would be lower than those shown on Exhibit 14. Effects would be expected to be qualitatively similar but lower in magnitude to those discussed for water conservation operation in Section 4.2.2. With the incorporation of MAIN-1, effects on Covered Fish would be expected to be minimal. Routine inspections/testing would not interfere with the availability of water for supplemental releases.

An emergency safety inspection (e.g., following an earthquake) may involve lowering the Reservoir, which may interfere with storage of water for the supplemental releases. Although it has not occurred since the Dam was constructed, the inspection and/or repair may involve complete dewatering. If it occurred during the breeding season (March 1 to July 31), dewatering releases would be ramped and released at a maximum of 250 cfs to minimize impacts on Covered Fish per MAIN-1. With the incorporation of MAIN-1, effects on Covered Fish would be expected to be minimal. However, the rate of dewatering would depend on the severity of the threat to public health and safety. Dewatering may need to occur as quickly as possible. In this case, the releases could affect Covered Fish adults, juvenile, eggs, and fry similar to, but equal to or greater in magnitude to, the effects discussed under flood control operations in Section 4.2.1. Emergency inspections/repairs could interfere with the availability of water for supplemental releases.

4.2.4.2 REGULAR SHORT-TERM, SMALL-SCALE MAINTENANCE

Regular short-term, small-scale maintenance would occur upstream of the Dam; therefore, there would be no direct effect on Covered Fish species.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. During trash booming, the Reservoir may be temporarily lowered or held steady. Releases during the breeding season (March 1 to July 31) would be limited to 250 cfs and would be ramped per MAIN-1. Modeled flows expected during a 250-cfs release are shown in Exhibit 14. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.2.2. With the incorporation of MAIN-1, effects on Covered Fish would be expected to be minimal. However, the rate of dewatering would depend on the severity of the threat to public health and safety. Dewatering may need to occur as quickly as possible to conduct an emergency repair on the boat ramp/dock. In this case, the releases could affect Covered Fish adults, juvenile, eggs, and fry similar to, but equal to or greater in magnitude to, the effects discussed under flood control operations in Section 4.2.1. Regular short-term, small-scale maintenance would not interfere with the availability of water for supplemental releases. Emergency maintenance may interfere with the availability of water for supplemental releases.

4.2.4.3 INFREQUENT SHORT-TERM, SMALL-SCALE MAINTENANCE

Maintenance on Dam/Rockfall Hazard for Access Roads

Most infrequent short-term, small-scale maintenance projects would occur on the Dam structure, adjacent developed areas, or upland habitats (i.e., repair or painting of trash racks/penstocks; repair, replacement, or installation of leakage points, piezometers, or other instrumentation and gages; repair of gunite and erosion protection measures; and rockfall hazard mitigation). Therefore, there would be no direct effect on habitat for Covered Fish species.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. Releases during the breeding season (March 1 to July 31) would be limited to 250 cfs and would be ramped per MAIN-1. Modeled flows expected during a 250-cfs release are shown in Exhibit 14. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.2.2. With the incorporation of MAIN-1, effects on Covered Fish would be expected to be minimal. Infrequent short-term, small-scale maintenance would not interfere with the availability of water for supplemental releases. Emergency maintenance may interfere with the availability of water for supplemental releases.

During the work, flow through the affected penstock may be temporarily stopped to allow for repair work. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could smother eggs and fry. If chemicals or excess silt are washed into the plunge pool or downstream areas, they could have detrimental effects on all life stages of Covered Fish species. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-1 and MAIN-6. With the incorporation of MAIN-1 and MAIN-6, no effects on Covered Fish would be expected.

Downstream Maintenance

Repair of the downstream stream channel; repair of downstream stream gages; and repair of the downstream access road would impact up to 2.69 acres of white alder grove–willow thicket that is expected to be occupied by all three Covered Fish species. Any work in the stream, including stream diversion, could cause injury or mortality to Covered Fish by crushing them with equipment or by stepping on or driving over rocks that are providing shelter. If temporary work in the stream and/or a stream diversion would be necessary to conduct downstream maintenance activities, MAIN-1 would be followed to ensure that Covered Fish are relocated and impacts on the stream are minimized. With the incorporation of MAIN-1, no take of Covered Fish would be expected.

Design of the downstream access road has potential to disrupt or enhance movement of Covered Fish through the culvert. Per MAIN-1, if road replacement is necessary, the road/stream crossing would be designed to allow wildlife movement for aquatic species, including Covered Fish. With the incorporation of MAIN-1, no effect on movement of Covered Fish would be expected.

Dam valves may need to be closed temporarily to minimize flows during the work to provide for the safety of crews working downstream of the Dam. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. As these are short-term projects (one month), closing the valves temporarily would not be expected to substantially affect stream flows. If necessary for the repairs, stream flow would be diverted around the work area using BMPs per MAIN-1. With the incorporation of MAIN-1, no take of Covered Fish would be expected.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could smother eggs and fry. If chemicals or excess silt are washed into the plunge pool or downstream areas, they could have detrimental effects on all life stages of Covered Fish species. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-1 and MAIN-6. With the incorporation of MAIN-1 and MAIN-6, no effects on Covered Fish would be expected.

Geotechnical Exploration

Geotechnical exploration would occur following an earthquake or landslide. The specific location of the work would depend on the event that triggers the geotechnical exploration. Disturbance as a result of geotechnical exploration is expected to be limited in extent (i.e., cores of less than 24 inches diameter [< 0.0001 acre], trenches less than 0.01 acre) and would be expected to be placed in upland habitats (i.e., outside riparian habitats). Therefore, no direct effect on Covered Fish species is expected.

Dam valves may need to be closed temporarily to allow a drill rig to drill downstream of the Dam or to allow a geologist to safely investigate the area. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could smother eggs and fry. If chemicals or excess silt are washed into the plunge pool or downstream areas, they could have detrimental effects on all life stages of Covered Fish species. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-1 and MAIN-6. With the incorporation of MAIN-1 and MAIN-6, no effects on Covered Fish would be expected.

4.2.4.4 INFREQUENT LONG-TERM, LARGE-SCALE MAINTENANCE

Infrequent long-term, large-scale maintenance projects (i.e., sediment removal, subsurface grouting, and concrete repair) would require complete dewatering of the Reservoir for work throughout the non-storm season. Sediment removal would be conducted over multiple years (up to five consecutive years); subsurface grouting and concrete repair would be completed in one non-storm season. Impacts resulting from subsurface grouting and concrete repair would be expected to be less in extent than those described for sediment removal. It should be noted that when Public Works is planning to dewater for a large-scale maintenance project, they attempt to group as many maintenance projects into the effort as possible to reduce the number of years that the Reservoir is dewatered.

Sediment removal would impact 0.06 acre of white alder grove–willow thicket, 0.17 acre black willow thicket, 0.23 acre arroyo willow thicket, 0.46 acre mulefat thicket, 2.29 acres smartweed–cocklebur patch, 43.35 acres open water, and 3.08 acres dry wash. However, all of the riparian habitat impacts would occur in the Reservoir and upstream area, which are not occupied by Covered Fish. The only portion of the project that would directly impact downstream of the Dam is dewatering of the plunge pool for sediment removal and installation of BMPs. These activities would require dewatering of 1.45 acres of open water in the plunge pool that is occupied by arroyo chub. Santa Ana sucker and Santa Ana speckled dace occur in the creek immediately downstream of the plunge pool but would not be expected to occur in the plunge pool because they occur in stream habitat (not lakes/ponds). When infrequent long-term, large-scale projects are occurring, the plunge pool would not be available as habitat to the arroyo chub during the non-storm season; however, the impact would be temporary. The plunge pool would be available as habitat during the storm season and following completion of the maintenance activity.

The outflow of the plunge pool could be occupied by all three Covered Fish species. Installation of BMPs could cause injury or mortality to Covered Fish by crushing them with equipment or by stepping on or driving over rocks that are providing shelter. Prior to installation of BMPs in the plunge pool at the beginning of each non-storm season, MAIN-1 would be followed to ensure that Covered Fish are relocated and downstream impacts are minimized. With the incorporation of MAIN-1, no take of Covered Fish would be expected.

Dewatering would occur prior to an infrequent large-scale, long-term maintenance project. Dewatering would begin during the typical storm season (i.e., October 15 to April 15); however, dewatering following installation of the bypass line and dewatering below the minimum pool would occur after the storm season ends (i.e., April 15) and could be delayed if a late-season storm occurred. As described in Table 12 in Section 3.4.4, during a wet year, releases over 100 cfs would occur for approximately six days; during average years, releases over 100 cfs would occur for a total of four days; and in dry years, releases over 100 cfs would not occur. These releases would be considered similar to a multiple-day spring storm. As described above, releases during the breeding season (March 1 to July 31) would be limited to 250 cfs and would be ramped per MAIN-1. Modeled flows expected during a 250-cfs release are shown in Exhibit 14. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.2.2. With the incorporation of MAIN-1, effects on Covered Fish would be expected to be minimal.

In an effort to determine whether dewatering flows would substantially affect Santa Ana sucker, a flow analysis was conducted in 2013 that compared maximum flow releases from the Dam during the months of March through May to the Santa Ana sucker population during annual monitoring efforts conducted in September and October of corresponding years from 2009 to 2012 (BonTerra Consulting 2012e). The highest releases were made from March 13 to April 11, 2011; 200 cfs releases were made for 27 of 31 days with the remaining four days at 150 cfs releases; the Santa Ana sucker population was the highest in fall 2011 (BonTerra Consulting

2013). During this year of high spring flows, Santa Ana sucker likely delayed breeding until later in the spring when flows subsided and also likely spawned multiple times through the breeding season because conditions remained favorable over the summer. However, conditions in the watershed at this time (2010 and 2011) were not typical because they followed the 2009 Station Fire. Precipitation and post-fire groundwater conditions allowed for year-round surface flows, which reduced stress on fish. Santa Ana sucker increased in density and distribution post-fire with these year-round flows. This analysis has not been updated because no subsequent years of high flow occurred during the ten-year monitoring study (2009-2018). While the data available for this analysis is limited to one year of high flows during this time period (i.e., 2011), the Santa Ana sucker population has also been able to persist through previous periods of extremely high flows (e.g., 2005, 2006). Therefore, this analysis suggests that Santa Ana sucker would be expected to persist due to their adaptations to withstand natural flooding, as discussed above under Section 4.2.1.

As mentioned above in Section 4.2.2, non-native wildlife are often present in reservoirs and could spread to downstream areas during dewatering. Non-native wildlife act as predators on all stages of Covered Fish species and can decrease their populations. Per MAIN-1, a screen with 0.125-inch mesh would be used at the inflow of the dewatering pump to prevent non-native wildlife from spreading from the Reservoir to areas below the Dam occupied by Covered Fish. Complete dewatering would also have the beneficial effect of eradicating non-native aquatic wildlife from the Reservoir. With the incorporation of MAIN-1, the effect of removing non-native aquatic wildlife from the Reservoir would have a beneficial effect on Covered Fish species.

Dewatering the Reservoir to the sediment level would be expected to increase the amount of sediment in the water releases as the water level approaches the sediment level. As mentioned above, sediment could smother eggs and fry. If excess silt is washed into downstream areas, it could have detrimental effects on all life stages of Covered Fish species. BMPs would be used to protect water quality downstream of the plunge pool per MAIN-1 and MAIN-6. With the incorporation of MAIN-1 and MAIN-6, no effects on Covered Fish would be expected.

When the Reservoir is dewatered for infrequent long-term, large-scale maintenance projects, a bypass line would carry flows from Big Tujunga Creek upstream of the project area within Big Tujunga Reservoir to Big Tujunga Creek downstream of the plunge pool. All available inflow would be conveyed downstream. Per MAIN-1, water temperatures in the bypass line would be cooled so that water from the bypass outflow would be similar to water temperatures at the bypass inflow upstream of the Reservoir. During bypass line operation, downstream hydrology would be subject to natural fluctuations depending on weather patterns over the years that the maintenance project occurs. During normal operations, Public Works generally releases water from the Reservoir near the same rate as inflow into the Reservoir; therefore, downstream flows typically mimic natural conditions during the non-storm season. Analysis of historic inflow/outflow data verified that outflow typically equals inflow over the non-storm season (BonTerra Consulting 2013; Psomas 2020b). Infrequent long-term, large-scale maintenance projects would occur for up to five years (i.e., sediment removal). Over this time period, if natural conditions caused the stream to go dry, Covered Fish could perish in drying pools or pools with decreased water quality and/or high temperatures. Mortality due to a drying stream would be the result of natural weather conditions and not an effect of the maintenance project. Covered Fish have persisted in this system through varying wet and dry cycles, including multiple years of drought conditions, prior to the supplemental releases. Thus, Covered Fish populations would be expected to continue to persist through the duration of an infrequent long-term, large-scale maintenance project even if some individuals may perish. However, during infrequent long-term, large-scale maintenance projects, downstream conditions would be monitored by a Biologist who would notify the resource agencies if Covered Fish may need to be rescued per MAIN-1. With the incorporation of MAIN-1, effects on Covered Fish would be expected to be minimal.

Since the completion of the Rehabilitation Project in 2012, supplemental releases have been made throughout the non-storm season (i.e., outflow equals inflow plus supplemental releases). During infrequent long-term, large-scale maintenance projects, supplemental releases would not be available for a period of up to five years (i.e., sediment removal) and the downstream system would be entirely dependent on natural conditions, as described above. A period with no supplemental releases may be beneficial for the system as it could allow the stream to become intermittent in the summer months, which could counteract the potential detrimental effects of supplemental releases described in Section 4.2.3. A drying stream may cause some mortality of non-native wildlife species and/or reduce their distribution, which would reduce predation on Covered Fish. The lack of supplemental releases may also cause the riparian vegetation to die back over the non-storm season, decreasing in-stream and overhanging vegetation, which could reverse, or at least not contribute further to, the detrimental effects of encroaching vegetation. Both of these effects would be beneficial effects of the lack of supplemental releases.

4.2.5 SPILLWAY IMPROVEMENT PROJECT

Construction of the Spillway Improvement Project would occur on the Dam structure and in upland areas; therefore, there would be no direct effect on Covered Fish species.

The only downstream area that would be directly impacted is dewatering of the plunge pool for installation of BMPs. This would require dewatering of 1.45 acres of open water in the plunge pool that is occupied by arroyo chub. Santa Ana sucker and Santa Ana speckled dace occur in the creek immediately downstream of the plunge pool but would not be expected to occur in the plunge pool because they occur in stream habitat (not lakes/ponds). During construction of the Spillway Improvement Project, the plunge pool would not be available as habitat to the arroyo chub during the non-storm season; however, the impact would be temporary. The plunge pool would be available as habitat during the storm season and following completion of the Spillway Improvement Project.

The outflow of the plunge pool could be occupied by all three Covered Fish species. Installation of BMPs could cause injury or mortality to Covered Fish by crushing them with equipment or by stepping on or driving over rocks that are providing shelter. Prior to installation of BMPs in the plunge pool at the beginning of each non-storm season, MAIN-1 would be followed to ensure that Covered Fish are relocated and downstream impacts are minimized. With the incorporation of MAIN-1, no take of Covered Fish would be expected.

Construction of the Spillway Improvement Project would require only partial dewatering of the Reservoir prior to each non-storm season. The effects of dewatering would be the same as those as described above in Section 4.2.4.4. As described above, releases during the breeding season (March 1 to July 31) would be limited to 250 cfs and would be ramped per MAIN-1. Modeled flows expected during a 250-cfs release are shown in Exhibit 14. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.2.2. With the incorporation of MAIN-1, effects on Covered Fish would be expected to be minimal.

As described above in Section 4.2.4.4, implementation of MAIN-1 and MAIN-6 would require the use of BMPs to protect downstream water quality. With the incorporation of MAIN-1 and MAIN-6, no effects on Covered Fish would be expected.

Following construction of the Spillway Improvement Project, the capacity of the Reservoir would increase by approximately 7.20 acres, inundating areas between elevation 2,290 feet and elevation 2,298 feet. The area is expected to be inundated for only a few weeks once every ten years; however, inundation may occur more frequently if large storms occur more frequently. Covered Fish are not known to occur in the Reservoir or in Big Tujunga Creek upstream of the

Reservoir; therefore, there would be no impact on Covered Fish habitat due to the additional inundation.

4.2.6 FUTURE TRANSLOCATION

If another entity (e.g., USFWS, CDFW, or USFS) were to translocate Santa Ana sucker, Santa Ana speckled dace, and/or arroyo chub upstream of the Reservoir to establish a new population, these Covered Fish species could occur in the Reservoir during normal operations in the future. If arroyo chub were translocated, they would be expected to occur throughout the Reservoir. However, Santa Ana sucker and Santa Ana speckled dace would be expected to occur only at the upper end of the Reservoir where the Reservoir is stream-like; they would not be expected to move very far into the area where the Reservoir becomes lake habitat.

Water releases from the Dam for flood control and water conservation would cause the Reservoir elevation to fluctuate. As such, the amount of habitat available to Covered Fish would also fluctuate based on Reservoir elevation, with more habitat available to Santa Ana sucker and Santa Ana speckled dace when the Reservoir is lower, and less available to these species when the Reservoir is higher. As arroyo chub could occur in both the stream-like areas and around the edges of the lake-like portions of the Reservoir, the fluctuations in Reservoir elevation would not be expected to affect the amount of habitat available. The existing footprint of the Reservoir is approximately 85.70 acres and would increase to 92.90 acres following construction of the Spillway Improvement Project; the Reservoir level may fluctuate within this footprint during normal operations (Exhibits 15 and 23). The Reservoir footprint following the Spillway Improvement Project (i.e., from the Dam to the maximum footprint of 2,298 feet) would extend approximately 2.06 stream miles, which is 0.08 stream mile further than the existing footprint of the Reservoir (i.e., from the Dam to maximum footprint of 2,290 feet) (Exhibit 23).

During flood control operations, higher releases are a result of higher inflows. If inflow is greater than outflow, the Reservoir rises to inundate more of its footprint. During high inflows, Covered Fish could be washed into the Reservoir. Once storm flows subside, Covered Fish would be expected to move back to areas of suitable habitat upstream. Few fish would be expected to be released through the valves because individuals would be expected to take shelter around the Reservoir edges and quieter water away from the deep water where the valves release. For this reason, no take of Covered Fish would be expected due to operation of the valves.

During water conservation operations, ramping is required per OPER-2. Therefore, Reservoir level is expected to change gradually. Adult and juvenile fish would be expected to move to areas of suitable habitat by following the water level. However, natural inflow could wash eggs and fry into areas that are not suitable habitat (i.e., Reservoir pool), and lowering the water level has potential to cause stranding on drying banks because these life stages have limited mobility. With the incorporation of OPER-2, effects on Covered Fish would be expected to be minimal.

Following translocation of Covered Fish upstream of the Reservoir, maintenance projects that include dewatering, work in the Reservoir, and/or installation of a bypass line could impact Covered Fish if they occurred in the Reservoir. Work in open water or the stream-like portion of the upper Reservoir could cause injury or mortality to Covered Fish by crushing them with equipment or by stepping on or driving over rocks that are providing shelter. If temporary work in the Reservoir and/or installation of a bypass line would be necessary to conduct maintenance activities, MAIN-1 would be followed to ensure that Covered Fish are relocated and impacts to fish in the Reservoir are minimized. With the incorporation of MAIN-1, no take of Covered Fish would be expected.

4.2.7 MITIGATION PROGRAM EFFECTS

The mitigation program described in Section 3 does not include restoration at a mitigation site. The measures that would be applied to operations have been described above. OPER-1 is discussed under Sections 4.1.1 and 4.2.1, OPER-2 is discussed under Sections 4.1.2 and 4.2.2. OPER-3 is discussed under Section 4.1.3 and 4.2.3. OPER-4 is a requirement to monitor the populations of Covered Species and use Adaptive Management to make adjustments needed for the benefit of Covered Fish species.

MAIN-1 and MAIN-6 describe measures that would avoid and minimize impacts on Covered Fish. Prior to installation of BMPs in the plunge pool or work within downstream areas, Covered Fish would be relocated out of the work area. This work would involve handling adult and juvenile Covered Fish to move them out of work areas. Biologists moving through the water may inadvertently injure or kill fish by stepping on an individual or a rock that an individual is sheltering under. Fish may also be inadvertently injured or killed during netting, handling, transport, or release. MAIN-1 requires that the USFWS review and approve the methods in the SSFRP prior to relocation of Covered Fish. Relocation of Covered Fish would be conducted by one or more Biologists holding the appropriate permits to handle Covered Fish. Therefore, take of Covered Fish individuals during relocation out of the work area is expected to be minimal.

MAIN-1 also requires monitoring throughout construction/maintenance. If a Biologist observes fry (unknown species) or Covered Fish adults or juveniles stranded in a drying pool, the Biologist would be authorized to move them to suitable habitat in the adjacent active channel. Covered Fish may be inadvertently injured or killed during netting, handling, transport, or release. As described above, MAIN-1 requires that the USFWS review and approve the methods in the SSFRP prior to relocation of Covered Fish. Relocation of fry and/or Covered Fish adults and juveniles would be conducted by one or more permitted Biologists holding the appropriate permits to handle Covered Fish. Therefore, take of fry and Covered Fish individuals during relocation to the active channel is expected to be minimal.

4.3 BIOLOGICAL EFFECTS TO COVERED HERPETOFAUNA SPECIES

4.3.1 ARROYO TOAD

4.3.1.1 FLOOD CONTROL OPERATIONS

Arroyo toad do not occur downstream of the Dam; therefore, flood control releases from the Dam into downstream areas would not affect arroyo toad.

Arroyo toad occurs along Big Tujunga Creek upstream of the Reservoir; it could also occur in the upper stream-like portion of the Reservoir. Most flood control operations occur during the non-breeding season when arroyo toads would be aestivating outside the active channel, in the upper stream terraces and adjacent upland areas. During larger flood events, sediment in the upper stream terraces could be washed away, which could injure or kill arroyo toads aestivating in the sediment. However, this would be a result of natural flood conditions. The arroyo toad is adapted to Southern California river systems with highly variable flows during the rainy season and has persisted over time despite repeated flood events. Episodic flooding is necessary to keep the low stream terraces free of vegetation and soils friable enough for adult and juvenile toads to create burrows (Jennings and Hayes 1994). Flood control operations would have no effect on the natural flood cycle along Big Tujunga Creek upstream of the Reservoir.

As inflow is occurring at the upper end of the Reservoir, the Dam outflow is comparable to inflow. If the inflow is greater than 500 cfs, the Reservoir would fill with water up to its existing footprint (elevation 2,290 feet; Exhibit 15). As inflow decreases, the Reservoir water level would subside and the upper Reservoir would return to a stream-like condition. As the Reservoir water level fluctuates, it would inundate the stream habitat at the upper end of the Reservoir for a period of time. When the Reservoir is inundated, it would not provide suitable habitat for arroyo toad; however, once the water subsides and becomes stream-like, the upper portion of the Reservoir would again provide potentially suitable habitat. During their active period, arroyo toad would be expected to move upstream and downstream to follow suitable habitat.

During the non-breeding season, most individuals would be expected to aestivate in upper stream terraces and adjacent upland areas that would not be inundated; in this case, they would not be expected to be affected by Reservoir fluctuations during the non-breeding season. However, some arroyo toads may be aestivating in the sediment in the upper stream-like portion of the Reservoir and may be periodically inundated. Effects would be expected to be limited as the upper portions of the Reservoir are inundated for the shortest period of time. Individuals would be expected to survive being inundated until flood waters subside.

Storms generally occur in the fall and winter, outside the breeding season, when arroyo toads are aestivating. However, a spring storm could occur during the early breeding season (March/April) and would have the potential to affect breeding upstream of the Reservoir or in the upper end of the Reservoir. High flows could dislodge eggs and/or tadpoles, injuring or killing them. Additionally, silt carried in storm flows could be deposited onto eggs, which could harm them. High flows during a spring storm would be a result of natural rainfall events. It is expected that arroyo toad would not begin breeding until high flows subside for the year. In the event that breeding begins prior to a large spring storm, eggs and tadpoles could be lost. This would be the result of natural rainfall conditions and not a result of Dam operations.

4.3.1.2 WATER CONSERVATION OPERATIONS

Arroyo toad do not occur downstream of the Dam; therefore, water conservation releases from the Dam into downstream areas would not affect arroyo toad.

As discussed above, arroyo toad could occur in the upper stream-like portion of the Reservoir. Water conservation operations would cause fluctuation in the Reservoir level. Water could be held to wait for the spreading grounds to have capacity to receive water conservation releases; during this time, the Reservoir pool would expand so that less stream-like habitat would be exposed. When water releases exceed inflow, the Reservoir pool would decrease, and more stream-like habitat in the upper Reservoir would be exposed. When stream-like habitat is exposed, it would provide potential habitat for arroyo toad. As the Reservoir fluctuates, arroyo toad adults, juveniles, and tadpoles would be expected to move upstream and downstream to follow suitable habitat.

The water level could fluctuate between minimum pool (2,225 feet) and the maximum Reservoir footprint (2,290 feet); fluctuation in the inundation level would impact up to 1.12 stream mile of stream-like habitat in the upper Reservoir that is potentially suitable for the arroyo toad. As described in Section 4.1.2, the mean Reservoir water surface elevation over the non-storm season is 2,240.7 feet (Zargaryan 2019a). Therefore, the upper 0.76 stream mile is typically available as stream-like habitat for the arroyo toad (Exhibit 15).

Eggs would not be able to follow the Reservoir fluctuations and could be lost if inundated too deep or stranded if the water level recedes quickly. However, the chance that arroyo toad eggs would be affected is considered extremely limited because for eggs to be lost: (1) a female arroyo toad would need to lay the eggs in the transition zone as the stream becomes the Reservoir pool (i.e., where water fluctuation occurs); (2) the water fluctuation would need to occur during the four to six days between when the eggs are laid and when they hatch; and (3) the fluctuation would need to be great enough to inundate the eggs to a point where they are no longer viable; or (4) water recession would need to occur quickly enough to strand eggs on the drying bank. Additionally, only limited breeding is expected at the upper end of the Reservoir because only one arroyo toad has been found immediately upstream from the project area; the majority of the known population occurs in the upper watershed (outside the study area). With the incorporation of OPER-2, which limits releases to 250 cfs and requires ramping of releases during the breeding season (March 1 to July 31), loss of arroyo toad eggs would be expected to be extremely limited.

4.3.1.3 SUPPLEMENTAL RELEASES

Arroyo toad do not occur downstream of the Dam; therefore, supplemental releases from the Dam into downstream areas would not affect arroyo toad.

As described in Section 4.1.2, storage of water in the Reservoir for supplemental releases (up to 1,500 af) would cause the Reservoir level to be higher and, thus, would reduce the amount of stream-like habitat available for arroyo toad at the upper end of the Reservoir. Adding 1,500 af of water above minimum pool would bring the Reservoir elevation to 2,256.7 feet (Zargaryan 2019b). Therefore, storage of supplemental release would inundate approximately 0.73 stream mile of potentially suitable habitat for the arroyo toad, leaving 0.39 stream mile in the upper Reservoir available as stream-like habitat for the arroyo toad (Exhibit 15). As water is released over the non-storm season, the Reservoir level would subside, exposing more stream-like habitat. As the Reservoir level decreases, arroyo toad adults, juveniles, and tadpoles could move down into the Reservoir to use available suitable habitat.

4.3.1.4 MAINTENANCE PROJECTS

4.3.1.4.1 <u>Inspections/Testing</u>

No physical disturbance would be associated with these activities; therefore, there would be no direct effect on arroyo toad.

Routine facility inspection, safety inspections, and valve and slide gate testing would not involve lowering the Reservoir. Therefore, there would be no effect on habitat in the upper end of the Reservoir.

Reservoir topographical surveys may involve lowering the Reservoir level temporarily to expose the upper Reservoir. An emergency safety inspection (e.g., following an earthquake) may involve lowering the Reservoir or complete dewatering. As discussed above under Section 4.3.1.2, arroyo toad adults, juveniles, and tadpoles would be expected to move upstream and downstream to follow suitable habitat as the Reservoir level fluctuates, while eggs have a very limited chance of being affected.

4.3.1.4.2 <u>Regular Short-Term, Small-Scale Maintenance</u>

Regular short-term, small-scale maintenance would occur upstream of the Dam structure at the downstream end of the Reservoir. As the arroyo toad occurs upstream of the Reservoir, there would be no direct effect on arroyo toad.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. During trash booming, the Reservoir may be temporarily lowered or held steady. As discussed above under Section 4.3.1.2, arroyo toad adults, juveniles, and tadpoles would be expected to move upstream and downstream to follow suitable habitat as the Reservoir level fluctuates, while eggs have a very limited chance of being affected.

4.3.1.4.3 <u>Infrequent Short-Term, Small-Scale Maintenance</u>

Infrequent short-term, small-scale maintenance projects would occur on the Dam structure, in upland habitats and developed areas adjacent to the Dam, or downstream of the Dam. As the arroyo toad occurs upstream of the Reservoir, there would be no direct effect on arroyo toad.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. For downstream projects, Dam valves may need to be closed temporarily to minimize flows during the work to provide for the safety of crews. As discussed above under Section 4.3.1.2, arroyo toad adults, juveniles, and tadpoles would be expected to move upstream and downstream to follow suitable habitat as the Reservoir level fluctuates, while eggs have a very limited chance of being affected.

4.3.1.4.4 <u>Infrequent Long-Term, Large-Scale Maintenance</u>

Infrequent long-term, large-scale maintenance projects (i.e., sediment removal, subsurface grouting, and concrete repair) would require complete or partial dewatering of the Reservoir for work throughout one or more non-storm seasons. Impacts resulting from subsurface grouting and concrete repair would be less in extent than those described for sediment removal. It should be noted that when Public Works is planning to dewater for a large-scale maintenance project, they attempt to group as many maintenance projects into the effort as possible to reduce the number of years that the Reservoir is dewatered.

Sediment Removal

Sediment removal would require complete dewatering of the Reservoir for work throughout the non-storm season for up to five consecutive years.

As discussed above, the upper Reservoir is stream-like and provides suitable habitat for arroyo toad. Sediment removal activities at the upstream area of Big Tujunga Creek would remove up to 6.29 acres of habitat for the arroyo toad including 0.06 acre of white alder grove—willow thicket, 0.17 acre of black willow thicket, 0.23 acre of arroyo willow thicket, 0.46 acre of mulefat thicket, 2.29 acres of smartweed–cocklebur patch, and 3.08 acres of dry wash. However, the impact would be temporary, as the habitat would be available following completion of the maintenance activity.

Sediment removal could directly kill arroyo toad individuals that occur within the impact area during vegetation clearing and excavation of sediment. Construction vehicles could cause injury or mortality to arroyo toad individuals by crushing them with equipment, moving or driving over rocks that are providing shelter, or crushing individuals aestivating in the sediment. MAIN-2 requires pre-construction surveys and relocation outside the work area, installation of exclusion measures, and biological monitoring to avoid and minimize direct take of individuals. With the incorporation of MAIN-2, no take of arroyo toad would be expected.

During dewatering, a coffer dam would be set up at the upper end of the Reservoir, and the intake pipe would have a screen to block arroyo toads from being allowed into the bypass line where they may be harmed. However, installation of the bypass line could directly impact arroyo toads upstream of the Reservoir. MAIN-2 requires pre-construction surveys and relocation outside the work area, installation of exclusion measures, and biological monitoring to avoid and minimize direct take of individuals during installation of the coffer dam and bypass line. With the incorporation of MAIN-2, no take of arroyo toad would be expected.

During dewatering, arroyo toad adults, juveniles, and tadpoles would be expected to move upstream and downstream to follow suitable habitat, while eggs have a very limited chance of being affected, as discussed in Section 4.3.1.2.

As mentioned above in Section 4.2.2, non-native wildlife are often present in reservoirs. Non-native wildlife act as predators on arroyo toads and can decrease their populations. Complete dewatering would have the beneficial effect of eradicating non-native aquatic wildlife from the Reservoir, which would reduce predation on arroyo toads that occupy the stream-like habitat in the upper Reservoir.

Subsurface Grouting/Concrete Repair

Subsurface grouting and concrete repair may require complete dewatering of the Reservoir for work throughout the non-storm season for one year.

Subsurface grouting and concrete repair would occur at the lower end of the Reservoir, which is not suitable habitat for the arroyo toad. Therefore, there would be no direct effect on arroyo toad habitat.

During dewatering, a coffer dam would be set up in the lower end of the Reservoir, just upstream of the work area. As described for sediment removal projects, the intake pipe would have a screen to block arroyo toads from being allowed into the bypass line where they may be harmed. However, installation of the bypass line could directly impact arroyo toads if the coffer dam is located in a stream-like portion of the Reservoir. MAIN-2 requires pre-construction surveys and relocation outside the work area, installation of exclusion measures, and biological monitoring to avoid and minimize direct take of individuals during installation of the coffer dam and bypass line. With the incorporation of MAIN-2, no take of arroyo toad would be expected.

During dewatering, arroyo toad adults, juveniles, and tadpoles would be expected to move upstream and downstream to follow suitable habitat, while eggs have a very limited chance of being affected, as discussed in Section 4.3.1.2.

During the project, the Reservoir level would be low, and the upper Reservoir would be stream-like throughout the non-storm season. As discussed above under Section 4.3.1.2, arroyo toad adults, juveniles, and tadpoles would be expected to move to follow suitable habitat and could utilize the stream-like habitat in the upper Reservoir. This would be a beneficial effect, as the Reservoir pool would not be increased until the beginning of the storm season, which is after the breeding season.

4.3.1.5 SPILLWAY IMPROVEMENT PROJECT

Construction of the Spillway Improvement Project would occur on the Dam structure and in upland areas. As the arroyo toad occurs upstream of the Reservoir, there would be no direct effect on arroyo toad.

Construction of the Spillway Improvement Project would require only partial dewatering (to elevation 2,250 feet) prior to each non-storm season. During dewatering, arroyo toad adults, juveniles, and tadpoles would be expected to move upstream and downstream to follow suitable habitat, while eggs have a very limited chance of being affected, as discussed in Section 4.3.1.2.

During the project, the Reservoir level would be lower, and the upper Reservoir would be stream-like throughout the non-storm season. As discussed above, arroyo toad adults, juveniles, and tadpoles would be expected to move to follow suitable habitat and could utilize the stream-like habitat in the upper Reservoir. This would be a beneficial effect, as the Reservoir pool would not be increased until the beginning of the storm season, which is after the breeding season.

Following construction of the Spillway Improvement Project, the capacity of the Reservoir would increase by approximately 7.20 acres, periodically inundating areas between elevation 2,290 feet and elevation 2,298 feet. The area is expected to be inundated for only a few weeks once every ten years during the storm season; however, it may occur more frequently if large storms occur more frequently. This would temporarily affect up to 1.20 stream mile of suitable habitat (i.e., minimum pool to 2,298 feet) that is known to be occupied by the arroyo toad. The existing Reservoir footprint is 1.12 stream mile (i.e., minimum pool to 2,290 feet); the Spillway Improvement Project would temporarily affect up to 0.08 stream mile of additional occupied habitat. This area includes 1.59 acre of riparian habitat types (0.28 acre white alder grove–willow thicket, 0.95 acre arroyo willow thicket, 0.13 acre sandbar willow thicket, 0.03 acre smartweed–cocklebur patch, 0.03 acre freshwater seep, 0.03 acre open water, and 0.14 acre dry wash).

4.3.1.6 FUTURE TRANSLOCATION

Following translocation of Covered Fish upstream of the Reservoir, maintenance projects that include dewatering would involve pre-construction surveys and relocation of Covered Fish out of the work area. Some fish survey techniques could impact arroyo toads if the surveys occurred during the breeding season. Following translocation, MAIN-2 would need to be implemented prior to MAIN-1 to ensure arroyo toad are not affected by pre-construction surveys and relocation of Covered Fish. With the incorporation of MAIN-2, no take of arroyo toad would be expected.

4.3.1.7 MITIGATION PROGRAM EFFECTS

The mitigation program described in Section 3 does not include restoration at a mitigation site. The measures that would be applied to operations have been described above. OPER-1 is discussed under Sections 4.1.1 and 4.3.1.1; OPER-2 is discussed under Sections 4.1.2 and 4.3.1.2. OPER-3 is discussed under Section 4.1.3 and 4.3.1.3. OPER-4 is a requirement to monitor the populations of Covered Species and use Adaptive Management to make adjustments needed for the benefit of arroyo toad.

MAIN-2 describes measures that would avoid and minimize impacts on arroyo toad. Prior to installation of a coffer dam, bypass line, or BMPs in the upper Reservoir, arroyo toad would be relocated out of the work area. This work would involve handling adults, juveniles, tadpoles, and eggs to move them out of work area. Biologists moving through the water may inadvertently injure or kill arroyo toads by stepping on the individual or a rock that the individual is sheltering under. Individuals may also be inadvertently injured or killed during netting, handling, transport, or release. MAIN-2 requires that the USFWS review and approve the methods in the ATRP prior to relocation of arroyo toads. Relocation of arroyo toads would be conducted by one or more Biologists holding the appropriate approval to handle arroyo toad. Therefore, take of arroyo toad individuals during relocation out of the work area is expected to be minimal.

MAIN-2 also requires monitoring throughout construction/maintenance. If a Biologist observes arroyo toad individuals in the sediment removal (or other work area), the Biologist would be authorized to move them to suitable habitat upstream. Individuals may be inadvertently injured or killed during netting, handling, transport, or release. As described above, MAIN-2 requires that the USFWS review and approve the methods in the ATRP prior to relocation of arroyo toads. Relocation of arroyo toads would be conducted by one or more Biologists holding the appropriate approvals to handle arroyo toad. Therefore, take of arroyo toad individuals during relocation out of the work area is expected to be minimal.

4.3.2 WESTERN POND TURTLE

4.3.2.1 FLOOD CONTROL OPERATIONS

Western pond turtle occurs along Big Tujunga Creek upstream of the Reservoir, throughout the Reservoir, in the plunge pool, and downstream along Big Tujunga Creek. Most flood control operations would occur during the non-breeding season when western pond turtles would be aestivating outside the active channel in the upper stream terraces and adjacent upland areas. Some western pond turtles may also aestivate underwater in the sediment of the Reservoir or stream bottom. During larger flood events, sediment in the upper stream terraces or on the stream bottom could be washed away, which may injure or kill western pond turtles aestivating in the sediment. However, this would be a result of natural flood conditions. The western pond turtle is adapted to Southern California river systems with highly variable flows during the rainy season and has persisted over time despite repeated flood events. Flood control operations would have no effect on the natural flood cycle along Big Tujunga Creek upstream of the Reservoir.

While storms generally occur in the fall and winter, a spring storm could occur during the active period (e.g., March/April). During a spring storm, western pond turtles would be expected to find shelter outside the active channel or buried in the sediment while high flows are occurring and return to the active channel once flows have subsided. High flows upstream of the Reservoir could wash some western pond turtles downstream into the Reservoir; this would be the result of natural flood events and not attributable to operations. Flood control releases from the Dam into downstream areas would be associated with storm events. HEC-RAS results for a 600-cfs modeled flow release downstream of the Dam show that stream edgewater velocity is approximately 1 fps, with most of the stream less than 4 fps, which would provide ample refuge for adult and juvenile western pond turtles (Exhibit 12). Under current operation, flood control releases are limited to a maximum of 500 cfs so that flows do not overtop the downstream Oro Vista Avenue crossing; thus, actual flows would be less than shown on Exhibit 12. Combined with runoff from other tributaries during larger storm events, individuals could be displaced by high flows and washed downstream. Whether they are upstream or downstream of the Dam, western pond turtles would be expected to move upstream or downstream to find areas of suitable habitat once high flows have subsided.

While the Reservoir level may fluctuate during flood control operations, western pond turtles can use both the Reservoir pool and the stream-like upper Reservoir. Therefore, flood control operations would not be expected to affect the amount of suitable habitat in the Reservoir. During their active period, western pond turtles would be expected to move throughout the Reservoir.

Storms generally occur in the fall and winter, outside the breeding season for western pond turtles; however, a storm could occur during the spring (April/May). It is not expected that breeding would be affected by spring storms, as nests are placed in terrestrial habitat on adjacent stream terraces.

The timing of flow events is critical ecologically because the life cycles of many aquatic and riparian species are timed to either avoid or exploit flows of variable magnitudes (Poff et al. 1997). During flood control operations, releases are made from the Reservoir as soon as possible following storms, usually within a few days or a few weeks, in order to ensure the Reservoir has adequate capacity for future storms. Thus, the timing of the releases is close to when it would occur naturally. Therefore, flood control operations are not expected to substantially affect the timing of breeding.

Flood control operations that mimic inflow conditions to the possible, while protecting human life and property, would benefit western pond turtle by maintaining the natural flood disturbance regime and periodically removing in-stream vegetation and reducing embeddedness. As described in Section 4.1.1., the downstream system experiences up to five-year storm events

(500 cfs) as it would in a natural system. However, the Dam reduces the peak flow of intermediate-sized storms (500 cfs to 3,000 cfs) downstream to Stone Canyon. As described in Section 4.1.1., vegetation in this portion of the stream may be disturbed less frequently than it would in a natural system, leading to higher vegetation cover and higher silt and embeddedness, decreasing habitat quality. The stream would experience natural disturbance events approximately every 25 years when the Dam goes to spillway (greater than 3,000 cfs), clearing substantial amounts of in-stream vegetation and redistributing sediment. The downstream area indirectly affected within the Dam's Limit of Hydraulic Influence includes approximately 111.20 acres of riparian habitat over 4.8 stream miles (Table 14).

4.3.2.2 WATER CONSERVATION OPERATIONS

While the Reservoir level may fluctuate during water conservation operations, western pond turtles can use both the Reservoir pool and the stream-like upper Reservoir. Therefore, water conservation operations would not be expected to affect the amount of suitable habitat in the Reservoir. During their active period, western pond turtles would be expected to move throughout the Reservoir.

Downstream of the Dam, water conservation releases of 100 to 250 cfs are not expected to substantially affect western pond turtles by moving them downstream. HEC-RAS results for a 250-cfs modeled flow release show that stream edgewater velocity would be approximately 1 fps, while most of the stream would be a maximum velocity of 3 fps (Exhibit 14). Under current operations, water conservation releases are often closer to 100 cfs; thus, actual flows would be less than shown on Exhibit 14. Additionally, ramping of water conservation releases, as required by OPER-2, would allow the stream flows to increase and decrease gradually, allowing the adult and juvenile western pond turtles the ability to adjust to the changes in flow. It is not expected that breeding would be affected by water conservation releases, as nests are placed in terrestrial habitat on adjacent stream terraces. With the implementation of OPER-2, no effects on western pond turtle would be expected.

As described in Section 4.2.2, Dam valves release water from approximately 23 and 37 feet below minimum pool. The deeper waters of a reservoir can be lower in temperature than surface flows and have decreased levels of dissolved oxygen (Green et al. 2015). Water temperatures downstream along Big Tujunga Creek were measured in mid-September to early October during the ten-year study, and no trend of warming from upstream to downstream was observed in any year (Tables 25 and 26). In every year, multiple instances of colder reaches occurred downstream of warmer reaches. Water temperature varies as a function of depth of the water, amount of shading by overhanging vegetation, and tributary inflow. Over the ten-year study, water temperatures ranged from 51 to 81 degrees Fahrenheit with median values ranging from 60 to 64 degrees Fahrenheit. All temperatures recorded during the ten-year monitoring effort were within an acceptable range for the western pond turtle. Therefore, the release of cold water from the lower portion of the Reservoir is not expected to substantially affect western pond turtle. Alternatively, in this system, release of cool water may provide the beneficial effect of keeping the stream cool through the warm summer months.

Reservoirs provide locations for the establishment and spread of non-native wildlife species that can then spread to areas downstream if their eggs, juveniles, or adults are released to downstream areas (Stephenson and Calcarone 1999). Non-native wildlife species are present in Big Tujunga Reservoir and may be released to downstream areas. These non-native species act as predators of juvenile western pond turtle and could decrease their populations. The monitoring program includes an option for removal of non-native wildlife as a Habitat Enhancement project (see Section 5.5).

4.3.2.3 SUPPLEMENTAL RELEASES

Storage of water in the Reservoir for supplemental releases (up to 1,500 af) would cause the Reservoir level to be higher for a portion of the year. As described above, western pond turtles can use both the Reservoir pool and the stream-like upper Reservoir. Therefore, storage of water for supplemental releases would not be expected to affect the amount of suitable habitat in the Reservoir. During their active period, western pond turtles would be expected to move throughout the Reservoir.

During the Rehabilitation Project, a low-flow valve was installed in the Dam to allow supplemental releases to be made over the non-storm season for the purpose of enhancing downstream habitat. As described in Section 4.1.3, HEC-RAS model results indicate that the supplemental releases add from 2.67 to 6.27 acres of additional wetted areas throughout the study area (Table 15); however, these additional areas are generally limited to flow depths of 1 inch and velocities much less than 1 fps (Table 16). The additional wetted areas added to the stream by the supplemental releases incrementally add to stream habitat being used by the western pond turtle by increasing the surface area of the stream.

HEC-RAS model results indicate that the supplemental releases result in small increases in maximum depth (less than 0.2-foot increase [2.4 inches] for most of the active stream) and small increases in average depth over the whole stream (average depth increase of 0.8 inch) (Table 17). The small increase in depth is expected to be the most beneficial effect for western pond turtle because western pond turtles prefer deeper pools.

HEC-RAS model results indicate that the supplemental releases result in a moderate increase in both maximum velocity (0.2 to 0.4 fps for most of the active stream, larger increases in segments) and a moderate increase in average velocity (average 0.2 fps faster) (Table 18, Exhibits 16 and 17). The moderate increases in average and maximum velocity are expected to be beneficial for the western pond turtle because they would provide more variety in stream habitat types (e.g., riffles).

Prior to the initiation of supplemental releases in 2012 following the Rehabilitation Project, Big Tujunga Creek would become intermittent over the summer months. Portions of the stream would dry, leaving pools with increasing temperatures and decreasing dissolved oxygen. Supplemental releases provide flow that keeps the stream wetted continuously and provide fresh, cool, oxygenated water to pools, which improves habitat and provides refugia from high summer temperatures. Both the continuous and pulsed approach to supplemental releases would be expected to provide these beneficial effects to water quality. The HCP Working Group will continue to discuss the best strategy for supplemental releases per OPER-4.

As described above, prior to the initiation of supplemental releases, portions of the river would become intermittent (depending on rainfall and the water table). Low-level water releases year-round can increase the potential spread of exotic predators into downstream areas that may have otherwise dried in the late summer months (Sweet 1992). Supplemental releases began in 2012 following completion of the Rehabilitation Project. As described in Section 4.2.3, non-native wildlife species occurrence increased from 22 percent of sampled reaches in 2011 to 80 to 91 percent of sampled reaches annually from 2015 to 2018 (Psomas 2019b). However, because the time frame of the ten-year long-term monitoring overlapped with recovery from the 2009 Station Fire, it is unknown whether the increase is due to the addition of supplemental releases or return to pre-fire conditions (Psomas 2019c). These non-native species act as predators of juvenile western pond turtles and could decrease their populations. With the combined effect of making habitat conditions more suitable for non-native predators through the non-storm season and controlling storm flows during the storm season, which would remove some non-native predators from the system, non-native predators may increase to greater populations than they would if they were in an unregulated system that experienced a natural flow regime. The monitoring program includes an option for removal of non-native wildlife as a Habitat Enhancement project (see Section 5.5).

Low-level water releases from dams can result in the development of a dense riparian corridor protected from scouring by flooding (Sweet 1992). Supplemental releases feed riparian vegetation that would otherwise die back during the summer months. Over the course of the ten-year monitoring, vegetation cover has increased from 22 percent in 2012 to over 80 percent in 2017 and 2018 (Psomas 2019b). However, it is unknown how much of this increase is due to recovery from the Station Fire and the addition of supplemental releases versus the lack of flushing flows over multiple consecutive years of low rainfall (Psomas 2019b). The three factors combined likely contributed and exacerbated the encroachment of vegetation into the stream and reduced the amount of open water. The monitoring program includes an option for removal of in-stream vegetation along the active channel as a Habitat Enhancement project (see Section 5.5).

4.3.2.4 MAINTENANCE PROJECTS

4.3.2.4.1 Inspections/Testing

No physical disturbance would be associated with these activities; therefore, there would be no direct effect on western pond turtle.

Routine facility inspection, safety inspections, and valve and slide gate testing would not involve lowering the Reservoir. Reservoir topographical surveys may involve lowering the Reservoir level temporarily to expose the upper Reservoir. An emergency safety inspection (e.g., following an earthquake) may involve lowering the Reservoir or complete dewatering. As discussed above under Section 4.3.2.2, western pond turtle would be expected to occur throughout the pool and stream-like portions of the Reservoir. During complete dewatering, western pond turtle would be expected to move upstream to suitable habitat along Big Tujunga Creek.

The valves may be opened and closed during these inspections/testing, which would temporarily release water or stop the release of water downstream of the Dam. Per MAIN-1, releases would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31), which would also benefit western pond turtles that occur downstream. Exhibit 14 shows modeled flows expected during a multiple-day release of 250 cfs; however; however, valve testing is a limited release that takes less than one hour. Therefore, flows expected would be lower than those shown on Exhibit 14. Effects would be expected to be qualitatively similar but lower in magnitude than those discussed for water conservation operation in Section 4.3.2.2. With the incorporation of MAIN-1, no effects on western pond turtle would be expected.

An emergency safety inspection (e.g., following an earthquake) may involve lowering the Reservoir. Although it has not occurred since the Dam was constructed, the inspection and/or repair may involve complete dewatering. If possible, dewatering releases would be ramped and released at a maximum of 250 cfs per MAIN-1. However, the rate of dewatering would depend on the severity of the threat to public health and safety. Dewatering may need to occur as quickly as possible. In this case, the releases could affect western pond turtle downstream of the Dam similar to the effects discussed under flood control operations in Section 4.3.2.1. It is not expected that breeding would be affected by dewatering releases, as nests are placed in terrestrial habitat on adjacent stream terraces.

4.3.2.4.2 Regular Short-Term, Small-Scale Maintenance

Western pond turtles may occur in the Reservoir near either of the boat launches. However, there is a cliff between the Reservoir and the upland areas of the northern boat launch. Therefore, western pond turtles would not be expected to occur in the areas to be graded for boat launch maintenance, except for the area where the boat launch enters the water. Western pond turtles may occur along the water's edge near the southern boat launch. During the active period for western pond turtle, it is anticipated that individuals would retreat into the water and escape the work area prior to grading of the boat launch. No take of western pond turtles would be expected.

Western pond turtles are expected to bask on debris (e.g., logs) to be removed by trash booming. During the active period for western pond turtle, it is anticipated that individuals would retreat into the water and escape the debris removal area prior to movement of debris. Outside of the active period, western pond turtles would not be basking on debris and would not be affected. Removal of debris from the trash boom would affect approximately 0.85 acre of open water (Table 19, Exhibit 18). No take of western pond turtles would be expected.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. During trash booming, the Reservoir may be temporarily lowered or held steady. Per MAIN-1, releases to lower the Reservoir would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31), which would also benefit western pond turtles that occur downstream. Exhibit 14 shows modeled flows expected during a multiple-day release of 250 cfs. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.3.2.2. With the incorporation of MAIN-1, no effects on western pond turtle would be expected.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for the western pond turtle by affecting visibility for foraging. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on western pond turtles. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-3 and MAIN-6. With the incorporation of MAIN-3 and MAIN-6, no effects on western pond turtle would be expected.

4.3.2.4.3 Infrequent Short-Term, Small-Scale Maintenance

Maintenance on Dam/Rockfall Hazard for Access Roads

Most infrequent short-term, small-scale maintenance projects would occur on the Dam structure, adjacent developed areas, or upland habitats (i.e., repair or painting of trash racks/penstocks; repair, replacement, or installation of leakage points, piezometers, or other instrumentation and gages; repair of gunite and erosion protection measures; and rockfall hazard mitigation). Undeveloped areas that would be impacted are extremely steep (e.g., cliffs) and would not be expected to be used by western pond turtle. Areas mapped as open water would be dewatered prior to the project; therefore, western pond turtle would not be expected to occur. Maintenance on the Dam is not expected to affect the western pond turtle.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. Per MAIN-1, dewatering releases would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31), which would also benefit western pond turtles that occur downstream. Exhibit 14 shows modeled flows expected during a multiple-day release of 250 cfs. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.3.2.2. With the incorporation of MAIN-1, no effects on western pond turtle would be expected.

During the work, flow through the affected penstock may be temporarily stopped to allow for repair work. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. Therefore, the stream would be expected to continue to flow and provide habitat for the western pond turtle.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for the western pond turtle by affecting visibility for foraging. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on western pond turtles. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-3 and MAIN-6. With the incorporation of MAIN-3 and MAIN-6, no effects on western pond turtle would be expected.

Downstream Maintenance

Repair of the downstream stream gage would impact 0.07 acre white alder grove–willow thicket. Repair of the downstream stream channel could impact up to 2.62 acres white alder grove–willow thicket. Repair of the downstream stream channel would impact 0.05 acre white alder grove–willow thicket. These three projects overlap; the total area of white alder grove–willow thicket that could be disturbed would be 2.69 acres (Exhibit 19b, Table 20). Construction vehicles working near the plunge pool or along the active stream may impact western pond turtles during vegetation clearing or installation of BMPs. During the active period for western pond turtle, it is anticipated that most individuals would retreat into the water and escape the work area. However, during colder time periods western pond turtles may be aestivating in terrestrial vegetation or in sediment along the edge of the stream and may not escape prior to being crushed. Western pond turtles could also be killed or injured by construction vehicles when crossing the access roads near the work area. Per MAIN-3, pre-construction surveys would be required to relocate western pond turtles out of the immediate work area, biological monitoring would be required when work is along the downstream portion of the stream, and exclusion fencing would be required to ensure that western pond turtles do not occur on the access roads. With the incorporation of MAIN-3, no take of western pond turtle would be expected.

Dam valves may need to be closed temporarily to minimize flows during the work to provide for the safety of crews working downstream of the Dam. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. Therefore, the stream would be expected to continue to flow and provide habitat for the western pond turtle. If necessary for the repairs, stream flow would be diverted around the work area using BMPs. With the incorporation of MAIN-3 and MAIN-6, no effects on western pond turtle would be expected.

Downstream of the Dam, an access road crosses Big Tujunga Creek to allow vehicle traffic to access the western abutment of the Dam and the plunge pool area. Per MAIN-3, if road replacement is necessary, the road/stream crossing design would continue to allow aquatic species passage, including western pond turtle.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for the western pond turtle by affecting visibility for foraging. If chemicals or excess silt are washed into downstream areas, they could have detrimental effects on western pond turtles. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-3 and MAIN-6. With the incorporation of MAIN-3 and MAIN-6, no effects on western pond turtle would be expected.

Geotechnical Exploration

Geotechnical exploration would occur following an earthquake or landslide. The specific location of the work would depend on the event that triggers the geotechnical exploration. Disturbance as a result of geotechnical exploration is expected to be limited in extent (i.e., cores of less than 24 inches diameter [< 0.0001 acre], trenches less than 0.01 acre) and would be expected to be placed in upland habitats (i.e., outside riparian habitats). During the active period for western pond turtle, it is anticipated that most individuals would retreat into the water and escape the work area. However, during colder time periods western pond turtle may be aestivating in terrestrial vegetation or in sediment along the edge of the stream and may not escape prior to being crushed. Western pond turtles could also be killed or injured by construction vehicles when crossing the access roads near the work area. Per MAIN-3, biological monitoring would be required when work is adjacent to the plunge pool or along the downstream portion of the stream. With the incorporation of MAIN-3, no take of western pond turtle would be expected.

Dam valves may need to be closed temporarily to allow a drill rig to drill downstream of the Dam or to allow a geologist to safely investigate the area. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for the western pond turtle by affecting visibility for foraging. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on western pond turtles. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-3 and MAIN-6. With the incorporation of MAIN-3 and MAIN-6, no effects on western pond turtle would be expected.

4.3.2.4.4 <u>Infrequent Long-Term, Large-Scale Maintenance</u>

Infrequent long-term, large-scale maintenance projects (i.e., sediment removal, subsurface grouting, and concrete repair) would require complete or partial dewatering of the Reservoir for work throughout one or more non-storm seasons. Impacts resulting from subsurface grouting and concrete repair would be less in extent than those described for sediment removal. It should be noted that when Public Works is planning to dewater for a large-scale maintenance project, they attempt to group as many maintenance projects into the effort as possible to reduce the number of years that the Reservoir is dewatered.

The western pond turtle occurs throughout the sediment removal area. Sediment removal would impact 49.69 acres of suitable habitat for the western pond turtle (0.06 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 0.23 acre arroyo willow thicket, 0.46 acre mulefat thicket, 2.29 acres smartweed–cocklebur patch, 0.01 acre freshwater seep, 0.04 acre disturbed freshwater seep, 43.35 acres open water, 3.08 acres dry wash) (Exhibit 20). Subsurface grouting and concrete repair would impact 19.13 acres of suitable habitat for the western pond turtle (0.04 acre disturbed freshwater seep and 19.09 acres open water) (Exhibit 21). When sediment removal is occurring, the Reservoir and plunge pool would not be available as habitat to the western pond turtle during the non-storm season. When subsurface grouting or concrete repair are occurring, the lower portion of the Reservoir and plunge pool would not be available as habitat to the western pond turtle during the non-storm season. However, the impact would be temporary, as the Reservoir and plunge pool would be available as habitat during the storm season and following completion of the maintenance activity.

Construction vehicles working in the dewatered Reservoir or in the dewatered plunge pool may impact western pond turtles during vegetation clearing or installation of BMPs. Western pond turtles could also be killed or injured by construction vehicles when crossing the access roads near the work area. Per MAIN-3, pre-construction surveys would be required to relocate western pond turtles out of the work area, biological monitoring would be required during dewatering and throughout construction, and exclusion fencing would be required to ensure that western pond turtles do not enter the work area. With the incorporation of MAIN-3, no take of western pond turtle would be expected.

Dewatering would occur prior to an infrequent long-term, large-scale maintenance project. Dewatering would begin during the typical storm season (i.e., October 15 to April 15); however, dewatering following installation of the bypass line and dewatering below the minimum pool would occur after the storm season ends (i.e., April 15) and could be delayed if a late-season storm occurred. As described in Table 12 in Section 3.4.4, during a wet year, releases over 100 cfs would occur for approximately six days; during average years, releases over 100 cfs would occur for a total of four days; and in dry years, releases over 100 cfs would not occur. These releases would be considered similar to a multiple-day spring storm. Per MAIN-1, releases would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31), which would also benefit western pond turtles that occur downstream. Modeled flows expected during a 250-cfs release are shown in Exhibit 14. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.3.2.2. With the incorporation of MAIN-1, no effects on western pond turtle downstream of the Dam would be expected.

As mentioned above in Section 4.2.2, non-native wildlife are often present in reservoirs and could spread to downstream areas during dewatering. Non-native wildlife act as predators on juvenile and small adult western pond turtles and can decrease their populations. Per MAIN-1, a screen with 0.125-inch mesh would be used at the inflow of the dewatering pump to prevent non-native wildlife from spreading from the Reservoir to areas below the Dam. Complete dewatering would also have the beneficial effect of eradicating non-native aquatic wildlife from the Reservoir. With the incorporation of MAIN-1, the effect of removing non-native aquatic wildlife from the Reservoir would have a beneficial effect on western pond turtle.

When the Reservoir is dewatered for infrequent long-term, large-scale maintenance projects, a bypass line would carry flows from Big Tujunga Creek upstream of the project area within Big Tujunga Reservoir to Big Tujunga Creek downstream of the plunge pool. Per MAIN-3, water temperatures in the bypass line would be cooled so that water from the bypass outflow would be similar to water temperatures at the bypass inflow upstream of the Reservoir. All available inflow would be conveyed downstream. During bypass line operation, downstream hydrology would be subject to natural fluctuations depending on weather patterns over the years in which the maintenance project occurs. Over this time period, if natural conditions caused the stream to go dry, western pond turtles would be expected to move upstream/downstream to find suitable habitat. With the incorporation of MAIN-3, no effects on western pond turtle would be expected.

Since the completion of the Rehabilitation Project in 2012, supplemental releases have been made throughout the non-storm season (i.e., outflow equals inflow plus supplemental releases). During infrequent long-term, large-scale maintenance projects, supplemental releases would not be available for a period of up to five years (i.e., sediment removal) and the downstream system would be entirely dependent on natural conditions, as described above. A period with no supplemental releases may be beneficial for the system, as it could allow the stream to become intermittent in the summer months, which could counteract the potential detrimental effects of supplemental releases described in Section 4.2.3. A drying stream may cause some mortality of non-native wildlife species and/or reduce their distribution, which would reduce predation on western pond turtle.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for the western pond turtle by affecting visibility for foraging. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on western pond turtles. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-3 and MAIN-6. With the incorporation of MAIN-3 and MAIN-6, no effects on western pond turtle would be expected.

4.3.2.5 SPILLWAY IMPROVEMENT PROJECT

Construction of the Spillway Improvement Project would occur on the Dam structure and in upland areas. Undeveloped areas that would be impacted are extremely steep (e.g., cliffs) and would not be expected to be used by western pond turtles. Areas mapped as open water would be dewatered prior to the project; therefore, western pond turtles would not be expected to occur. Maintenance on the Dam is not expected to affect the western pond turtle.

The only portion of the project that would directly impact downstream of the Dam is dewatering of the plunge pool for installation of BMPs. This would require dewatering of 1.45 acres of open water in the plunge pool that is occupied by western pond turtle. During construction of the Spillway Improvement Project, the plunge pool would not be available as habitat to the western pond turtle during the non-storm season; however, the impact would be temporary. The plunge pool would be available as habitat during the storm season and following completion of the Spillway Improvement Project.

Installation of BMPs in the plunge pool could cause injury or mortality by crushing western pond turtles with equipment or by stepping on or driving over rocks that are providing shelter. Prior to installation of BMPs in the plunge pool at the beginning of the non-storm season, MAIN-3 would be followed to ensure that western pond turtles are relocated out of the work area. With the incorporation of MAIN-3, no effects on western pond turtle would be expected.

Construction of the Spillway Improvement Project would require only partial dewatering prior to the non-storm season. The effects of dewatering would be the same as those as described above in Section 4.3.2.4.4. As described above, releases during the Covered Fish breeding season (March 1 to July 31) would be limited to 250 cfs and would be ramped per MAIN-1, which would also benefit the western pond turtles downstream of the Dam. Modeled flows expected during a 250-cfs release are shown in Exhibit 14. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.3.2.2. With the incorporation of MAIN-1, no effects on western pond turtle downstream of the Dam would be expected.

Petroleum, chemicals, and/or concrete washings are toxic to aquatic wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of aquatic species. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for the western pond turtle by affecting visibility for foraging. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on western pond turtles. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-3 and MAIN-6. With the incorporation of MAIN-3 and MAIN-6, no effects on western pond turtle would be expected.

Following construction of the Spillway Improvement Project, the capacity of the Reservoir would increase by approximately 7.20 acres, periodically inundating areas between elevation 2,290 feet and elevation 2,298 feet. The area is expected to be inundated for only a few weeks once every ten years; however, it may occur more frequently if large storms occur more frequently. As western pond turtles occupy both habitat types, the inundation of stream habitat is not expected to affect the distribution of western pond turtles. Additionally, the inundation would be expected to occur during the storm season when the western pond turtles are aestivating. Therefore, no impact on western pond turtle habitat would be expected due to the additional inundation. If storms occurred during the turtles' active period, they would beneficially impact the habitat by increasing the amount of ponded area.

4.3.2.6 FUTURE TRANSLOCATION

Following translocation of Covered Fish upstream of the Reservoir, maintenance projects that include dewatering would involve pre-construction surveys and relocation of Covered Fish out of the work area. Fish surveys are not expected to impact western pond turtles.

4.3.2.7 MITIGATION PROGRAM EFFECTS

The mitigation program described in Section 3 does not include restoration at a mitigation site. The measures that would be applied to operations have been described above. OPER-1 is discussed under Sections 4.1.1 and 4.3.2.1, OPER-2 is discussed under Sections 4.1.2 and 4.3.2.2. OPER-3 is discussed under Section 4.1.3 and 4.3.2.3. OPER-4 is a requirement to monitor the populations of Covered Species and use Adaptive Management to make adjustments needed for the benefit of western pond turtle.

MAIN-3 describes measures that would avoid and minimize impacts on western pond turtle. Prior to installation of BMPs in the plunge pool or work within downstream areas, western pond turtles would be relocated out of the work area. This work would involve trapping and handling adult and juvenile western pond turtles to move them out of work areas. Although current protocols would be followed, there is a limited chance that western pond turtles could be inadvertently injured or killed in traps or during handling, transport, or release. MAIN-3 requires that the USFWS review and approve the methods in the WPTRP prior to relocation of western pond turtles. Relocation of western pond turtles would be conducted by one or more Biologists holding the appropriate permits to handle them. Therefore, take of western pond turtle individuals during pre-construction trapping and relocation out of the work area is expected to be minimal.

MAIN-3 also requires monitoring throughout construction/maintenance. If a Biologist observes western pond turtles in the work area, the Biologist would be authorized to move them to suitable habitat in the adjacent active channel. Western pond turtle individuals may be inadvertently injured or killed during handling, transport, or release. As described above, MAIN-3 requires that the USFWS review and approve the methods in the WPTRP prior to relocation of western pond turtles. Relocation of western pond turtles would be conducted by one or more permitted Biologists holding the appropriate permits to handle them. Therefore, take of western pond turtle individuals during monitoring and relocation out of the work area is expected to be minimal.

4.4 BIOLOGICAL EFFECTS TO COVERED RIPARIAN BIRD SPECIES

4.4.1 FLOOD CONTROL OPERATIONS

Potentially suitable habitat for riparian bird species occurs along Big Tujunga Creek both upstream and downstream of the Reservoir, with a more well-developed riparian forest downstream of the Dam. Most flood control operations would occur during the non-breeding season when Covered Riparian Birds are on their wintering grounds. Therefore, flood control releases during the non-breeding season would have no effect on least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo individuals.

While storms generally occur in the fall and winter, a spring storm could occur during the breeding season (e.g., March/April). If a bird builds a nest close to the active stream, rising high flows could impact the nest. Upstream of the Reservoir, this would be the result of natural flood events and not attributable to operations. Downstream of the Dam, flood control releases would be associated with storm events. Of the three species, least Bell's vireo has the highest potential to be affected by a spring storm because its nesting period begins earlier than the other species (i.e., March/April), which is at the end of the storm season. However, the potential that this would occur is expected to be minimal. Southwestern willow flycatcher begins breeding later (i.e., May/June) and would have even less chance to be affected by spring storms because, typically, few storms occur after the storm season. Western yellow-billed cuckoos are not expected to be affected by spring storm flood control releases because they do not arrive and begin breeding until the summer (i.e., June/July).

HEC-RAS results for a 600-cfs modeled flow release downstream of the Dam show that maximum depth is 9 feet deep, which is only 1 foot deeper than the maximum depth for the 250-cfs modeled flow release (Psomas 2020b). Furthermore, under current operation, flood control releases are limited to a maximum of 500 cfs so that flows do not overtop the downstream Oro Vista Avenue crossing; thus, actual flows would be less than shown by the 600-cfs modeling (i.e., less than a 1-foot difference in water depth). The chance that a nest of a least Bell's vireo or southwestern willow flycatcher would be placed within 1 foot of the water level, that a spring storm would occur, and that the stream would rise enough to affect the nest is expected to be extremely limited. Additionally, the impact would have been associated with natural flood conditions and, without attenuation from the Dam, the stream's water would rise higher and faster than with the Dam in place. Therefore, attenuation of spring flood flows would be a beneficial effect of the Dam for Covered Riparian Birds nesting downstream during a large spring storm.

The Reservoir level may fluctuate during flood control operations and may temporarily inundate up to 6.36 acres of riparian scrub/forest vegetation (0.82 acre white alder grove-willow thicket, 0.17 acre black willow thicket, 4.74 acres arroyo willow thicket, 0.03 acre sandbar willow thicket, and 0.60 acre mulefat thicket) when the Reservoir is filled to capacity. As described above, Covered Riparian Birds would be on their wintering grounds during much of the storm season and would not be directly affected.

If a large spring storm occurred late in the storm season (e.g., March/April), it could temporarily inundate the riparian scrub/forest habitat at the upper end of the Reservoir. However, the Reservoir would need to be more than 75 percent full to inundate this area. As described above for downstream areas, the chance that a nest would be placed close to the water level in the Reservoir footprint, that a spring storm would occur, and that the Reservoir would be inundated enough to affect that nest is expected to be minimal for the least Bell's vireo. The potential that a nest would be affected would be even lower for the southwestern willow flycatcher, while western yellow-billed cuckoo would not be expected to be affected due to the later timing of their nesting, as described above.

Flood control operations (i.e., releases) that mimic inflow conditions to the extent possible, while protecting human life and property, would benefit Covered Riparian Birds downstream by maintaining the natural flood disturbance regime and periodically removing in-stream vegetation to allow for new understory growth and a varied habitat mosaic. As described in Section 4.1.1., the downstream system experiences up to five-year storm events (500 cfs) as it would in a natural system. However, the Dam reduces the intensity of intermediate-sized storms (500 cfs to 3,000 cfs) downstream to Stone Canyon. As described in Section 4.1.1., vegetation in this portion of the stream may be disturbed less frequently than it would in a natural system, leading to higher vegetation cover and a more mature, extensive, and monotypic riparian forest, decreasing habitat quality and quantity for Covered Riparian Birds. The stream would experience natural disturbance events approximately every 25 years when the Dam goes to spillway (greater than 3,000 cfs), clearing substantial amounts of in-stream vegetation and redistributing sediment. The downstream area indirectly affected within the Dam's Limit of Hydraulic Influence includes approximately 111.20 acres of riparian habitat over 4.8 stream miles (Table 14). Of this, 85.85 acres are currently mapped as riparian scrub/forest and would be potentially suitable for riparian bird species; however, the habitat mosaic would change over time.

4.4.2 WATER CONSERVATION OPERATIONS

The Reservoir level could fluctuate within its footprint during water conservation operations. If the upper 25 percent of the Reservoir were inundated, it could inundate the riparian scrub/forest habitat at the upper end of the Reservoir, which provides potentially suitable habitat for riparian bird species. Reservoir fluctuation could temporarily inundate up to 6.36 acres of riparian scrub/forest habitat in the upper Reservoir (0.82 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 4.74 acres arroyo willow thicket, 0.03 acre sandbar willow thicket, and 0.60 acre mulefat thicket). As riparian scrub/forest habitat is located in the upper Reservoir, it is expected to be inundated for the least amount of time. While the riparian habitat would be periodically inundated, it is not expected to be frequent enough or long enough in duration to cause conversion of the habitat to another type. Therefore, no effect on habitat for Covered Riparian Birds would be expected due to inundation.

As described in Section 4.1.2, the mean Reservoir water surface elevation over the non-storm season is 2,240.7 feet; and the Reservoir maximum water surface elevation is 2,290 feet (Exhibit 15). While storms generally occur in the fall and winter, a spring storm could occur during the breeding season (e.g., March/April). Of the three species, least Bell's vireo has the highest potential to be affected by a spring storm because its nesting period begins earlier than the other species (i.e., March/April), which is at the end of the storm season. However, the potential that this would occur is expected to be minimal. Southwestern willow flycatcher begins breeding later (i.e., May/June) and would have even less chance to be affected by spring storms because, typically, few storms occur after the storm season. Western yellow-billed cuckoos are not expected to be affected by spring storm flood control releases because they do not arrive and begin breeding until the summer (i.e., June/July). The chance that a nest would be placed close to the water level in the upper Reservoir footprint and that the Reservoir would be inundated enough during the non-storm season to affect that nest is expected to be minimal for the least Bell's vireo. No effect on southwestern willow flycatcher or western yellow-billed cuckoo nests would be expected due to inundation.

Downstream of the Dam, water conservation releases would be limited to 250 cfs during the Covered Fish breeding season per OPER-2. Water conservation releases of 100 to 250 cfs are not expected to substantially inundate stream habitat. HEC-RAS results for a 250-cfs modeled flow release show that maximum stream depth would be approximately 2 feet deeper than the maximum depth for the 5-cfs modeled release (Psomas 2020b). Under current operations, water conservation releases are often closer to 100 cfs; thus, actual flows would be less than modeled (i.e., less than a 2-foot difference in depth). Additionally, water conservation releases are typically done at the beginning of the non-storm season (April/May) or following a spring storm, which is more likely to occur earlier in the non-storm season. The chance that a nest would be built prior to the water conservation release, placed within 2 feet of the water level (assuming implementation of OPER-2), and that the stream would rise enough during a water conservation release to affect the nest is expected to be minimal for the least Bell's vireo. No effect on southwestern willow flycatcher or western yellow-billed cuckoo would be expected due to water conservation releases.

4.4.3 SUPPLEMENTAL RELEASES

As described in Section 4.1.2, storage of water in the Reservoir for supplemental releases (up to 1,500 af) would cause the Reservoir level to be higher. Adding 1,500 af of water above minimum pool would bring the Reservoir elevation to 2,256.7 feet (Exhibit 15). As water is released over the non-storm season, the Reservoir level would subside, exposing more stream-like habitat. As the habitat for riparian bird species (i.e., riparian scrub/forest) is located in the upper 25 percent of the Reservoir, it would not be expected to be affected by storage of water for the supplemental releases. Therefore, no effect on habitat for Covered Riparian Birds would be expected due to inundation.

During the Rehabilitation Project, a low-flow valve was installed in the Dam to allow supplemental releases to be made over the non-storm season for the purpose of enhancing downstream habitat. As described in Section 4.1.3, HEC-RAS model results indicate that the supplemental releases add from 2.67 to 6.27 acres of additional wetted areas (Table 15). The additional wetted areas added to the stream by the supplemental releases incrementally support additional riparian vegetation, which provides additional habitat for Covered Riparian Birds, along Big Tujunga Creek downstream of the Reservoir. This would be a beneficial effect of supplemental releases on habitat for Covered Riparian Birds.

HEC-RAS model results indicate that the supplemental releases result in small increases in maximum depth (less than 2.4 inches for most of the active stream) and small increases in average depth over the whole stream (average depth increase of 0.8 inch) (Table 17). As supplemental releases remain relatively constant over the non-storm season, the stream depth is not expected to change quickly enough to affect Covered Riparian Birds nesting near the water surface level. If supplemental releases are conducted in the future by releasing larger pulsed flow rather than continuous releases, effects would be expected to be comparable to those discussed for water conservation releases in Section 4.4.2. The HCP Working Group will continue to discuss the best strategy for supplemental releases per OPER-4.

Low-level water releases from dams can result in the development of a dense riparian corridor protected from scouring by flooding (Sweet 1992). Supplemental releases feed riparian vegetation that would otherwise die back during the summer months. Over the course of the ten-year monitoring, vegetation cover has increased from 22 percent in 2012 to over 80 percent in 2017 and 2018 (Psomas 2019b). However, it is unknown how much of this increase is due to the addition of supplemental releases and recovery from the Station Fire versus the lack of flushing flows over multiple consecutive years of low rainfall (Psomas 2019b). All of these factors likely contributed to the increase in riparian canopy cover. In the short-term, this increase is beneficial for Covered Riparian Birds as it increases the amount of riparian scrub/forest habitat. However, over the long-term, the lack of flushing flows causes the riparian habitat to mature and shade out the understory. Periodic flooding is needed to maintain the habitat mosaic with openings where new understory growth can occur. The effect that supplemental releases have on riparian scrub/forest habitat depends on the successional stage of the habitat (young versus mature), which depends on the natural flood regime at a particular point in time. If flooding has recently removed substantial vegetation and created openings, supplemental releases would be beneficial by watering the habitat. If an extended amount of time has passed since the last flood or other disturbance and the habitat is becoming mature, supplemental releases likely exacerbate the decline in habitat quality and quantity by increasing the mature riparian vegetation and shading out the shrubby understory preferred by Covered Riparian Birds. The monitoring program includes an option for removal of in-stream vegetation along the active channel as a Habitat Enhancement project (see Section 5.5).

4.4.4 MAINTENANCE PROJECTS

4.4.4.1 INSPECTIONS/TESTING

No physical disturbance would be associated with these activities; therefore, there would be no direct effect on Covered Riparian Birds.

Routine facility inspection, safety inspections, and valve and slide gate testing would not involve lowering the Reservoir. Reservoir topographical surveys may involve lowering the Reservoir level temporarily to expose the upper Reservoir. As riparian scrub/forest is located in the upper Reservoir, lowering the water level would not affect Covered Riparian Birds.

The valves may be opened and closed during these inspections/testing, which would temporarily release water or stop the release of water downstream of the Dam. Per MAIN-1, releases would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31). Routine inspections/testing typically occur at the beginning of the non-storm season (April/May) and the beginning of the storm season (October/November). During the non-storm season, effects would be expected to be qualitatively similar but lower in magnitude than those discussed for water conservation operation in Section 4.4.2. With implementation of MAIN-1, potential effects on nests of Covered Riparian Birds would be expected to be minimal for the least Bell's vireo. No effect on southwestern willow flycatcher or western yellow-billed cuckoo nests would be expected due to the timing of dewatering releases as discussed in Section 4.4.2. No effect would be expected due to routine inspections/testing during the storm season because Covered Riparian Birds would be on their wintering grounds.

An emergency safety inspection (e.g., following an earthquake) may involve lowering the Reservoir. Although it has not occurred since the Dam was constructed, the inspection and/or repair may involve complete dewatering. If possible, dewatering releases would be ramped and released at a maximum of 250 cfs, per MAIN-1. However, the rate of dewatering would depend on the severity of the threat to public health and safety. Dewatering may need to occur as quickly as possible. In this case, the releases would be expected to affect Covered Riparian Birds similar to the effects discussed under flood control operations in Section 4.4.1. With implementation of MAIN-1, potential effects on nests of Covered Riparian Birds would be expected to be minimal.

4.4.4.2 REGULAR SHORT-TERM, SMALL-SCALE MAINTENANCE

Regular short-term, small-scale maintenance would occur just upstream of the Dam structure at the downstream end of the Reservoir. As potential habitat for Covered Riparian Birds occurs at the upper end of the Reservoir and downstream of the Dam, no direct effect on Covered Riparian Birds would result.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. Planned maintenance typically occurs at the beginning of the non-storm season. During trash booming, the Reservoir may be temporarily lowered or held steady. Per MAIN-1, releases to lower the Reservoir would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31). Exhibit 14 shows modeled flows expected during a multiple day release of 250-cfs. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.4.2 (e.g., potential loss of nests placed low to the water). With implementation of MAIN-1, potential effects on nests of Covered Riparian Birds would be expected to be minimal for the least Bell's vireo. No effect on southwestern willow flycatcher or western yellow-billed cuckoo nests would be expected due to the timing of dewatering releases as discussed in Section 4.4.2.

Petroleum, chemicals, and/or concrete washings are toxic to wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of species drinking or bathing in the water. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on water quality. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-1 and MAIN-6. With implementation of MAIN-1 and MAIN-6, no effects on Covered Riparian Birds would be expected.

4.4.4.3 INFREQUENT SHORT-TERM, SMALL-SCALE MAINTENANCE

Maintenance on Dam/Rockfall Hazard for Access Roads

Infrequent short-term, small-scale maintenance on the Dam would occur on the Dam structure and adjacent developed areas. Rockfall hazard for access roads would occur on steep slopes and would affect upland habitats. No riparian scrub/forest habitat would be affected; therefore, no direct effect on Covered Riparian Birds would result.

If the work occurs during the breeding season (i.e., March 15 to September 15), noise from maintenance activities may cause Covered Riparian Birds within approximately 500 feet to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Maintenance activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Per MAIN-4, pre-construction surveys would be required if riparian scrub/forest habitat is located within 500 feet of the maintenance work; if least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo are observed, a RBCP would be prepared describing noise-reduction measures, monitoring, and reporting. With implementation of MAIN-4, no effect on Covered Riparian Birds would be expected. If the work occurs during the non-breeding season (i.e., September 16 to March 14), Covered Riparian Birds would be on their wintering ground and there would be no effect.

Planned maintenance would be scheduled at a time when the Reservoir elevation is low to avoid unnecessary releases; however, drawdown could be required in an emergency repair situation. Planned maintenance typically occurs at the beginning of the non-storm season. Per MAIN-1, releases to lower the Reservoir would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31). Exhibit 14 shows modeled flows expected during a multiple day release of 250 cfs release. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.4.2 (e.g., potential loss of nests placed low to the water). With implementation of MAIN-1, potential effects on nests of Covered Riparian Birds are expected to be minimal for the least Bell's vireo. No effect on southwestern willow flycatcher or western yellow-billed cuckoo nests would be expected due to the timing of dewatering releases as discussed in Section 4.4.2.

During the work, flow through the affected penstock may be temporarily stopped to allow for repair work. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. Covered Riparian Birds are not limited to wetted areas; therefore, temporarily altering the flow through the valves is not expected to affect the distribution of Covered Riparian Birds.

Petroleum, chemicals, and/or concrete washings are toxic to wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of species drinking or bathing in the water. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on water quality. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-1 and MAIN-6. With implementation of MAIN-1 and MAIN-6, no effects on Covered Riparian Birds would be expected.

Downstream Maintenance

Repair of the downstream stream gage would impact 0.07 acre white alder grove–willow thicket. Repair of the downstream stream channel could impact up to 2.62 acres white alder grove–willow thicket. Repair of the downstream stream channel would impact 0.05 acre white alder grove–willow thicket. These three projects overlap; the total area of white alder grove–willow thicket that could be temporarily disturbed would be 2.69 acres (Exhibit 19b, Table 20). If riparian scrub/forest habitat is removed during the breeding season (i.e., March 15 to September 15), it could kill or injure least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo adults, eggs, or young. It could also cause abandonment of a nest (i.e., nest failure). Re-nesting in another location would cost the pair additional energy; thus, re-nesting may not be possible if it is too late in the season or if the pair does not have enough energy (depending on the rainfall and prey base for that year). Removal of habitat could also remove a portion of the riparian bird's territory, which would limit the foraging area and may cause a male to have to establish additional habitat as part of his territory. MAIN-4 requires that habitat be removed outside the breeding season or that a pre-construction survey be conducted to confirm no nests are in the area prior to removal of habitat during the breeding season. With implementation of MAIN-4, no take of Covered Riparian Birds would be expected. If the habitat is removed during the non-breeding season (i.e., September 16 to March 14), it would not kill or injure individuals or affect territories because Covered Riparian Birds would be on their wintering grounds; however, the habitat would not be available for Covered Riparian Birds the following spring. The removal of habitat for downstream stream maintenance would be temporary. With implementation of MAIN-6, habitat would be re-seeded and would be expected to re-establish following completion of the maintenance.

Additionally, if the work occurs during the breeding season (i.e., March 15 to September 15), noise from maintenance activities may cause Covered Riparian Birds within approximately 500 feet to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Maintenance activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Per MAIN-4, pre-construction surveys would be required if riparian scrub/forest habitat is located within 500 feet of the maintenance work; if least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo are observed, a RBCP would be prepared describing noise-reduction measures, monitoring, and reporting. With implementation of MAIN-4, no effects on Covered Riparian Birds would be expected. If the work occurs during the non-breeding season (i.e., September 16 to March 14), Covered Riparian Birds would be on their wintering ground and there would be no effect due to noise.

Dam valves may need to be closed temporarily to minimize flows during the work to provide for the safety of crews working downstream of the Dam. However, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. Covered Riparian Birds are not limited to wetted areas; therefore, temporarily altering the flow through the valves is not expected to affect the distribution of Covered Riparian Birds.

If necessary for the repairs, stream flow would be diverted around the work area using BMPs. Stream diversion and/or installation of BMPs could affect riparian scrub/forest habitat for Covered Riparian Birds. Per MAIN-4, installation of BMPs would be conducted under the supervision of a Biological Monitor to ensure that no nests are impacted by the work. With implementation of MAIN-4, no take of Covered Riparian Birds would be expected.

Petroleum, chemicals, and/or concrete washings are toxic to wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of species drinking or bathing in the water. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds. If chemicals or excess silt are washed into downstream areas, they could have detrimental effects on water quality. BMPs would be used to protect water quality downstream from the maintenance projects per MAIN-1 and MAIN-6. With implementation of MAIN-1 and MAIN-6, no effects on Covered Riparian Birds would be expected.

Geotechnical Exploration

Geotechnical exploration would occur following an earthquake or landslide. The specific location of the work would depend on the event that triggers the geotechnical exploration. Disturbance as a result of geotechnical exploration is expected to be limited in extent (i.e., cores of less than 24 inches diameter [< 0.0001 acre], trenches less than 0.01 acre) and would be expected to be placed in upland habitats (i.e., outside riparian habitats). Therefore, no direct effect on Covered Riparian Birds would be expected.

During the breeding season for Covered Riparian Birds (i.e., March 15 to September 15), noise from geotechnical activities may cause Covered Riparian Birds within approximately 500 feet to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Geotechnical activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Per MAIN-4, pre-construction surveys would be required if riparian scrub/forest habitat is located within 500 feet of the geotechnical activities. It is expected that if a least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo is observed within 500 feet, the geotechnical exploration would be moved at least 500 feet away. However, if the location cannot be moved, a RBCP would be prepared describing noise-reduction measures, monitoring, and reporting, per MAIN-4. With implementation of MAIN-4, no take of Covered Riparian Birds would be expected. If geotechnical work occurs during the non-breeding season (i.e., September 16 to March 14), Covered Riparian Birds would be on their wintering ground and there would be no effect due to noise.

Dam valves may need to be closed temporarily to allow a drill rig to drill downstream of the Dam or to allow a geologist to safely investigate the area. As discussed above, this would not disrupt all flows since seepage from the Dam (1 to 2 cfs, unless the Reservoir is below minimum pool) and inflow from other downstream tributaries would continue to occur. Covered Riparian Birds are not limited to wetted areas; therefore, temporarily altering the flow through the valves is not expected to affect Covered Riparian Birds.

Petroleum, chemicals, and/or concrete washings are toxic to wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of species drinking or bathing in the water. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on water quality. BMPs would be used to protect water quality downstream from the maintenance projects, per MAIN-1 and MAIN-6. With implementation of MAIN-1 and MAIN-6, no effects on Covered Riparian Birds would be expected.

4.4.4.4 INFREQUENT LONG-TERM, LARGE-SCALE MAINTENANCE

Infrequent long-term, large-scale maintenance projects (i.e., sediment removal, subsurface grouting, and concrete repair) would require complete or partial dewatering of the Reservoir for work throughout one or more non-storm seasons. Impacts resulting from subsurface grouting and concrete repair would be less in extent than those described for sediment removal. It should be noted that when Public Works is planning to dewater for a large-scale maintenance project, they attempt to group as many maintenance projects into the effort as possible to reduce the number of years that the Reservoir is dewatered.

Sediment Removal

Sediment removal would temporarily affect 0.92 acre of riparian habitat (0.06 acre white alder grove—willow thicket, 0.17 acre black willow thicket, 0.23 acre of arroyo willow thicket, and 0.46 acre mulefat thicket) (Exhibit 20). Due to the nature of the Project, sediment removal would begin at the end of the rainy season (i.e., April 16 of each year), which is during the breeding season. Removal of riparian scrub/forest habitat and installation of the bypass line and/or BMPs for the maintenance project could kill or injure least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo adults, eggs, or young. It could also cause abandonment of a nest (i.e., nest failure). Re-nesting in another location would cost the pair additional energy; thus, re-nesting may not be possible if it is too late in the season or if the pair does not have enough energy (depending on the rainfall and prey base for that year). Removal of habitat could also remove a portion of the riparian bird's territory, which would limit the foraging area and may cause a male to have to establish additional habitat as part of his territory. MAIN-4 requires that habitat be removed outside the breeding season or that a preconstruction survey be conducted to confirm no nests are present prior to removal of habitat during the breeding season. With implementation of MAIN-4, no take of Covered Riparian Birds would be expected. If the habitat is removed during the non-breeding season (i.e., September 16 to March 14), it would not kill or injure individuals or affect territories because Covered Riparian Birds would be on their wintering grounds; however, the habitat would not be available for Covered Riparian Birds the following spring. The removal of habitat for downstream stream maintenance would be temporary. With implementation of MAIN-6, habitat would be re-seeded and would be expected to re-establish following completion of the maintenance.

Additionally, noise from sediment removal may cause Covered Riparian Birds within approximately 500 feet to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Maintenance activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Per MAIN-4, pre-construction surveys would be required if riparian scrub/forest habitat is located within 500 feet of the maintenance work. If least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo are observed, a RBCP would be prepared describing noise-reduction measures, monitoring, and reporting, per MAIN-4. With implementation of MAIN-4, no effects on Covered Riparian Birds would be expected.

The Reservoir would need to be completely dewatered for sediment removal. Per MAIN-1, releases to lower the Reservoir would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31). Exhibit 14 shows modeled flows expected during a multiple-day release of 250-cfs. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.4.2 (e.g., potential loss of nests placed low to the water). With implementation of MAIN-1, potential effects on nests of Covered Riparian Birds are expected to be minimal. As a sediment removal project would be planned to begin at the start of the non-storm season (i.e., April 16), least Bell's vireo is the only species with a limited chance of being affected. No effect on southwestern willow flycatcher or western yellow-billed cuckoo nests would be expected due to the later timing of their nesting.

When the Reservoir is dewatered for infrequent long-term, large-scale maintenance projects, a bypass line would carry flows from Big Tujunga Creek upstream of the project area within Big Tujunga Reservoir to Big Tujunga Creek downstream of the plunge pool. All available inflow would be conveyed downstream. During bypass line operation, downstream hydrology would be subject to natural fluctuations depending on weather patterns over the years in which the maintenance project occurs. Over this time period, natural conditions may cause the stream to go dry. Covered Riparian Birds are not limited to wetted areas; therefore, the distribution of Covered Riparian Birds is not expected to be affected if natural conditions cause the stream to go dry.

Petroleum, chemicals, and/or concrete washings are toxic to wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of species drinking or bathing in the water. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on water quality. BMPs would be used to protect water quality downstream from the maintenance projects, per MAIN-1 and MAIN-6. With implementation of MAIN-1 and MAIN-6, no effects on Covered Riparian Birds would be expected.

Subsurface Grouting/Concrete Repair

Subsurface grouting and concrete repair would occur just upstream of the Dam structure at the downstream end of the Reservoir. As potential habitat for Covered Riparian Birds occurs at the upper end of the Reservoir and downstream of the Dam, no direct effect on Covered Riparian Birds would result.

As this work may require dewatering of the Reservoir, it would be conducted during the non-storm season, which is during the breeding season (i.e., March 15 to September 15). Noise from maintenance work may cause Covered Riparian Birds within approximately 500 feet to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Maintenance activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Per MAIN-4, pre-construction surveys would be required if riparian scrub/forest habitat is located within 500 feet of the maintenance work. If least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo are observed, a RBCP would be prepared describing noise-reduction measures, monitoring, and reporting, per MAIN-4. With implementation of MAIN-4, no take of Covered Riparian Birds would be expected.

The Reservoir may need to be completely dewatered for subsurface grouting and concrete repair. Per MAIN-1, releases to lower the Reservoir would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31). Exhibit 14 shows modeled flows expected during a multiple-day release of 250-cfs. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.4.2 (e.g., potential loss of nests placed low to the water). With implementation of MAIN-1, potential effects on nests of Covered Riparian Birds are expected to be minimal. As a subsurface grouting and concrete repair would be planned to begin at the start of the non-storm season (i.e., April 16), least Bell's vireo is the only species with a limited chance of being affected. No effect on southwestern willow flycatcher or western yellow-billed cuckoo nests would be expected due to the later timing of their nesting.

When the Reservoir is dewatered for infrequent long-term, large-scale maintenance projects, a bypass line would carry flows from Big Tujunga Creek upstream of the project area within Big Tujunga Reservoir to Big Tujunga Creek downstream of the plunge pool. All available inflow would be conveyed downstream. During bypass line operation, downstream hydrology would be subject to natural fluctuations depending on weather patterns over the years that the maintenance project occurs. Over this time period, natural conditions may cause the stream to go dry. Covered Riparian Birds are not limited to wetted areas; therefore, their distribution is not expected to be affected if natural conditions cause the stream to go dry.

Petroleum, chemicals, and/or concrete washings are toxic to wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of species drinking or bathing in the water. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on water quality. BMPs would be used to protect water quality downstream from the maintenance projects, per MAIN-1 and MAIN-6. With implementation of MAIN-1 and MAIN-6, no effects on Covered Riparian Birds would be expected.

4.4.5 SPILLWAY IMPROVEMENT PROJECT

The Spillway Improvement Project would be constructed on the Dam structure and using adjacent upland areas for access and staging. As potential habitat for Covered Riparian Birds occurs at the upper end of the Reservoir and downstream of the Dam, no direct effect on Covered Riparian Birds as a result of construction would result.

The Spillway Improvement Project would be constructed during the non-storm season, which is during the breeding season (i.e., March 15 to September 15). Noise from maintenance work may cause Covered Riparian Birds within approximately 500 feet to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Construction activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Per MAIN-4, pre-construction surveys would be required if riparian scrub/forest habitat is located within 500 feet of the construction work. If least Bell's vireo, southwestern willow flycatcher, or western yellow-billed cuckoo are observed, a RBCP would be prepared describing noise-reduction measures, monitoring, and reporting, per MAIN-4. With implementation of MAIN-4, no take of Covered Riparian Birds would be expected.

The Reservoir would need to be lowered to bedrock at 2,250 feet. Per MAIN-1, releases to lower the Reservoir would be limited to 250 cfs and would be ramped during the Covered Fish breeding season (March 1 to July 31). Exhibit 14 shows modeled flows expected during a multiple-day release of 250-cfs. Effects would be expected to be qualitatively similar to those discussed for water conservation operation in Section 4.4.2 (e.g., potential loss of nests placed low to the water). With implementation of MAIN-1, potential effects on nests of Covered Riparian Birds are expected to be minimal. As the Spillway Improvement Project would be planned to begin at the start of the non-storm season (i.e., April 16), least Bell's vireo is the only species with a limited chance of being affected. No effect on southwestern willow flycatcher or western yellow-billed cuckoo nests would be expected due to the later timing of their nesting.

Petroleum, chemicals, and/or concrete washings are toxic to wildlife; if these substances are washed into waterways, they would affect water quality and could affect the health of species drinking or bathing in the water. If construction disturbance causes erosion or leaves barren soils exposed, excess silt can wash into waterways, which would also affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds. If chemicals or excess silt are washed into the Reservoir, plunge pool, or downstream areas, they could have detrimental effects on water quality. BMPs would be used to protect water quality downstream from the maintenance projects, per MAIN-1 and MAIN-6. With implementation of MAIN-1 and MAIN-6, no effects on Covered Riparian Birds would be expected.

Following construction of the Spillway Improvement Project, the capacity of the Reservoir would increase by approximately 7.20 acres, periodically inundating areas between elevation 2,290 feet and elevation 2,298 feet. The area is expected to be inundated for only a few weeks once every ten years; however, it may occur more frequently if large storms occur more frequently. The additional inundation could temporarily affect 1.36 acres of suitable riparian habitat (0.28 acre of white alder grove–willow thicket, 0.95 acre arroyo willow thicket, and 0.13 acre sandbar willow thicket). Inundation of these areas would be temporary; thus, they would not be expected to adversely affect riparian scrub/willow habitat that is adapted to fluctuating water levels. Additionally, these areas are located in the upper portion of the Reservoir, so they would be inundated for the least amount of time. While the riparian habitat would be periodically inundated, it is not expected to be frequent enough or long enough in duration to cause conversion of the habitat to another type. Therefore, no effect on habitat for Covered Riparian Birds would be expected due to inundation.

Inundation of the additional Reservoir footprint would typically be expected to occur during the storm season when Covered Riparian Birds are on their wintering grounds. Therefore, there would be no effect on Covered Riparian Birds. However, a large spring storm or a series of spring storms could fill the Reservoir and inundate habitat where Covered Riparian Birds are nesting. If a bird built a nest close to the water level at the upper end of the Reservoir, inundation could impact the nest. The inundation would be associated with natural storm events. Of the three species, least Bell's vireo has the highest potential to be affected by a spring storm because their nesting period begins earlier than the other species (i.e., March/April), which is at the end of the storm season. However, the potential that this would occur is expected to be minimal. Southwestern willow flycatcher begins breeding later (i.e., May/June) and would have even less of a chance to be affected by spring storms because, typically, few storms occur after the storm season. Western yellow-billed cuckoos are not expected to be affected by spring storm flood control releases because they do not arrive and begin breeding until the summer (i.e., June/July). The chance that a nest would be placed close to the water level in the upper Reservoir footprint and that the Reservoir would be inundated enough during the non-storm season to affect that nest is expected to be minimal for the least Bell's vireo. No effect on southwestern willow flycatcher or western yellow-billed cuckoo would be expected due to inundation.

4.4.6 FUTURE TRANSLOCATION

Following translocation of Covered Fish upstream of the Reservoir, maintenance projects that include dewatering would involve pre-construction surveys and relocation of Covered Fish out of the work area. If fish surveys would be conducted within riparian scrub/forest habitat, the fish survey crew could affect Covered Riparian Birds nesting in the area by walking through habitat and inadvertently knocking down vegetation with a nest. Following translocation, MAIN-4 and MAIN-5 would need to be implemented prior to MAIN-1 to ensure Covered Riparian Birds (and other nesting birds) are not affected by pre-construction fish surveys and relocation of Covered Fish. With implementation of MAIN-4 and MAIN-5, no take of Covered Riparian Birds would be expected.

4.4.7 MITIGATION PROGRAM EFFECTS

The mitigation program described in Section 3 does not include restoration at a mitigation site. The measures that would be applied to operations have been described above. OPER-1 is discussed under Sections 4.1.1 and 4.4.1, OPER-2 is discussed under Sections 4.1.2 and 4.4.2. OPER-3 is discussed under Section 4.1.3 and 4.4.3. OPER-4 is a requirement to monitor the populations of Covered Species and use Adaptive Management to make adjustments needed for the benefit least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo.

MAIN-4 and MAIN-5 describe measures that would avoid and minimize impacts on Covered Riparian Birds and other nesting birds. Prior to maintenance activities, pre-construction surveys would be conducted to determine the presence or absence of Covered Riparian Birds within 500 feet of work areas. It also requires monitoring throughout maintenance work, which would increase human activity by requiring a Biologist to visit the habitat weekly. As the Biologist would be sensitive to disturbing wildlife species and aware of impacting nests, biological monitoring would not be expected to substantially affect riparian bird species. With implementation of MAIN-4 and MAIN-5, no take of Covered Riparian Birds would be expected.

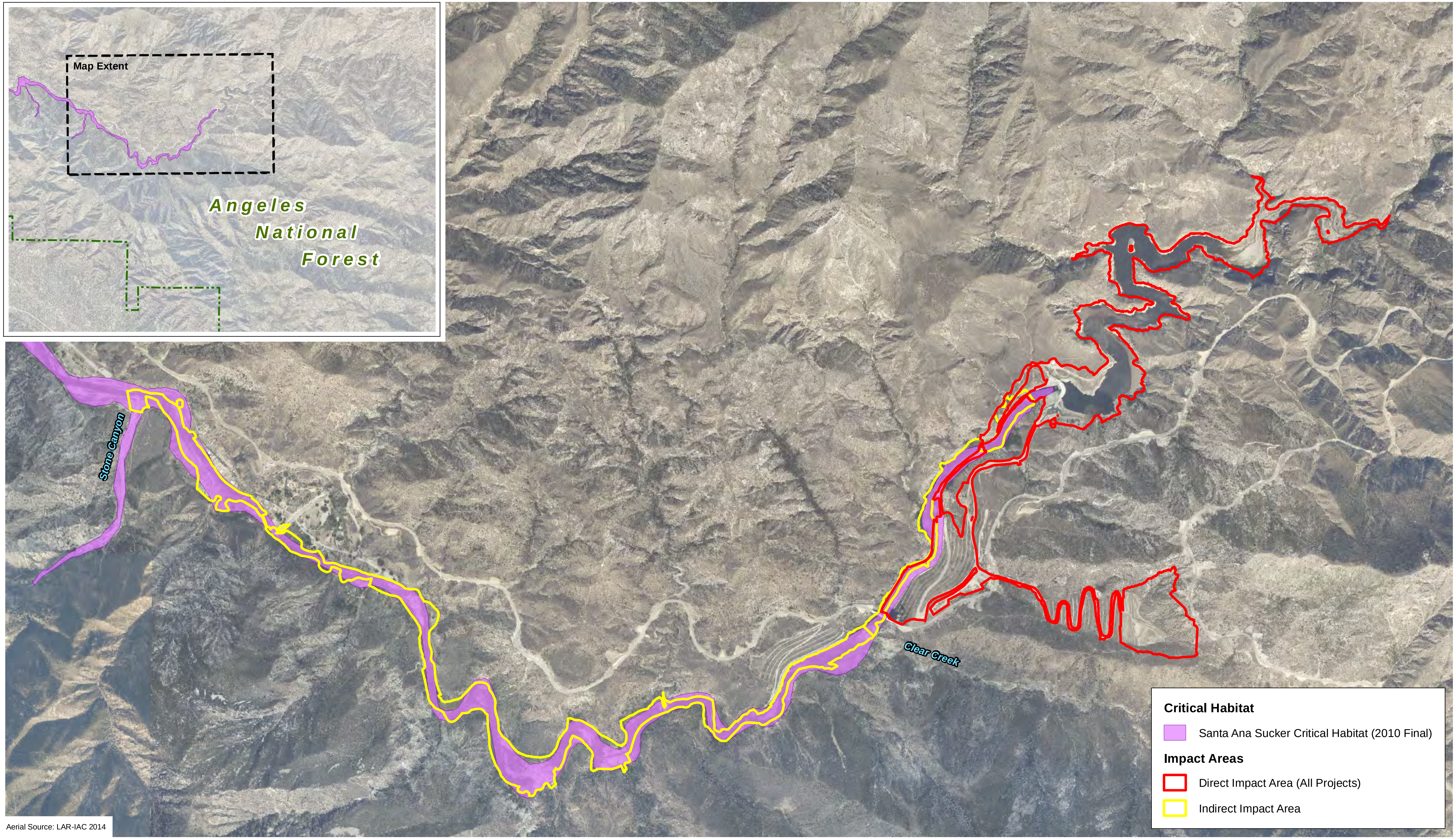
4.5 CRITICAL HABITAT

Three Covered Species have critical habitat in the Big Tujunga Creek watershed: Santa Ana sucker, arroyo toad, and southwestern willow flycatcher (Exhibits 25, 26, and 27). Impacts on Critical Habitat are discussed below.

4.5.1 SANTA ANA SUCKER

Critical habitat for the Santa Ana sucker is located downstream of the Dam, from the plunge pool to Hansen Dam, including Gold Canyon, Delta Canyon, and Stone Canyon (USFWS 2010). Operation of the Dam would not directly affect Critical Habitat for the Santa Ana sucker. Infrequent short-term, small-scale maintenance would temporarily impact up to 2.69 acres for maintenance to the downstream stream gage, downstream stream channel, and downstream access road. Infrequent long-term, large-scale maintenance and the Spillway Improvement Project would impact 1.45 acres of designated Critical Habitat in the plunge pool; however, the plunge pool does not provide suitable habitat for Santa Ana sucker.

Dams are used to control large flood flows in order to protect life and property downstream and to store water for water conservation. As such, dams interrupt the natural flood cycle for the portion of the stream immediately downstream of the dam. This reduces the amount of natural disturbance for that portion of the stream. As described in Section 4.1.1 and Section 4.2.1, flood control operations indirectly affect 111.20 acres of riparian habitat along 4.8 miles between the



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Santa Ana Sucker Critical Habitat Impacts

Exhibit 25

Big Tujunga Reservoir Sediment Removal Project

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1,500 750 0 1,500 Feet

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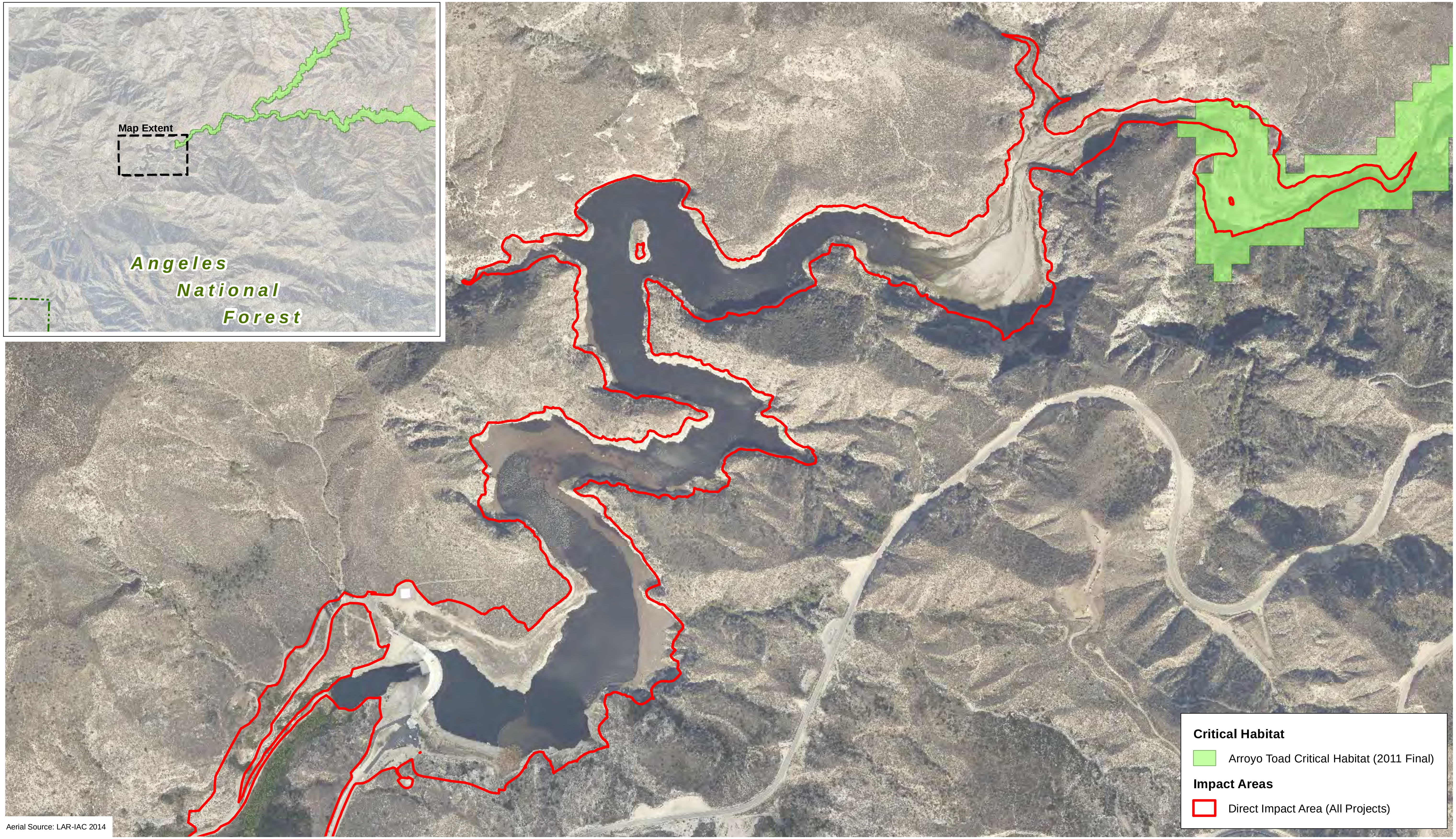

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Arroyo Toad Critical Habitat Impacts

Exhibit 26

Big Tujunga Reservoir Sediment Removal Project

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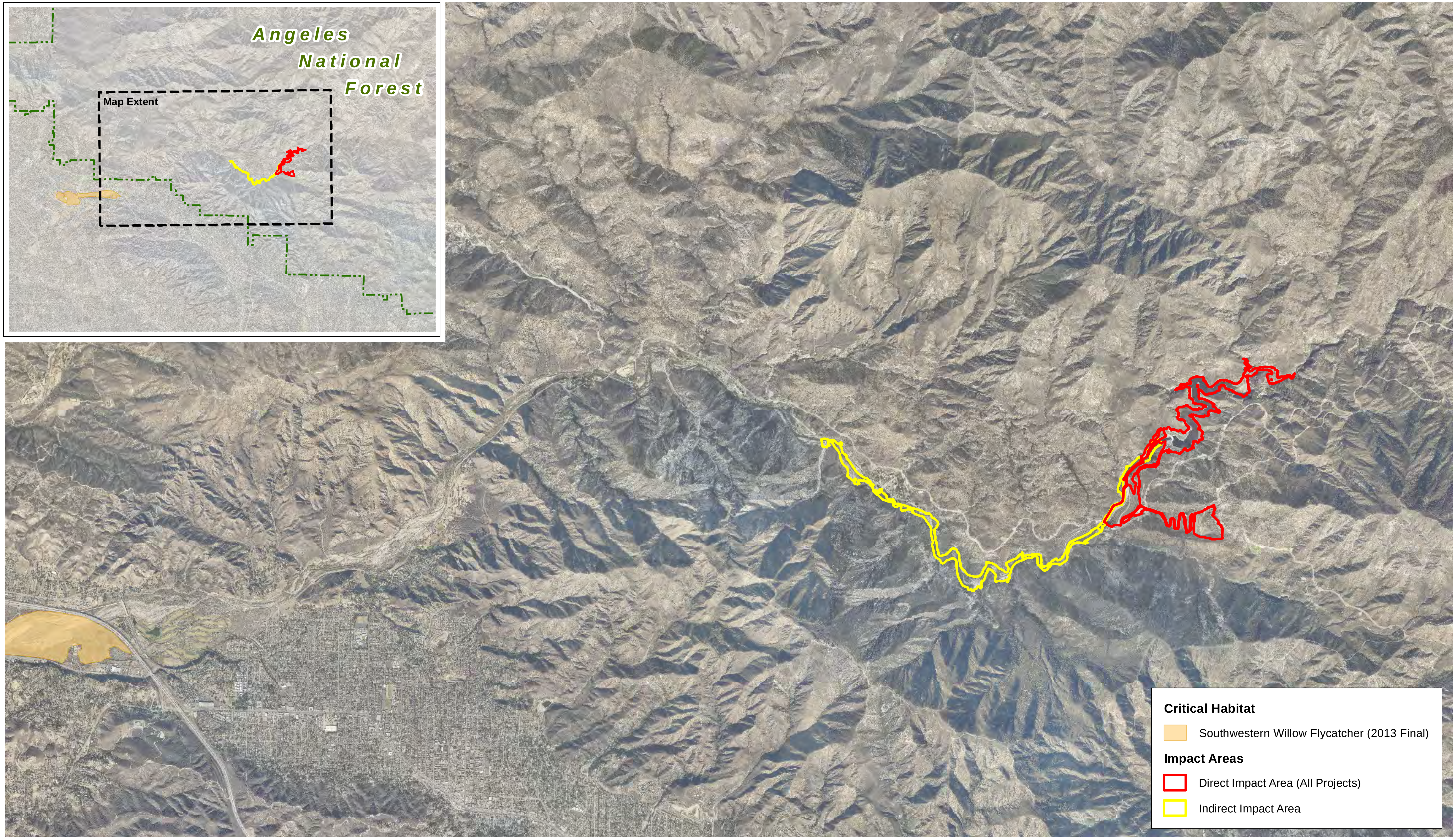

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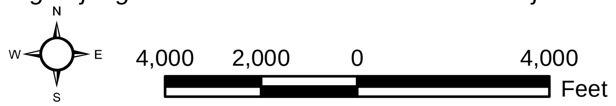
Southwestern Willow Flycatcher Critical Habitat Impacts

Exhibit 27

Big Tujunga Reservoir Sediment Removal Project



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plunge pool and Stone Canyon. The monitoring program includes several Habitat Enhancement projects (see Section 5.5).

The 2010 Critical Habitat lists physical and biological features (PBFs) for the Santa Ana sucker. PBFs and their potential to be impacted by each Covered Activity are discussed in Table 27.

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TABLE 27
SANTA ANA SUCKER PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
1 – A functioning hydrological system within the historical geographic range of the Santa Ana sucker that experiences peaks and ebbs in the water volume (either naturally or regulated) that encompasses areas that provide or contain sources of water and coarse sediment necessary to maintain all life stages	Releases up to 500 cfs would be consistent with the natural hydrologic regime. Dam attenuates flood releases between 500 cfs and 3,000 cfs. Downstream system would experience approximately 25-year storms and greater when the Dam goes to spillway. Sediment is captured by the Reservoir; however, natural tributaries downstream contribute coarse sediment during storm flows.	Releases of 100 to 250 cfs made for water conservation depending on natural rainfall patterns and capacity in the spreading grounds. Water conservation releases generally follow rainfall but timing would vary, typically 1-2 weeks following rainfall event. These releases would be too small to affect distribution of coarse sediment.	Year-round flows are not typical for the natural hydrologic regime; however, supplemental releases provide a source of water to maintain all life stages through the summer months in dry years. These releases would be too small to affect distribution of coarse sediment.	Releases to lower the Reservoir would be consistent with water conservation releases and would not be expected to substantially affect stream hydrology. Increased flows for testing would be short in duration. Stopping flows during downstream work would be short in duration, while leakage and downstream tributaries would still provide flows downstream so water to downstream areas would not be completely stopped. When dewatering is needed, a bypass line would be used to carry Reservoir inflow to areas downstream of the Dam so downstream flows would be reliant on natural regime.	Releases up to 500 cfs would be consistent with the natural hydrologic regime. Dam attenuates flood releases between 500 cfs and 3,000 cfs. Downstream system would experience approximately 25-year storms and greater when the Dam goes to spillway (same as the existing condition). Sediment is captured by the Reservoir; however, natural tributaries downstream contribute coarse sediment during storm flows (same as existing condition).	Would not affect the hydrological regime or coarse sediment.	OPER-1 requires outflow from the Dam to be comparable to inflow from the Reservoir. OPER-2 and MAIN-1 limit water conservation releases during the breeding season to less than 250 cfs and requires that they be ramped. OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species.
2 – Stream channel substrate consisting of a mosaic of loose sand, gravel, cobble, and boulder substrates in a series of riffles, runs, pools, and shallow sandy stream margins necessary to maintain various life stages of the species, including adults, juveniles, larvae, and eggs, in the riverine environment	Downstream of the plunge pool, the stream consists of a mosaic of substrates and habitat types. Even during modeled flows of 600 cfs, there is variation of stream velocities/ habitat across the stream channel, including resting habitat immediately below the plunge pool. Disturbance from flood flows is needed to maintain a mosaic of habitat types. See discussion of indirect effects of flood control in Section 4.1.1.	Downstream of the plunge pool, the stream consists of a mosaic of substrates and habitat types. During modeled flows of 250 cfs, there is variation of stream velocities/ habitat across the stream channel, including resting habitat immediately below the plunge pool. Water conservation releases are not large enough to change the distribution of habitat and stream channel substrate. See discussion in Section 4.1.2.	Downstream of the plunge pool, the stream consists of a mosaic of substrates and habitat types. Supplemental releases beneficially increase the stream velocities during the non-storm season. See discussion in Section 4.1.3 and 4.2.3. Supplemental releases are not large enough to change the distribution of habitat and stream channel substrate. See discussion in Section 4.1.3.	Downstream of the plunge pool, the stream consists of a mosaic of substrates and habitat types. Releases to dewater or lower the Reservoir would be consistent with water conservation releases and would not be large enough to change the distribution of habitat or redistribute stream channel substrate. See discussion in Section 4.1.2.	Downstream of the plunge pool, the stream consists of a mosaic of substrates and habitat types. Releases to dewater or lower the Reservoir would be consistent with water conservation releases and would not be large enough to change the distribution of habitat or redistribute stream channel substrate. Disturbance from flood flows is needed to maintain a mosaic of habitat types. Raising the spillway would result in incremental additional attenuation for ten-year floods (i.e., flows up to 3,000 cfs). See discussion of indirect effects of flood control in Section 4.1.1 and 4.1.5.	Would not affect the distribution of habitat.	OPER-1 requires outflow from the Dam to be comparable to inflow from the Reservoir. OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species. MAIN-1 would require installation of BMPs and biological monitoring to ensure sedimentation from maintenance projects would not affect downstream habitat.

TABLE 27
SANTA ANA SUCKER PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
3 – Water depths greater than 1.2 inches and bottom water velocities greater than 0.01 foot per second	Downstream of the plunge pool, the stream depth and velocity meet these criteria. Exhibit 12 shows stream velocities for a 600-cfs modeled release. See Exhibit 17 of the Final Hydraulic Report for stream depth for a 600-cfs modeled release (Psomas 2020b).	Downstream of the plunge pool, the stream depth and velocity meet these criteria. Exhibit 14 shows stream velocities for a 250-cfs release. See Exhibit 16 of the Final Hydraulic Report for stream depth for a 250-cfs modeled release (Psomas 2020b).	Downstream of the plunge pool, the stream depth and velocity meet these criteria. Supplemental releases beneficially increase the stream velocities during the non-storm season. See discussion in Section 4.1.3 and 4.2.3; see Exhibits 16 and 17 for a comparison of average stream velocities with and without supplemental releases in April and September.	Downstream of the plunge pool, the stream depth and velocity meet these criteria. Some maintenance activities require the valves to be closed temporarily. Even when the valves are closed, leakage from the Dam is 1-2 cfs (in addition to any flow from downstream tributaries). During infrequent large-scale maintenance projects when the Reservoir is dewatered, a bypass line would be used to carry natural stream flow from upstream of the Reservoir to downstream of the Dam. If the stream dries, it would be the result of natural conditions.	Downstream of the plunge pool, the stream depth and velocity meet these criteria. Releases to lower the Reservoir would be consistent with water conservation releases. Construction would not require complete dewatering; the Dam would operate normally through construction.	Would not affect the stream depth and velocity.	OPER-1 requires outflow from the Dam to be comparable to inflow from the Reservoir. OPER-3 requires up to 1,500 af of water to be released over the non-storm season as supplemental releases. OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species. MAIN-1 would require biological monitoring during dewatering and throughout construction of maintenance projects. If the stream were observed to be drying, the resource agencies would be notified so that Santa Ana sucker could be relocated to nearby suitable habitat.
4 – Clear or only occasionally turbid water	When the water reaches the Reservoir, much of the sediment settles and is trapped behind the Dam. However, during flood conditions, flood control releases may carry a substantial amount of sediment to downstream areas. Downstream, fast-moving water may also pick up additional sediment from the stream bottom. This sediment transport is the result of natural conditions and is necessary to maintain a mosaic of substrate types downstream. Flood waters would occur only occasionally. HEC-RAS modeling showed that during a 600-cfs modeled release, only limited movement of sediment is expected. See Section 4.1.1 and Exhibit 12.	Water conservation releases would provide clear water from above minimum pool. HEC-RAS modeling showed that a 250-cfs modeled release would not be expected to move sediment. See Section 4.1.2 and Exhibit 14.	Supplemental releases would provide clear water from above minimum pool. HEC-RAS modeling showed that supplemental releases would not be expected to move sediment. See Section 4.1.3 and Exhibits 15 and 16.	Dewatering releases would provide clear water from above minimum pool. BMPs would be installed prior to dewatering below minimum pool. Maintenance work within or adjacent to the stream could cause an increase in sedimentation in the stream. BMPs would be installed to ensure that downstream areas are protected from sedimentation.	Dewatering releases would provide clear water from above minimum pool. BMPs would be in place prior to using the pump to dewater the remainder of the Reservoir. Construction work within or adjacent to the stream could cause an increase in sedimentation in the stream. BMPs would be used to ensure that downstream areas are protected from sedimentation.	Would not affect turbidity in the stream.	MAIN-1 would require installation of BMPs and biological monitoring to ensure sedimentation would not affect downstream habitat.
5 – Water temperatures less than 86°F	Flood control releases could remove vegetation that shades the stream. This is a natural process and necessary to maintain a mosaic of habitat (PBF1).	Water conservation releases would release cool water from below the Reservoir's surface to downstream areas, which would help to keep the stream cool. This would be a beneficial effect.	Supplemental releases would release cool water from below the Reservoir's surface to downstream areas, which would help to keep the stream cool, especially during the warm summer and fall months. This beneficial effect is one of the primary motivations for supplemental releases.	During infrequent long-term, large-scale maintenance, projects that require dewatering of the Reservoir, water conservation releases and supplemental releases would not be possible. However, leakage would continue to occur, vegetation would continue to shade the stream,	This project would require only partial dewatering, so some supplemental releases would continue to be available throughout the construction.	Would not affect stream temperature.	OPER-3 requires up to 1,500 af of water to be released over the non-storm season as supplemental releases.

TABLE 27
SANTA ANA SUCKER PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
				and natural springs would continue to provide cool water to the stream. Even during times of multiple years of low rainfall, when releases were limited, temperatures have been measured within an acceptable temperature range (see Section 4.2.2).			
6 – In-stream habitat that includes food sources (e.g., zooplankton, phytoplankton, and aquatic invertebrates), and associated vegetation such as aquatic emergent vegetation and adjacent riparian vegetation to provide the following: (a) shading to reduce water temperature when ambient temperatures are high, (b) shelter during periods of high water velocity, and (c) protective cover from predators	Releases up to 500 cfs would be consistent with the natural hydrologic regime, which supports riparian vegetation. The downstream system would experience approximately 25-year storms and greater when the Dam goes to spillway, which is important for maintaining a mosaic of habitat. See discussion in Section 4.1.2. No effect on downstream food sources is anticipated.	Water conservation releases generally follow rainfall (but timing would vary, typically 1-2 weeks following rainfall event) and would be consistent with the hydrologic regime, which supports riparian vegetation. No effect on downstream food sources is anticipated.	Supplemental releases provide water for riparian vegetation during the growing season. Over multiple years of low rainfall conditions, in-stream vegetation may become too dense, see discussion in Section 4.1.3. No effect on downstream food sources is anticipated.	Most maintenance projects would not affect in-stream habitat. Infrequent short-term, small-scale maintenance projects may affect up to 2.69 acres of riparian habitat (critical habitat) occupied by Santa Ana sucker. No effect on downstream food sources is anticipated.	Construction of the Spillway Improvement Project would not affect riparian vegetation downstream of the Dam. Some supplemental releases would occur throughout the non-storm season. No effect on downstream food sources is anticipated.	Would not affect riparian vegetation or food sources.	MAIN-1 would require pre-construction surveys and relocation of Santa Ana sucker out of riparian areas that would be impacted prior to vegetation removal. It would also require that construction limits be marked to ensure riparian vegetation outside the work area is not inadvertently impacted.
7 – Areas within perennial stream courses that may be periodically dewatered, but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted	Flood control releases would not affect habitat connectivity.	Water conservation releases would not affect habitat connectivity.	Supplemental releases would increase habitat connectivity over the warm summer/fall months when the stream would naturally become intermittent.	Maintenance projects would not affect habitat connectivity. If the downstream access road is redesigned, it would continue to provide for movement of aquatic wildlife. Any work within downstream areas would be temporary and limited in extent.	The Spillway Improvement Project would not affect habitat connectivity.	Would create a new population of Santa Ana sucker upstream of the Reservoir that would never be connected to downstream populations due to the interruption of habitat by the Reservoir/ Dam.	OPER-3 requires up to 1,500 af of water to be released over the non-storm season as supplemental releases. OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species.

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4.5.2 ARROYO TOAD

Critical habitat is located upstream of the Reservoir to 1.2miles upstream of the confluence with Alder Creek, Mill Creek upstream to Monte Cristo Creek, and Alder Creek upstream to the Mule Fork confluence (USFWS 2011). The only operation of the Dam that would affect Critical Habitat for the arroyo toad is inundation of the Reservoir pool (i.e., elevation 2,290 feet), which would affect 5.39 acres over 0.24 stream mile of Critical Habitat at the upper end of the Reservoir. The Spillway Improvement Project would extend the footprint of potential inundation further upstream (elevation 2,298 feet), impacting a total of 7.05 acres over 0.32 stream mile (an additional 1.66 acres over 0.08 stream mile) of Critical Habitat. None of the maintenance projects would impact arroyo toad Critical Habitat; the Reservoir Restoration Project (sediment removal) footprint was reduced to avoid impacts on Critical Habitat.

The 2011 Critical Habitat lists physical and biological features (PBFs) for the arroyo toad. PBFs and their potential to be impacted by each Covered Activity are discussed in Table 28.

TABLE 28
ARROYO TOAD PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
1 – Rivers or streams with a hydrologic regime that supplies water to provide space, food, and cover needed to sustain eggs, tadpoles, metamorphosing juveniles, and adult breeding toads. Breeding pools must persist a minimum of two months for the completion of larval development. Due to the dynamic nature of southern California riparian systems and flood regimes, the location of suitable breeding pools may vary from year to year. Specifically, the conditions necessary to allow for successful reproduction of arroyo toads are: • *Breeding pools that are less than 6 inches deep* • *Areas of flowing water with current velocities less than 1.3 feet per second* • *Surface water that lasts for a minimum of two months during the breeding season (a sufficient wet period in the spring months to allow arroyo toad larvae to hatch, mature, and metamorphose).*	Critical habitat is located at the upper end of the Reservoir where it would experience a natural hydrologic regime. When the Reservoir pool is full, it would inundate the stream-like habitat at the upper end of the Reservoir. This would most likely happen during the storm season, which is outside the breeding season. During the arroyo toad breeding season, the upper Reservoir would likely be available as stream-like habitat. Releases during March/April have an extremely limited potential	Critical habitat is located at the upper end of the Reservoir where it would experience a natural hydrologic regime. When the Reservoir pool is full, it would inundate the stream-like habitat at the upper end of the Reservoir. This would most likely occur if a series of spring storms occurred. During most of the breeding season, the upper Reservoir would be available as stream-like habitat. Releases during March/April have an extremely limited potential to strand eggs/juveniles as water level decreases. See	Storage of water for the supplemental releases may account for a portion of the water in the Reservoir; however, it is not expected to affect Critical Habitat (Exhibit 15).	None of the maintenance projects would directly impact Critical Habitat; the Reservoir Removal Project (sediment removal) boundary was revised to avoid impacts on Critical Habitat. Dewatering for infrequent long-term, large-scale maintenance projects during the arroyo toad breeding season (March/April) have an extremely limited potential to strand eggs/ tadpoles as water level decreases. See discussion in Section 4.3.1.2.	Construction of this project is concentrated on the Dam structure and would not impact Critical Habitat. Dewatering releases during the arroyo toad breeding season (March/April) have an extremely limited potential to strand eggs/ tadpoles as water level decreases. See discussion in Section 4.3.1.2.	Would not affect hydrologic regime or breeding pools for arroyo toad.	OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species. MAIN-2 would require pre-construction surveys to relocate arroyo toads out of an area that may be affected by dewatering.

TABLE 28
ARROYO TOAD PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
	to strand eggs/juveniles as water level decreases. See discussion in Section 4.3.1.1.	discussion in Section 4.3.1.2.					
2 – Riparian and adjacent upland habitats, particularly low-gradient (typically less than 6 percent) stream segments and alluvial streamside terraces with sandy or fine gravel substrates that support the formation of shallow pools and sparsely vegetated sand and gravel bars for breeding and rearing of tadpoles and juveniles and adjacent valley bottomlands that include areas of loose soil where toads can burrow underground, to provide foraging and living areas for juvenile and adult arroyo toads.	Critical habitat is located at the upper end of the Reservoir where it would experience a natural hydrologic regime, which would support the formation of shallow pools, gravel bars, etc. When the Reservoir pool is full, it would inundate the stream-like habitat and adjacent stream terraces at the upper end of the Reservoir. This would most likely happen during the storm season, which is outside the breeding season. During the arroyo toad breeding	Critical habitat is located at the upper end of the Reservoir where it would experience a natural hydrologic regime, which would support the formation of shallow pools, gravel bars, etc. When the Reservoir pool is full, it would inundate the stream-like habitat and adjacent stream terraces at the upper end of the Reservoir. This would most likely occur if a series of spring storms occurred. During most of the breeding season, the upper Reservoir would be	Critical habitat is located at the upper end of the Reservoir where it would experience a natural hydrologic regime, which would support the formation of shallow pools, gravel bars, etc. Storage of water for the supplemental releases would not affect adjacent stream terraces within Critical Habitat.	Critical habitat is located at the upper end of the Reservoir where it would experience a natural hydrologic regime, which would support the formation of shallow pools, gravel bars, etc. None of the maintenance projects would directly impact Critical Habitat; the Reservoir Restoration Project (sediment removal) boundary was revised to avoid impacts on Critical Habitat.	Critical habitat is located at the upper end of the Reservoir where it would experience a natural hydrologic regime, which would support the formation of shallow pools, gravel bars, etc. Construction of this project is concentrated on the Dam structure and would not impact Critical Habitat.	Would not affect riparian and stream terrace habitat for arroyo toad.	OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species. MAIN-2 would require pre-construction surveys to relocate arroyo toads out of an area that may be affected by dewatering.

TABLE 28
ARROYO TOAD PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
	season, the upper Reservoir would likely be available as stream-like habitat.	available as stream-like habitat.					
3 – A natural flooding regime, or one sufficiently corresponding to natural that: (A) is characterized by intermittent or near-perennial flow that contributes to the persistence of shallow pools into at least mid-summer; (B) maintains areas of open, sparsely vegetated stream channels and terraces by periodically scouring riparian vegetation; and (C) also modifies stream channels and terraces and redistributes sand and sediment, such that breeding pools and terrace habitats with scattered vegetation are maintained.	Critical Habitat is located upstream of the Reservoir where the flood regime is natural.	Critical Habitat is located upstream of the Reservoir where the flood regime is natural.	Critical Habitat is located upstream of the Reservoir where the flood regime is natural.	Critical Habitat is located upstream of the Reservoir where the flood regime is natural. None of the maintenance projects would directly impact Critical Habitat; the Reservoir Restoration Project (sediment removal) boundary was revised to avoid impacts on Critical Habitat.	Critical Habitat is located upstream of the Reservoir where the flood regime is natural. Construction of this project is concentrated on the Dam structure and would not impact Critical Habitat.	Would not affect the natural flood regime.	OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species.

TABLE 28
ARROYO TOAD PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
4 – Stream channels and adjacent upland habitats that allow for movement to breeding pools, foraging areas, overwintering sites, upstream and downstream dispersal, and connectivity to areas that contain suitable habitat.	Flood control releases would not disrupt habitat connectivity because arroyo toad are only known from upstream; there are no downstream populations.	Water conservation releases would not disrupt habitat connectivity because arroyo toad are only known from upstream; there are no downstream populations.	Supplemental releases would not disrupt habitat connectivity because arroyo toad are only known from upstream; there are no downstream populations.	Dewatering releases for infrequent long-term, large-scale maintenance projects would not disrupt habitat connectivity because arroyo toad are only known from upstream; there are no downstream populations.	Dewatering releases for the Spillway Improvement Project would not disrupt habitat connectivity because arroyo toad are only known from upstream; there are no downstream populations.	Would not affect habitat connectivity for arroyo toad.	OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species.

4.5.3 SOUTHWESTERN WILLOW FLYCATCHER

Critical Habitat for the southwestern willow flycatcher is located approximately 13.5 miles downstream at Hansen Dam (USFWS 2013b). As described in Section 4.1.1, flood control operations indirectly affect 111.20 acres of riparian habitat along 4.8 miles between the plunge pool and Stone Canyon. The Critical Habitat for southwestern willow flycatcher is located 8.7 miles downstream of Stone Canyon; therefore, operation of the Dam would not substantially affect Critical Habitat.

The 2013 Critical Habitat lists physical and biological features (PBFs) for the southwestern willow flycatcher. PBFs and their potential to be impacted by each Covered Activity are discussed in Table 29.

TABLE 29
SOUTHWESTERN WILLOW FLYCATCHER PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
1 – Riparian vegetation. Riparian habitat along a dynamic river or lakeside, in a natural or man-made successional environment (for nesting, foraging, migration, dispersal, and shelter) that comprises trees and shrubs and some combination of: • *Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 6 to 98 feet. Lower-stature thickets (6 to 13 feet tall) are found at higher-elevation riparian forests, and tall-stature thickets are found at middle- and lower-elevation riparian forests* • *Areas of dense riparian foliage at least from the ground level up to approximately 13 feet above ground or dense foliage only at the shrub or tree level as a low, dense canopy* • *Sites for nesting that contain a dense (about 50 to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground)* • *Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser*	Flood control releases combine with tributary storm flows downstream of the Dam to support downstream Critical Habitat. Flood control operations are not expected to adversely affect downstream riparian vegetation within Critical Habitat.	Water conservation releases bring water to Hansen Dam when there is capacity to accept the flows (i.e., the spreading grounds are not saturated). These releases extend the duration of aboveground flows and are beneficial for the growth of riparian vegetation.	Supplemental releases bring low flow of water to Hansen Dam during the non-storm season. This is beneficial for growth of riparian vegetation.	None of the maintenance projects would affect Hansen Dam. Infrequent long-term, large-scale projects would dewater in mid–April, providing some additional water to the system, which is beneficial for growth of riparian vegetation.	The Spillway Improvement Project would not affect Hansen Dam. Partial dewatering would occur in mid-April, providing some additional water to the system, which is beneficial for growth of riparian vegetation.	Would not affect riparian vegetation at Hansen Dam.	OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species.

TABLE 29
SOUTHWESTERN WILLOW FLYCATCHER PHYSICAL AND BIOLOGICAL FEATURES

PBFs	Flood Control Operations	Water Conservation Operations	Supplemental Release	Maintenance Projects	Spillway Improvement Project	Future Translocation	Mitigation Program
vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.25 acre or as large as 175 acres							
2 – Insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include: flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies, moths, and caterpillars (Lepidoptera); and spittlebugs (Homoptera)	Flood control releases combine with tributary storm flows downstream of the Dam to support downstream riparian communities. Flood control releases are not expected to adversely affect invertebrate populations in downstream Critical Habitat.	Water conservation releases bring water to Hansen Dam when there is capacity to accept the flows (i.e., the spreading grounds are not saturated). These releases extend the duration of aboveground flows and are beneficial for invertebrates.	Supplemental releases bring low flow of water to Hansen Dam during the non-storm season. This is beneficial for invertebrates.	None of the maintenance projects would affect Hansen Dam. Infrequent long-term, large-scale projects would dewater in mid-April, providing some additional water to the system, which is beneficial for invertebrates.	The Spillway Improvement Project would not affect Hansen Dam. Partial dewatering would occur in mid-April, providing some additional water to the system, which is beneficial for invertebrates.	Would not affect invertebrate populations at Hansen Dam.	OPER-4 requires an annual HCP Working Group meeting to discuss Adaptive Management to benefit Covered Species.

4.6 CUMULATIVE IMPACT

Cumulative effects are those effects of future actions by State, Tribal, or local government or private groups or individuals that are reasonably certain to occur in the HCP study area during the course of the activity subject to consultation.

Big Tujunga Dam is surrounded by the Angeles National Forest; as such, the only entity expected to conduct projects in the vicinity of the HCP study area is the USFS. As the USFS is a federal entity, their projects are not considered in this analysis to meet the requirements of the ESA.

Natural Resources Group, Inc. is currently obtaining the necessary approvals to create an approximately 10-acre mitigation bank for riparian species along Big Tujunga Creek, just downstream of the USFS boundary. The creation of a mitigation bank would have a beneficial cumulative effect by preserving and enhancing habitat for Covered Species that occur within and adjacent to the mitigation bank site.

No road, utility, or private projects are reasonably anticipated to occur in the vicinity of Big Tujunga Dam at this time. Therefore, no adverse cumulative effects beyond the project-level effects of the HCP's Covered Activities would occur.

4.7 CLIMATE CHANGE

Climate change may cause changes in environmental conditions, leaving species no longer adapted to the environmental conditions in a given region. Species responses to environmental changes can be through three different mechanisms: (1) spatial, whereby species shift their distribution to follow appropriate habitat conditions; (2) temporal, whereby species shift their phenology (i.e., timing of life cycle events such as flowering, fruiting, or migration); or (3) self, whereby species physiologically tolerate varying conditions or behaviorally adjust their diet, activity, or energy (Bellard et al. 2012). Changes in species distributions and phenology will also have effects on trophic networks (e.g., competition, predator-prey dynamics) and ecosystem function (Bellard et al. 2012).

California's *2012 Vulnerability and Adaptation Study* examines local and statewide vulnerabilities to climate change and includes new data and projections on climate changes in California. Dr. Alex Hall, from the University of California, Los Angeles, in partnership with the Los Angeles Regional Collaborative for Climate Action and Sustainability, recently published several studies that develop climate change predictions that are specific to the greater Los Angeles area. These studies indicate that if greenhouse gas emissions continue to increase globally based on current trends, climate change could impact the natural environment in the following ways (LACDRP 2015b):

- **Increases in Ambient Temperatures:** On average, the Los Angeles region is expected to warm 4 to 5 degrees Fahrenheit over land by mid-century. The coasts and oceans will likely warm the slowest, whereas the mountains and deserts will experience more rapid warming. Warming across the region will be greatest in the summer and fall. The high emissions modeling scenario predicts that mountain and inland areas may warm up to or greater than 4.5 degrees Fahrenheit, and coastal and valley/urban areas warming up to 3.7 to 3.9 degrees Fahrenheit.
- **Increases in Extreme Heat Conditions:** Heat waves and very high temperatures could last longer and become more frequent. The number of extreme heat days is expected to triple in the coastal and central areas; the San Fernando Valley and San Gabriel Valley will witness almost a quadrupling of heat days. The number of extreme heat days in the desert and mountain areas will increase five to six times relative to the current amounts.

The high emissions modeling scenario predicts a nearly 12-fold increase in the number of heat days.

- **Decreased Snowfall and Winter Snowpack:** The region's mountains could see a 42-percent reduction in annual snowfall by mid-century. The winter snowpack is also expected to melt 16 days earlier as a result of rising temperatures. Changes in snowfall could exacerbate drought-like conditions, reducing water supplies and water security for all end users throughout Los Angeles County.
- **Increased Frequency, Intensity, and Duration of Extreme Storms:** Increased winter storm events could affect peak stream flows and flooding as well as landslides.
- **Changes in Growing Season and Species Distribution:** Plant and wildlife distributions may be affected by changes in temperature, competition from colonizing species, regional hydrology, sea level, and other climate-related effects.
- **Rising Sea Levels:** Sea levels are expected to steadily rise by mid-century, which could inundate portions of the coastline (LACDRP 2015b).

Climate change may degrade aquatic habitat through changes in temperature, increases in extreme heat events, changing precipitation patterns, and subsequent magnitude and timing of runoff and sediment yield. The Los Angeles Regional Water Quality Control Board is currently partnering with the Southern California Coastal Watershed Research Project to investigate how climate change-induced alterations in precipitation and temperature may affect riparian-dependent species in the region (Stein et al. 2018). This study (underway) will use modeling to relate changes in temperature, flow, and physical habitat to changes in habitat suitability or the likelihood of occurrence. Seven focal species were selected for the study including arroyo chub, Santa Ana sucker, western pond turtle, southern California steelhead/resident rainbow trout (*Oncorhynchus mykiss*), arroyo toad, least Bell's vireo, and great blue heron. As five of the seven species are Covered Species for this HCP, the HCP Working Group should continue to track this study as findings are made available.

4.7.1 COVERED FISH

Increases in ambient air temperatures would likely cause an increase in water temperatures in areas that lacked adequate shading along Big Tujunga Creek. Similarly, longer and more frequent heat waves would also increase the water temperatures. Higher water temperatures have lower levels of dissolved oxygen, which is detrimental to fish species and has resulted in fish kills in the past (O'Brien and Stephens 2009). Releases of cold water from the lower Reservoir (i.e., valves at 2,202 feet and 2,188 feet, which are approximately 23 and 37 feet below minimum pool at 2,225 feet) would be beneficial to keep the stream temperature cooler in the warm summer and fall months.

Increases in drought-like conditions would also be expected to increase the frequency and magnitude of large fires. With multiple years of below-average rainfall and a lack of flushing flows, leaf litter and woody debris would increase the fire risk and increase the intensity of fires when they occur (Stromberg and Chew 2002; Ellis et al. 1998). With warmer and drier conditions, and fuel in the understory, fires may burn through riparian habitats rather than jumping over the moist habitat as they did historically (USFWS 2002). Large fires would remove both upland and riparian vegetation, which may then be partially replaced with invasive species. Additionally, during the following storm season, increased erosion could occur as sediment washes into the creeks. This, in turn, would affect water quality and may cause harm or mortality of Covered Fish species.

Increased frequency, duration, and intensity of storm events would be attenuated by the Dam as part of its standard flood control function. The purpose of the Spillway Improvement Project is to capture water from approximately ten-year storms, which may occur more frequently with climate change. Although a portion of the peak flows would be attenuated, downstream tributaries would contribute flows of increased frequency, duration, and intensity. It is assumed that these storms would generally occur during the storm season, in which case, native fish are already adapted to high flows during the non-breeding season. As discussed in Section 4.2.1, in years of high flows, conditions for breeding usually remain favorable into the summer months; and Covered Fish species would be expected to spawn again following storms. More frequent flood disturbance (assuming stream flows greater than 4 fps) would be expected to remove in-stream vegetation and create more riffle habitat, which would be beneficial for Santa Ana sucker and Santa Ana speckled dace. Arroyo chub can use both riffle and pool habitat with in-stream vegetation, so this effect would be neutral. Removal of in-stream vegetation during large storm events could also counteract the adverse effects of increasing fuel load described above. However, removal of vegetation along the stream would also reduce shading, which may be adverse, assuming higher ambient temperatures and longer and more frequent heat waves.

Covered Fish species would be expected to move upstream or downstream to follow suitable aquatic habitat conditions (e.g., temperature) unless the stream dries to pools and they are unable to escape inhospitable conditions. Supplemental releases required by OPER-3 are expected to benefit Covered Fish species by keeping water cool and continuous (i.e., not intermittent) throughout the creek. The HCP Working Group will continue to assess conditions annually to determine the appropriate approach to supplemental releases to benefit the downstream habitat for Covered Fish species.

4.7.2 COVERED HERPETOFAUNA

4.7.2.1 ARROYO TOAD

Increases in ambient air temperatures would likely cause an increase in water temperatures in areas that lack adequate shading along Big Tujunga Creek upstream of the Reservoir. Similarly, longer and more frequent heat waves would also increase the water temperatures. When conditions along the creek become inhospitable, the arroyo toad would be expected to aestivate in stream terraces or upland habitats. With the effects of climate change, aestivation may begin earlier in the summer.

Increases in drought-like conditions would also be expected to increase the frequency and magnitude of large fires. With multiple years of below-average rainfall and a lack of flushing flows, leaf litter and woody debris would increase the fire risk and increase the intensity of fires when they occur (Stromberg and Chew 2002; Ellis et al. 1998). With warmer and drier conditions, and fuel in the understory, fires may burn through riparian habitats rather than jumping over the moist habitat as they did historically (USFWS 2002). Large fires would remove both upland and riparian vegetation, which may then be partially replaced with invasive species. Additionally, during the following storm season, increased erosion could occur as sediment washes into the creeks, increasing sediment load and turbidity. This, in turn, would affect water quality and may cause harm or mortality of arroyo toad or affect their breeding by depositing silt on eggs.

Increased frequency, duration, and intensity of storm events would be experienced as part of the natural flow regime upstream of the Reservoir, as it is an uncontrolled system. As discussed in Section 4.3.1.1, if large storms occurred during the storm season, arroyo toad would be expected to aestivate in upper terraces and upland areas and would not be affected by the storm flows. If large storms occurred during the breeding season, they could affect breeding by washing away eggs or depositing silt onto them. However, in years of high flows, conditions remain suitable for a longer time period; and arroyo toad would be expected to breed again following the storm. More frequent flood disturbance (assuming flows greater than 4 fps) would be expected to remove in-stream vegetation and create more riffle habitat. This could also counteract the adverse effects of increasing fuel load described above. However, removal of vegetation along the stream would also reduce shading, which may be adverse, assuming higher ambient temperatures and longer and more frequent heat waves.

The purpose of the Spillway Improvement Project is to capture water from approximately ten-year storms, which may occur more frequently with climate change. Following these large storms, the Reservoir would be holding water until the downstream spreading grounds are available to receive released flows. During this time, the Reservoir would have less stream-like habitat available for the arroyo toad. However, if the storms occurred during the storm season, arroyo toad would be aestivating and would not be affected by the fluctuation in the Reservoir pool. If the storms occurred during the breeding season, it could affect the amount of stream-like habitat available, as discussed under Section 4.3.1.1 and 4.3.1.2.

4.7.2.2 WESTERN POND TURTLE

Upstream of the Dam

Increases in ambient air temperatures would likely cause an increase in water temperatures in areas that lack adequate shading along Big Tujunga Creek upstream of the Reservoir. Similarly, longer and more frequent heat waves would also increase the water temperatures. When conditions along the creek become inhospitable, western pond turtle would be expected to aestivate in stream terraces. With the effects of climate change, western pond turtles may select cooler water in the Reservoir and/or aestivation may begin earlier in the summer.

Increases in drought-like conditions would also be expected to increase the frequency and magnitude of large fires. With multiple years of below-average rainfall and a lack of flushing flows, leaf litter and woody debris would increase the fire risk and increase the intensity of fires when they occur (Stromberg and Chew 2002; Ellis et al. 1998). With warmer and drier conditions, and fuel in the understory, fires may burn through riparian habitats rather than jumping over the moist habitat as they did historically (USFWS 2002). Large fires would remove both upland and riparian vegetation, which may then be partially replaced with invasive species. Additionally, during the following storm season, increased erosion could occur as sediment washes into the creeks, increasing sediment load and turbidity. This, in turn, would affect water quality and may affect foraging habitat for western pond turtle. The sediment could settle over aquatic plants that provide food for turtles. It could also affect turbidity, which could affect visibility when turtles are foraging for small wildlife prey (e.g., fish).

Increased frequency, duration, and intensity of storm events would be experienced as part of the natural flow regime upstream of the Reservoir, as it is an uncontrolled system. As discussed in Section 4.3.2.1, if the storms occurred during the storm season, the western pond turtle would be expected to be aestivating. If the storms occurred during the western pond turtle's active period, individuals would be expected to find refuge in the upper stream terraces or they may be washed downstream into the Reservoir. As the western pond turtle can persist in either the Reservoir or the stream, individuals would be expected to move throughout the Reservoir or upstream to the creek following the storm. Large storms would not be expected to affect breeding since western pond turtles lay eggs in the upper stream terraces. More frequent flood disturbance (assuming flows greater than 4 fps) would be expected to remove in-stream vegetation and create more riffle habitat. This could also counteract the adverse effects of increasing fuel load described above. However, removal of vegetation along the stream would also reduce shading, which may be adverse, assuming higher ambient temperatures and longer and more frequent heat waves.

The purpose of the Spillway Improvement Project is to capture water from approximately ten-year storms, which may occur more frequently with climate change. Following these large storms, the Reservoir would be holding water until the downstream spreading grounds are available to receive released flows. During this time, the Reservoir would have more ponded habitat and less stream-like habitat. As discussed under Section 4.3.2.1 and Section 4.3.2.2, western pond turtles would be expected to move throughout the Reservoir, including both ponded and stream-like habitat, during their active period.

Downstream of the Dam

Increases in ambient air temperatures would likely cause an increase in water temperatures in areas that lack adequate shading along Big Tujunga Creek. Similarly, longer and more frequent heat waves would also increase the water temperatures. Releases of cold water from the lower Reservoir would be beneficial to keep the downstream temperature cooler in the warm summer and fall months. When conditions along the creek become inhospitable, western pond turtle would be expected to aestivate in stream terraces. With the effects of climate change, western pond turtles may spend more time in the plunge pool or cooler portions of the stream or aestivation may begin earlier in the summer.

Increases in drought-like conditions would also be expected to increase the frequency and magnitude of large fires. With multiple years of below-average rainfall and a lack of flushing flows, leaf litter and woody debris would increase the fire risk and increase the intensity of fires when they occur (Stromberg and Chew 2002; Ellis et al. 1998). With warmer and drier conditions, and fuel in the understory, fires may burn through riparian habitats rather than jumping over the moist habitat as they did historically (USFWS 2002). Large fires would remove both upland and riparian vegetation, which may then be partially replaced with invasive species. Additionally, during the following storm season, increased erosion could occur as sediment washes into the creeks. This, in turn, would affect water quality and may affect foraging habitat for western pond turtle. The sediment could settle over aquatic plants that provide food for turtles. It could also affect turbidity, which could affect visibility when turtles are foraging for small wildlife prey (e.g., fish).

Increased frequency, duration, and intensity of storm events would be attenuated by the Dam as part of its standard flood control functions. The purpose of the Spillway Improvement Project is to capture water from approximately ten-year storms, which may occur more frequently with climate change. Although a portion of the peak flows would be attenuated, downstream tributaries would contribute flows of increased frequency, duration, and intensity. It is assumed that these storms would generally occur during the storm season, in which case, western pond turtles would be aestivating in sediment or on upper stream terraces. If the storms occurred during the western pond turtle's active period, individuals would be expected to find refuge in the upper stream terraces or they may be washed downstream. Individuals would be expected to move along the creek to find suitable habitat following the storm. Large storms would not be expected to affect breeding since western pond turtles lay eggs in the upper stream terraces. More frequent flood disturbance (assuming flows greater than 4 fps) would be expected to remove in-stream vegetation and create more riffle habitat. This could also counteract the adverse effects of increasing fuel load described above. However, removal of vegetation along the stream would also reduce shading, which may be adverse, assuming higher ambient temperatures and longer and more frequent heat waves. As described above, western pond turtles may spend more time in the plunge pool or cooler portions of the stream or aestivation may begin earlier in the summer.

Western pond turtles would be expected to move along the stream to follow suitable aquatic habitat conditions (e.g., temperature) or they will enter aestivation. Supplemental releases required by OPER-3 are expected to benefit western pond turtles by keeping water cool and continuous (i.e., not intermittent). The HCP Working Group will continue to assess conditions annually to determine the appropriate approach to supplemental releases to benefit the downstream habitat for the western pond turtle.

4.7.3 COVERED BIRD SPECIES

Increases in ambient air temperatures would likely cause an increase in temperatures in areas that lack adequate shading along Big Tujunga Creek. Similarly, longer and more frequent heat waves would also increase temperatures. Because nestlings are not able to thermoregulate, increased temperatures may lead to nestling mortality and/or nest failure. Covered Riparian Birds may shift their phenology to compensate for the effects of higher temperatures by migrating to their breeding grounds earlier, nesting earlier, and migrating to their wintering grounds earlier. They may also reduce additional nesting attempts if habitat conditions and health of the birds cannot support additional nesting attempts; this could affect the overall population if the first nesting attempt fails and a subsequent nesting attempt is not made.

Increases in air and water temperatures could affect insect and benthic macroinvertebrate (e.g., mayflies, damselflies, dragonflies) communities. Changes in these communities may affect the timing and availability of prey for Covered Riparian Bird species. To some extent, Covered Riparian Birds would be expected to shift their diet to consume prey that is available. Releases of cold water from the lower Reservoir would be beneficial to keep the stream temperature cooler to support the current array of benthic macroinvertebrates in the warm summer and fall months.

Increases in drought-like conditions would also be expected to increase the frequency and magnitude of large fires. With multiple years of below-average rainfall and a lack of flushing flows, leaf litter and woody debris would increase the fire risk and increase the intensity of fires when they occur (Stromberg and Chew 2002; Ellis et al. 1998). With warmer and drier conditions, and fuel in the understory, fires may burn through riparian habitats rather than jumping over the moist habitat as they did historically (USFWS 2002). Large fires would remove both upland and riparian vegetation, which may then be partially replaced with invasive species that do not provide habitat for Covered Riparian Bird species. Additionally, during the following storm season, increased erosion could occur as sediment washes into the creeks. This, in turn, would affect water quality. Excess silt that is washed into the stream could degrade habitat quality for benthic macroinvertebrates that provide food for Covered Riparian Birds (e.g., mayflies, damselflies, dragonflies). Erosional landslides could also remove riparian habitat.

Changes in precipitation could also affect the distribution of riparian plant species. Goodding's willows and Fremont cottonwoods do not regenerate if the groundwater levels fall below 6 feet (Shafroth et al. 2000). Goodding's willows cannot survive if groundwater levels drop below 10 feet, and Fremont cottonwoods cannot survive if groundwater drops below 16 feet (Stromberg and Tiller 1996). When groundwater levels are lowered, abundant and healthy riparian vegetation decreases and habitat becomes stressed and less productive (Stromberg and Tiller 1996). The distribution and health of riparian vegetation could affect the number of Covered Riparian Bird individuals that can be supported by the habitat.

Increased frequency, duration, and intensity of storm events would be attenuated by the Dam as part of its standard flood control functions. The purpose of the Spillway Improvement Project is to capture water from approximately ten-year storms, which may occur more frequently with climate change. Although a portion of the peak flows would be attenuated, downstream tributaries would contribute flows of increased frequency, duration, and intensity. It is assumed that these storms would generally occur during the storm season, when Covered Riparian Birds are on their wintering grounds. However, if large storms occur during the breeding season, they could affect nests placed low to the water level as described in Section 4.4.1. More frequent flood disturbance (assuming flows greater than 4 fps) would be expected to remove in-stream vegetation and create a mosaic with patches of young riparian habitat, which would be beneficial for Covered Riparian Birds. This could also counteract the adverse effects of increasing fuel load described above. However, removal of vegetation along the stream would also reduce shading, which may be adverse, assuming higher ambient temperatures and longer and more frequent heat waves. Heat exposure could cause mortality to eggs, nestlings, and adults.

Covered Riparian Birds would be expected to move along Big Tujunga Creek to follow suitable riparian habitat conditions. Supplemental releases required by OPER-3 are expected to benefit Covered Riparian Birds by supplying water to support insects and benthic macroinvertebrates as prey. The HCP Working Group will continue to assess conditions annually to determine the appropriate approach to supplemental releases to benefit the downstream habitat.

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4.8 SUMMARY OF POTENTIAL EFFECTS ON COVERED SPECIES AND CRITICAL HABITAT

TABLE 30
SUMMARY OF POTENTIAL EFFECTS ON COVERED SPECIES AND CRITICAL HABITAT

Covered Species	Potential Direct Take	Possible Indirect Take	Direct Loss of Habitat	Indirect Effects on Habitat
Santa Ana sucker, arroyo chub, Santa Ana speckled dace	No direct take of Covered Fish expected as a result of operation and maintenance assuming implementation of OPER-2, and MAIN-1. Handling individuals for relocation out of work areas per MAIN-1 could inadvertently kill/injure the juveniles/adults (minimized through use of proper methods reviewed in the SSFRP per MAIN-1).	9. Releases could wash eggs/fry downstream into non-suitable habitat (minimized by implementation of OPER-2). 10. Abrupt change in release rate could cause stranding of eggs/fry/juveniles in drying pools (not expected with implementation of OPER-2). 11. Supplemental releases beneficially affect water quality by lowering water temperature and increasing dissolved oxygen levels during the warm summer months, which would increase survival (per OPER-3). 12. Maintenance projects could have indirect effects on water quality (not expected with implementation of MAIN-1 and MAIN-6). 13. Maintenance projects within the plunge pool or stream downstream could inadvertently kill/injure individuals during installation of exclusion measures or BMPs (not expected with implementation of MAIN-1). 14. Replacement of the downstream access road could disrupt movement of aquatic species (not expected with implementation of MAIN-1). 15. Supplemental releases would not be available during infrequent long-term, large-scale maintenance projects; stream would be on a bypass line and subject to natural flows (minimized by biological monitoring under MAIN-1). 16. Following translocation upstream, stream habitat in the upper Reservoir footprint would be subject to inundation based on fluctuation in the Reservoir pool (not expected to adversely affect Covered Fish).	**Infrequent short-term, small-scale maintenance (downstream maintenance):** up to 2.69 acres of white alder grove–willow thicket; *temporary impact* **Infrequent long-term, large-scale maintenance:** 1.45 acres open water in the plunge pool (occupied by only arroyo chub); *temporary impact* **Spillway Improvement Project:** 1.45 acres open water in the plunge pool (occupied by only arroyo chub); *temporary impact*	5. Dampening of the flood cycle downstream of the Dam to Stone Canyon: 111.20 acres of riparian habitat along 4.8 stream miles (see habitat enhancement in Section 5.5). 6. Non-native wildlife species could spread from the Reservoir (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 7. Supplemental releases provide continuous water that could contribute to expansion of non-native wildlife downstream (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 8. Supplemental releases could contribute to densification of riparian vegetation that would encroach upon the stream habitat (see in-stream vegetation removal as a potential habitat enhancement measure in Section 5.5).
arroyo toad	No direct take expected as a result of operation and maintenance assuming implementation of MAIN-2. Handling individuals for relocation out of work areas per MAIN-2 could inadvertently kill/injure the eggs/tadpoles/juveniles/adults (minimized through use of proper methods reviewed in the ATRP per MAIN-2).	7. Up to 1.12 stream miles of stream-like habitat could be inundated by fluctuation in the Reservoir pool; however, typically 0.76 stream mile is available during the non-storm season. 8. Eggs/tadpoles could be inundated or stranded due to fluctuation in the Reservoir pool (extremely limited potential; further minimized with implementation of OPER-2). 9. Storage of water for the supplemental releases would inundate up to 0.73 stream mile, leaving 0.39 mile of suitable stream-like habitat in the upper Reservoir; the amount of available habitat would increase over the non-storm season as water is released. 10. Maintenance projects that require a bypass line inlet at the upper end of the Reservoir could inadvertently kill/injure individuals during installation of exclusion measures, bypass line, or BMPs (not expected with implementation of MAIN-2). 11. Following the Spillway Improvement Project, an additional 0.08 mile of stream-like habitat would be inundated following large storms (approximately once every ten years during the storm season). 12. Following future translocation of Covered Fish upstream of the Reservoir, pre-construction surveys for Covered Fish	**Reservoir fluctuation (flood control/water conservation/supplemental releases):** Inundation of 1.12 stream miles of stream-like habitat at upper end of Reservoir; 14.60 acres riparian/alluvial habitats (0.07 acre scale broom scrub, 0.82 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 4.74 acres arroyo willow thicket, 0.03 acre sandbar willow thicket, 0.60 acre mulefat thicket, 2.67 acres smartweed–cocklebur patch, and 5.50 acres dry wash; *temporary impact* **Infrequent long-term, large-scale maintenance (sediment removal only):** 6.29 acres of habitat (0.06 acre of white alder grove—willow thicket, 0.17 acre of black willow thicket, 0.23 acre of arroyo willow thicket, 0.46 acre of mulefat thicket, 2.29 acres of smartweed—cocklebur patch, and 3.08 acres of dry wash); *temporary impact* **Spillway Improvement Project:** infrequent inundation of 0.08 additional stream mile of stream-like habitat at the upper end of Reservoir, which includes 1.60 acres riparian/alluvial habitats (0.07 acre scale broom	2. Non-native wildlife species could spread from the Reservoir (see non-native species removal as a potential habitat enhancement measure in Section 5.5).

TABLE 30
SUMMARY OF POTENTIAL EFFECTS ON COVERED SPECIES AND CRITICAL HABITAT

Covered Species	Potential Direct Take	Possible Indirect Take	Direct Loss of Habitat	Indirect Effects on Habitat
		could kill/injure arroyo toads in the area being surveyed (minimized through conducting surveys for MAIN-2 prior to surveys for MAIN-1).	scrub, 0.28 acre white alder grove–willow thicket, 0.95 acre arroyo willow thicket, 0.13 acre sandbar willow thicket, 0.03 acre smartweed–cocklebur patch, and 0.14 acre dry wash); *temporary impact*	
western pond turtle	No direct take is expected as a result of operation and maintenance assuming implementation of MAIN-3. Handling individuals for relocation out of work areas per MAIN-3 could inadvertently kill/injure the juveniles/adults (minimized through use of proper methods reviewed in the WPTRP per MAIN-3).	8. Releases could displace individuals downstream, but they would be expected to move upstream/downstream to suitable habitat. 9. Supplemental releases beneficially add suitable habitat during the non-storm season. 10. Supplemental releases beneficially affect water quality by lowering water temperature and increasing dissolved oxygen levels during the warm summer months. 11. Maintenance projects could have indirect effects on water quality (not expected with implementation of MAIN-3 and MAIN-6). 12. Maintenance projects within the plunge pool or downstream areas could inadvertently kill/injure individuals during installation of exclusion measures or BMPs (not expected with implementation of MAIN-3). 13. Replacement of the downstream access road could disrupt movement of aquatic species (not expected with implementation of MAIN-3). 14. Supplemental releases would not be available during infrequent long-term, large-scale maintenance projects; stream would be on a bypass line and subject to natural flows. Western pond turtles would be expected to move to suitable habitat.	**Infrequent short-term, small-scale maintenance (downstream maintenance):** 2.69 acres of white alder grove–willow thicket; *temporary impact* **Infrequent long-term, large-scale maintenance (sediment removal):** 49.64 acres (0.06 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 0.23 acre arroyo willow thicket, 0.46 acre mulefat thicket, 2.29 acres smartweed–cocklebur patch, 43.35 acres open water, 3.08 acres dry wash); *temporary impact* **Infrequent long-term, large-scale maintenance (subsurface grouting/ concrete repair):** 19.13 acres (0.04 acre disturbed freshwater seep, 19.09 acres open water); *temporary impact* **Spillway Improvement Project:** 1.45 acres open water in the plunge pool; *temporary impact*	5. Dampening of the flood cycle downstream of the Dam to Stone Canyon: 111.20 acres of riparian habitat along 4.8 stream miles (see habitat enhancement in Section 5.5). 6. Non-native wildlife species could spread from the Reservoir (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 7. Supplemental releases provide continuous water that could contribute to expansion of non-native wildlife downstream (see non-native species removal as a potential habitat enhancement measure in Section 5.5). 8. Supplemental releases could contribute to densification of riparian vegetation that would encroach upon the stream habitat (see in-stream vegetation removal as a potential habitat enhancement measure in Section 5.5).
least Bell's vireo, southwestern willow flycatcher, western yellow-billed cuckoo	No direct take is expected as a result of operation and maintenance assuming implementation of MAIN-4 and MAIN-5.	8. Releases during the breeding season could inundate nests that are built close to the water level downstream of the Dam; minimal potential to affect least Bell's vireo nests; not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests (minimized with implementation of OPER-2 and MAIN-1). 9. Reservoir fluctuation during the breeding season could inundate nests that are built close to the water level in riparian habitat in the upper Reservoir; minimal potential to affect least Bell's vireo nests; not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests. 10. Maintenance projects could have indirect effects on water quality, which could affect invertebrate prey of riparian bird species (not expected with implementation of MAIN-1 and MAIN-6). 11. Noise and human activity during the breeding season could cause Covered Riparian Birds to abandon a nest or avoid establishing a territory within 500 feet of the work area. Noise could interfere with communication between a pair and could affect nest success (not expected with implementation of MAIN-4). 12. Maintenance projects that remove riparian habitat during the breeding season could impact riparian bird nests during	**Reservoir fluctuation (flood control/water conservation):** Inundation of 6.36 acres riparian habitat (0.82 acre white alder grove–willow thicket, 0.17 acre black willow thicket, 4.74 acre arroyo willow thicket, 0.03 acre sandbar willow thicket, 0.60 acre mulefat thicket); *temporary impact* **Infrequent short-term, small-scale, maintenance (downstream maintenance):** Removal of 2.69 acres of white alder grove–willow thicket; *temporary impact* **Infrequent long-term, large-scale maintenance (sediment removal only):** Removal of 0.92 acre of riparian habitat (0.06 acre of white alder grove—willow thicket, 0.17 acre of black willow thicket, 0.23 acre of arroyo willow thicket, 0.46 acre of mulefat thicket); *temporary impact* **Spillway Improvement Project (additional inundation):** Inundation of 1.36 acres riparian habitats (0.28 acre white alder grove–willow thicket, 0.95 acre arroyo willow thicket, 0.13 acre sandbar willow thicket); *temporary impact*	3. Dampening of the flood cycle downstream of the Dam to Stone Canyon: 85.85 acres of riparian scrub/forest habitat along 4.8 stream miles (see habitat enhancement in Section 5.5). 4. Supplemental releases could contribute to densification of riparian vegetation that would encroach upon the stream habitat. Initially beneficial for increasing the amount of riparian habitat; but, over time, the lack of flooding would reduce the amount of young understory growth preferred for nesting (see in-stream vegetation removal as a potential habitat enhancement measure in Section 5.5).

TABLE 30
SUMMARY OF POTENTIAL EFFECTS ON COVERED SPECIES AND CRITICAL HABITAT

Covered Species	Potential Direct Take	Possible Indirect Take	Direct Loss of Habitat	Indirect Effects on Habitat
		vegetation removal or installation of BMPs (not expected with implementation of MAIN-4 and MAIN-5). 13. Following the Spillway Improvement Project, an additional 0.08 mile of stream-like habitat would be temporarily inundated following large storms (approximately once every ten years during the storm season); minimal potential to affect least Bell's vireo nests; not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests. 14. Following future translocation of Covered Fish upstream of the Reservoir, pre-construction surveys for Covered Fish could impact riparian bird nests in the area being surveyed.		
Critical Habitat				
Santa Ana sucker	Not applicable	See above	**Infrequent short-term, small-scale maintenance (downstream maintenance):** up to 2.69 acres; *temporary impact* **Infrequent long-term. large-scale maintenance:** 1.45 acres (not occupied by Santa Ana sucker); *temporary impact* **Spillway Improvement Project:** 1.45 acres (not occupied by Santa Ana sucker); *temporary impact*	Disruption of the flood cycle downstream of the Dam to Stone Canyon: 111.20 acres of riparian habitat along 4.8 stream miles
arroyo toad	Not applicable	See above	**Reservoir fluctuation (flood control/water conservation):** Inundation of 5.39 acres over 0.24 stream mile typically during the storm season; *temporary impact* **Spillway Improvement Project:** Inundation of an additional 1.59 acres over 0.08 stream mile typically during the storm season; *temporary impact*	None
southwestern willow flycatcher	Not applicable	None	None	None

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5.0 Conservation Strategy

The conservation strategy defines what the HCP is trying to accomplish through biological goals; how the applicant will track progress through the monitoring program; and how the applicant will adjust implementation of the HCP through Adaptive Management because of new information and/or changed and unforeseen circumstances. The conservation strategy must be: (1) founded in the biological needs of species, (2) a logical structured approach, (3) forward-thinking to anticipate future changes, and (4) developed to fit into the larger conservation context occurring around the HCP (USFWS 2016a).

Definition of Biological Goals, Objectives, and Adaptive Management

Biological goals represent the overarching vision for a conservation program. Biological goals describe the desired outcome for the Covered Species and their habitats through implementation of the conservation program. Biological goals are broad, guiding principles that provide the motivation behind the management strategy (i.e., biological objectives).

Biological objectives are incremental steps taken to achieve each biological goal. The number of objectives per biological goal will vary, but there should be enough objectives to describe how to adequately achieve the biological goal over a specific period of time. Biological objectives articulate a measurable standard, desired state, threshold value, amount of change, or a trend. The objectives can be either habitat or species-based; but they must be specific, measurable, and achievable. Objectives could involve the maintenance of a certain acreage of suitable habitat, certain levels of habitat quality, certain numbers of individuals within habitat areas, or certain levels of reproductive success, as examples. Results of monitoring provide feedback on the effectiveness of the biological objectives.

An *Adaptive Management* approach is learning by doing. It involves exploring alterative ways to meet biological objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of those alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions. Adaptive Management focuses on learning and adapting through partnerships with managers, scientists, and other stakeholders to learn together how to create and maintain sustainable resource systems (USFWS 2016b). Adaptive Management is especially important in consideration of the uncertainty related to future climate changes; implementation strategies will need to prepare for and adjust to climate-related effects on natural systems and human communities (Stein et al. 2014).

The following documents were reviewed to develop the conservation strategy:

- *Santa Ana Sucker Recovery Plan* (USFWS 2017a)
- *Arroyo Toad Recovery Plan* (USFWS 1999a)
- *Arroyo Toad Five-Year Review* (USFWS 2009)
- *Draft Least Bell's Vireo Recovery Plan* (USFWS 1998; never finalized)
- *Least Bell's Vireo Five-Year Review* (USFWS 2006)
- *Southwestern Willow Flycatcher Recovery Plan* (USFWS 2002)
- *Southwestern Willow Flycatcher Five-Year Reviews* (USFWS 2014a, 2017b)

5.1 BIOLOGICAL GOALS

The HCP Working Group has established the following biological goals:

Biological Goal 1 Facilitate water releases that are not detrimental to conserving existing Covered Species occurrences in the Action Area and that would support an increase in the number of Covered Species individuals and/or an increase in the distribution of Covered Species in the Action Area.

Biological Goal 2 While providing flood protection and water conservation pursuant to LACFCD's mission, maintain natural stream dynamics (hydrological and sediment transport processes) to the extent reasonably possible downstream of Big Tujunga Dam. Natural stream dynamics would support a mosaic of riparian and riverine habitats (i.e., various successional stages) that would provide habitat value for multiple Covered Species.

Biological Goal 3 Avoid and minimize impacts on Covered Species in the Action Area during maintenance projects.

5.2 BIOLOGICAL OBJECTIVES

Table 31 shows the biological objectives to accomplish the biological goals listed in Section 5.1. The table also includes a reference to related conservation measures previously included in Section 3.7 and the associated monitoring requirements described in detail in Section 5.4.

TABLE 31
BIOLOGICAL OBJECTIVES

Biological Objective Number	Biological Objective Description	Conservation Measure Number	Monitoring Requirements Described
Biological Goal 1: *Facilitate water releases that are not detrimental to conserving existing Covered Species occurrences in the Action Area and that would support an increase in the number of Covered Species individuals and/or an increase in the distribution of Covered Species in the Action Area.*			
Biological Objective 1-1	During the Santa Ana sucker breeding season (March 1 to July 31), non-flood control releases (e.g., water conservation, valve testing, etc.) shall not exceed 250 cfs. Non-flood control operations shall "ramp" releases (i.e., step-wise increases and decreases); the maximum step-wise increase/ decrease during ramping shall be 100 cfs over four hours.	OPER-2	Section 5.4.1 (Records of Inflow/Outflow)
Biological Objective 1-2	When sufficient water is available, supplemental releases shall be made over the course of the non-storm season (i.e., April 16 to October 14) to provide base flow for Covered Species, lower stream temperatures, and increase in dissolved oxygen.	OPER-3	Section 5.4.1 (Records of Inflow/Outflow)
Biological Objective 1-3	Populations of Covered Species in the Action Area shall be monitored to determine whether their populations are remaining steady, increasing, or decreasing.	OPER-4	Section 5.4.2 (Monitoring Covered Species)

TABLE 31
BIOLOGICAL OBJECTIVES

Biological Objective Number	Biological Objective Description	Conservation Measure Number	Monitoring Requirements Described
Biological Objective 1-4	The HCP Working Group shall meet annually to discuss monitoring results and whether Adaptive Management and/or habitat enhancement measures are necessary.	OPER-4	Reporting requirements described in OPER-4 (Meeting Minutes) and Section 5.6 (Annual Report); also see Section 5.5 (Habitat Enhancement)
Biological Goal 2: *While providing flood protection and water conservation pursuant to LACFCD's mission, maintain natural stream dynamics (hydrological and sediment transport processes) downstream of Big Tujunga Dam to the extent reasonably possible. Natural stream dynamics would support a mosaic of riparian and riverine habitats (i.e., various successional stages) that would provide habitat value for multiple Covered Species.*			
Biological Objective 2-1	Based on existing operational guidelines, flood control releases shall be conducted so that outflow is comparable to inflow except where limited by downstream constraints such as the Oro Vista Avenue crossing (currently 500 cfs). Flood control releases shall not be ramped.	OPER-1	Section 5.4.1 (Records of Inflow/Outflow)
Biological Objective 2-2	Periodic high flows (i.e., releases of 250 to 500 cfs) within the stream channel shall be allowed to the extent possible within the limits of public safety and water conservation.	OPER-1	Section 5.4.1 (Records of Inflow/Outflow)
Biological Objective 2-3	Aquatic and riparian habitat for Covered Species shall be monitored in the Action Area to determine whether habitat conditions are suitable for Covered Species.	OPER-4	A. Section 5.4.2.4 (Aquatic Habitat) B. Section 5.4.2.5 (Riparian Habitat)
Biological Objective 2-4	The HCP Working Group shall meet annually to discuss the results of aquatic and riparian habitat monitoring and whether Adaptive Management and/or habitat enhancement measures are necessary to support a mosaic of riparian/riverine habitat types and successional stages.	OPER-4	Reporting requirements described in OPER-4 (Meeting Minutes) and Section 5.6 (Annual Report); also see Section 5.5 (Habitat Enhancement)
Biological Goal 3: *Avoid and minimize impacts on Covered Species in the Action Area during maintenance projects.*			
Biological Objective 3-1	Alterations to the release regime shall be minimized by scheduling multiple maintenance projects within the same area to occur at the same time (or in tandem).	MAIN-6	Section 5.4.3 (Monitoring for Maintenance Activities)
Biological Objective 3-2	Maintenance activities shall avoid and/or minimize impacts on habitat for Covered Species.	MAIN-6	Section 5.4.3 (Monitoring for Maintenance Activities)
Biological Objective 3-3	If riparian or in-stream vegetation removal is necessary, vegetation removal should be scheduled to occur outside the breeding season for Covered Species.	MAIN-4, MAIN-5	Section 5.4.3 (Monitoring for Maintenance Activities)
Biological Objective 3-4	If work in aquatic or riparian habitat would occur during the breeding season for Covered Species, biological monitoring shall occur during the work effort. Biological monitoring shall be full-time during vegetation removal and installation of BMPs and periodic throughout construction.	MAIN-1, MAIN-2, MAIN-3, MAIN-4, MAIN-5	Section 5.4.3 (Monitoring for Maintenance Activities)
Biological Objective 3-5	Appropriate BMPs shall be incorporated to minimize indirect effects on habitat value for Covered Species. This includes measures to protect water quality; prevent the spread of invasive weed seeds; prepare for quick emergency response by having appropriate equipment on site (e.g., fire extinguishers and spill kits).	MAIN-1, MAIN-3, MAIN-6	Section 5.4.3 (Monitoring for Maintenance Activities)

5.3 CONSERVATION MEASURES

Conservation measures for operations were previously listed in Section 3.7.1 (see OPER-1, OPER-2, OPER-3, and OPER-4). Conservation measures for maintenance activities were previously listed in Section 3.7.2 (see MAIN-1, MAIN-2, MAIN-3, MAIN-4, MAIN-5, and MAIN-6).

Section 4 described the potential effects of operation and maintenance activities. This section relates each of the effects identified in Section 4 to the corresponding conservation measures (Tables 32, 33, 34, and 35). The tables also include reference to the corresponding monitoring strategy for each conservation measure.

5.3.1 COVERED FISH

TABLE 32
COVERED FISH

Project Element	Direct Effects	Indirect Project Effects	Impact on Covered Fish	Conservation Measures for Covered Fish	Monitoring for Covered Fish
Flood Control Operations	Water stored in Reservoir and released over a longer time period; reduces peak flows	Dampening of moderate-sized storms (500-3,000 cfs) reduces flood disturbance to 111.20 acres downstream	Presence of Dam beneficially minimizes high flows early in the breeding season that may displace individuals, eggs, or fry; could strand fry in drying pools when flows subside	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.1 (Monitor Covered Fish Species populations)
	Dam captures sediment	Disruption of sediment transport	Indirect effect of reducing flood disturbance and disrupting sediment transport may reduce habitat quality for Covered Fish Species	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.1 (Covered Fish Species); Section 5.4.2.4 (Aquatic Habitat Quality)
Water Conservation	Periodic releases that do not coincide with storm events	Increased flows downstream	Releases may displace individuals, eggs, or fry; could strand fry in drying pools when flows subside	OPER-2 (ramping during fish breeding season)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.1 (Monitor Covered Fish Species)
Supplemental Releases	Water stored in Reservoir for non-storm season release	Water held back and not released during the storm season	Beneficial increase in the amount and quality of habitat over summer months especially during drought years	OPER-4 (release strategy)	Section 5.4.2.1 (Covered Fish Species); Section 5.4.2.4 (Aquatic Habitat Quality)
	Increase downstream stream velocity during non-storm season	May increase in-stream vegetation, slow flows, increase sediment deposition, and increase embeddedness	May decrease overall habitat quality in the absence of flushing flows	OPER-4 (release strategy)	Section 5.4.2.1 (Covered Fish Species); Section 5.4.2.4 (Aquatic Habitat Quality)
	Recharge downstream pools with cool oxygenated water	May support non-native wildlife by providing year-round aboveground flow/habitat	May increase predation on Covered Fish Species	OPER-4 (release strategy)	Section 5.4.2.1 (Covered Fish Species); Section 5.4.2.4 (Aquatic Habitat Quality/Non-native Wildlife Species Abundance)
Inspections/Testing	Periodic releases that do not coincide with storm events	Slight increase in flows downstream	Releases may displace individuals, eggs, or fry; could strand fry in drying pools when flows subside	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.1 (Covered Fish Species); Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Regular Short-term, Small-scale Maintenance	Reservoir may be lowered or held steady	Temporary increase in flows downstream	Releases may displace individuals, eggs, or fry; could strand fry in drying pools when flows subside	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.1 (Covered Fish Species); Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Covered Fish Species health or prey availability could be affected by water quality	MAIN-1 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Infrequent Short-term, Small-scale Maintenance	Reservoir may be lowered or held steady	Temporary increase in flows downstream	Releases may displace individuals, eggs, or fry; could strand fry in drying pools when flows subside	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.1 (Covered Fish Species); Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Releases may be stopped temporarily during maintenance work	Temporary decrease in flows downstream; however, leakage would still occur (1-2 cfs)	No effect expected		Section 5.4.2.1 (Covered Fish Species); Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Covered Fish Species health or prey availability could be affected by water quality	MAIN-1 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary impact to up to 2.69 acres of riparian habitat		Up to 2.69 acres of stream habitat not available during maintenance project (stream channel, stream gages, downstream access road)	MAIN-1 (relocation out of work area per SSFRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary stream diversion may be required for work within stream channel		Installation of BMPs or maintenance work in creek could injure/kill Covered Fish Species	MAIN-1 (relocation out of work area per SSFRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)

TABLE 32
COVERED FISH

Project Element	Direct Effects	Indirect Project Effects	Impact on Covered Fish	Conservation Measures for Covered Fish	Monitoring for Covered Fish
			Design of access road culvert bridge could disrupt movement of Covered Fish Species	MAIN-1 (aquatic wildlife passage)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Infrequent Long-term, Large-scale Maintenance	Reservoir would be fully or partially dewatered	Temporary increase in flows downstream	Releases may displace individuals, eggs, or fry; could strand fry in drying pools when flows subside	MAIN-1 (ramping during fish breeding season)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary impact to 1.45 acres of habitat in the plunge pool		1.45 acres of pool habitat (affects arroyo chub only) not available during maintenance project	MAIN-1 (relocation out of work area per SSFRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
			Installation of BMPs or maintenance work in plunge pool could injure/kill fish	MAIN-1 (relocation out of work area)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Covered Fish Species health or prey availability could be affected by water quality	MAIN-1 (BMPs) and MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
		Dewatering releases may release non-native species from Reservoir into downstream habitat	Non-native species may increase predation on fish downstream	MAIN-1 (fish screen during dewatering)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Bypass line in place when Reservoir dewatered; supplemental releases would not be available during project	Stream may dry up if weather conditions are dry	Covered Fish Species mortality may occur if stream dries	MAIN-1 (monitoring)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Spillway Improvement Project	Reservoir would be partially dewatered	Temporary increase in flows downstream	Releases may displace individuals, eggs, or fry; could strand fry in drying pools when flows subside	MAIN-1 (ramping during fish breeding season)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary impact to 1.45 acres of habitat in the plunge pool		1.45 acres of pool habitat (affects arroyo chub only) not available during maintenance project	MAIN-1 (relocation out of work area per SSFRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
			Installation of BMPs or maintenance work in plunge pool could injure/kill fish	MAIN-1 (relocation out of work area per SSFRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Reduced supplemental releases during project	Stream may be reduced if weather conditions are dry	Covered Fish Species habitat quantity/quality may be reduced	MAIN-1 (monitoring)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Future Translocation	Reservoir elevation would fluctuate	Amount of habitat that is lake-like versus stream-like would fluctuate	Amount of stream-like habitat available for Covered Fish Species would fluctuate	OPER-2 (ramping during fish breeding season); changes footprint gradually	Section 5.4.1 (Records of Inflow/Outflow)
			Covered Fish Species could be washed into the Reservoir during high flows	N/A (result of natural conditions)	Section 5.4.1 (Records of Inflow/Outflow)
	Installation of bypass line when Reservoir is dewatered		Installation of BMPs or maintenance work in Reservoir could injure/kill Covered Fish Species	MAIN-1 (relocation out of work area per SSFRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Mitigation Program	Biological surveys/monitoring	Biologist moving through habitat and handling individuals	Handling Covered Fish Species for relocation could injure/kill them, or Biologists could step on them while moving through habitat	MAIN-1 (SSFRP approved by agencies)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)

Notes: BMP: Best Management Practice; cfs: cubic feet per second; SSFRP: Special Status Fish Relocation Plan

5.3.2 COVERED HERPETOFAUNA

5.3.2.1 ARROYO TOAD

TABLE 33
ARROYO TOAD

Project Element	Direct Project Effects	Indirect Project Effects	Impact on Arroyo Toad	Conservation Measures for Arroyo Toad	Monitoring for Arroyo Toad
Flood Control Operations	Water stored in Reservoir and released over a longer time period	Reservoir pool fluctuates	Suitable habitat for arroyo toad (stream-like habitat) fluctuates with more available when Reservoir is low and less available when Reservoir is inundated; Reservoir fluctuation could affect 1.12 stream miles, although typically 0.76 stream mile is available as stream-like habitat	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.2 (Covered Herpetofauna Species)
			Reservoir may inundate aestivating arroyo toads	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.2 (Covered Herpetofauna Species)
Water Conservation	Water stored in the Reservoir and released when spreading grounds have capacity	Reservoir pool fluctuates	Suitable habitat for arroyo toad (stream-like habitat) fluctuates with more available when Reservoir is low and less available when Reservoir is inundated; Reservoir fluctuation could affect 1.12 stream miles, although typically 0.76 stream mile is available as stream-like habitat		Section 5.4.2.2 (Covered Herpetofauna Species)
			Limited potential for eggs laid in transition zone to be lost if Reservoir level changes quickly	OPER-2 (ramping during fish breeding season); changes water level gradually	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.2 (Covered Herpetofauna Species)
Supplemental Releases	Water stored in Reservoir for non-storm season release	Water held back and not released during the storm season	Suitable habitat for arroyo toad (stream-like habitat) reduced when Reservoir inundated; Reservoir inundation for supplemental releases could affect 0.73 stream mile, leaving 0.39 stream mile available as habitat	OPER-4 (release strategy)	Section 5.4.2.2 (Covered Herpetofauna Species)
Inspections/Testing	Periodic releases that do not coincide with storm events	Reservoir pool not expected to change substantially	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
	Reservoir topographical surveys may require lowering the Reservoir temporarily	Reservoir pool reduced	Suitable habitat for arroyo toad (stream-like habitat) increases when Reservoir is low		Section 5.4.2.2 (Covered Herpetofauna Species)
Regular Short-term, Small-scale Maintenance	Reservoir may be lowered or held steady	Reservoir pool reduced	Suitable habitat for arroyo toad (stream-like habitat) increases when Reservoir is low		Section 5.4.2.2 (Covered Herpetofauna Species)
Infrequent Short-term, Small-scale Maintenance	Reservoir may be lowered or held steady	Reservoir pool reduced	Suitable habitat for arroyo toad (stream-like habitat) increases when Reservoir is low		Section 5.4.2.2 (Covered Herpetofauna Species)
	Releases may be stopped temporarily during maintenance work	Reservoir pool may increase	Suitable habitat for arroyo toad (stream-like habitat) may decrease but would be within typical Reservoir fluctuation		Section 5.4.2.2 (Covered Herpetofauna Species)
Infrequent Long-term, Large-scale Maintenance	Reservoir would be dewatered	Reservoir would be empty	Sediment removal would temporarily affect 6.29 acres of stream habitat; could injure/kill arroyo toads	MAIN-2 (relocation out of work area per ATRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Bypass line in place when Reservoir dewatered; supplemental releases would not be available during project		Installation of bypass line/coffer dam/BMPs could injure/kill arroyo toads	MAIN-2 (relocation out of work area per ATRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
			Dewatering Reservoir would remove non-native wildlife and decrease predation on arroyo toad		Section 5.4.2.2 (Covered Herpetofauna Species)
	Reservoir would be partially dewatered	Reservoir pool reduced	Suitable habitat for arroyo toad (stream-like habitat) increases when Reservoir is low		Section 5.4.2.2 (Covered Herpetofauna Species)

TABLE 33
ARROYO TOAD

Project Element	Direct Project Effects	Indirect Project Effects	Impact on Arroyo Toad	Conservation Measures for Arroyo Toad	Monitoring for Arroyo Toad
Spillway Improvement Project	Reservoir would be partially dewatered	Reservoir pool reduced	Suitable habitat for arroyo toad (stream-like habitat) increases when Reservoir is low		Section 5.4.2.2 (Covered Herpetofauna Species)
	Capacity of Reservoir would be increased	Reservoir inundation footprint would be larger (estimated once every 10 years)	During maximum inundation, Reservoir footprint would extend 0.08 stream mile further upstream; suitable habitat for arroyo toad would temporarily decrease by 0.08 stream mile		Section 5.4.2.2 (Covered Herpetofauna Species)
Future Translocation	Pre-construction fish surveys/monitoring upstream of Reservoir per MAIN-1	Biologist moving through habitat	Biologists moving through habitat could injure/kill arroyo toads by stepping on them	MAIN-2 (relocation out of work area per ATRP) prior to MAIN-1	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Mitigation Program	Biological surveys/monitoring	Biologist moving through habitat and handling individuals	Handling toads for relocation could injure/kill them, or Biologists could step on them while moving through habitat	MAIN-2 (ATRP approved by agencies)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Note: ATRP: Arroyo Toad Relocation Plan					

5.3.2.2 WESTERN POND TURTLE

TABLE 34
WESTERN POND TURTLE

Project Element	Direct Project Effects	Indirect Project Effects	Impact on Western Pond Turtle	Conservation Measures for Western Pond Turtle	Monitoring for Western Pond Turtle
Flood Control Operations	Water stored in Reservoir and released over a longer time period; reduces peak flows downstream	Dampening of moderate-sized storms (500-3,000 cfs) reduces flood disturbance to 111.20 acres downstream	Presence of Dam beneficially minimizes high flows early in the spring that may displace individuals (downstream)	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.2 (Covered Herpetofauna Species)
	Dam captures sediment	Disruption of sediment transport	Indirect effect of reducing flood disturbance may reduce habitat quality	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.2 (Covered Herpetofauna Species)
		Reservoir pool fluctuates	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
Water Conservation	Periodic releases that do not coincide with storm events	Increased flows downstream	May displace individuals (downstream)	OPER-2 (ramping during fish breeding season)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.2 (Covered Herpetofauna Species)
	Water stored in the Reservoir and released when spreading grounds have capacity	Reservoir pool fluctuates	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
Supplemental Releases	Water stored in Reservoir for non-storm season release	Water held back and not released during the storm season	Beneficial increase in the amount and quality of habitat over summer months especially during drought years	OPER-4 (release strategy)	Section 5.4.2.2 (Covered Herpetofauna Species); Sections 5.4.2.4 and 5.4.2.5 (Aquatic/Riparian Habitat Quality)
	Increase downstream stream velocity during non-storm season	May increase in-stream vegetation, slow flows, increase sediment deposition, and increase embeddedness	May decrease overall habitat quality downstream in the absence of flushing flows	OPER-4 (release strategy)	Section 5.4.2.2 (Covered Herpetofauna Species); Sections 5.4.2.4 and 5.4.2.5 (Aquatic/Riparian Habitat Quality)
	Recharge downstream pools with cool oxygenated water	May support non-native wildlife by providing year-round aboveground flow/habitat	Increased flow may increase predation on western pond turtle	OPER-4 (release strategy)	Section 5.4.2.2 (Covered Herpetofauna Species); Sections 5.4.2.4 and 5.4.2.5 (Aquatic/Riparian Habitat Quality)
Inspections/Testing	Periodic releases that do not coincide with storm events	Slight increase in flows downstream	May displace individuals (downstream)	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.2 (Covered Herpetofauna Species); Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Reservoir topographical surveys may require lowering the Reservoir temporarily	Reservoir pool reduced	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
Regular Short-term, Small-scale Maintenance	Reservoir may be lowered or held steady	Temporary increase in flows downstream	May displace individuals (downstream)	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.2 (Covered Herpetofauna Species)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Western pond turtle foraging or prey availability could be affected by water quality	MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Infrequent Short-term, Small-scale Maintenance	Reservoir may be lowered or held steady	Temporary increase in flows downstream	May displace individuals (downstream)	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.2 (Covered Herpetofauna Species)
	Releases may be stopped temporarily during maintenance work	Temporary decrease in flows downstream; however, leakage would still occur (1-2 cfs)	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Western pond turtle foraging or prey availability could be affected by water quality	MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary impact to up to 2.69 acres of riparian habitat		2.69 acres of stream habitat not available during maintenance project (stream channel, stream gages, downstream access road)	MAIN-3 (relocation out of work area per WPTRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary stream diversion may be required for work within stream channel		Installation of BMPs or maintenance work in creek could injure/kill western pond turtles	MAIN-1 (relocation out of work area per WPTRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
			Design of access road could disrupt movement of western pond turtles	MAIN-1 (aquatic wildlife passage)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)

TABLE 34
WESTERN POND TURTLE

Project Element	Direct Project Effects	Indirect Project Effects	Impact on Western Pond Turtle	Conservation Measures for Western Pond Turtle	Monitoring for Western Pond Turtle
Infrequent Long-term, Large-scale Maintenance	Reservoir would be fully or partially dewatered	Temporary increase in flows downstream	May displace individuals (downstream)	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.2 (Covered Herpetofauna Species)
	Temporary impact to 49.69 acres during sediment removal; 19.13 acres during subsurface grouting/concrete repair		49.69 acres of habitat not available during sediment removal; 19.13 acres of habitat not available during subsurface grouting/concrete repair	MAIN-3 (relocation out of work area per WPTRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
			Vegetation clearing or installation of BMPs could injure/kill western pond turtles	MAIN-3 (relocation out of work area per WPTRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Bypass line in place when Reservoir is dewatered		Installation of bypass line/coffer dam/BMPs could injure/kill western pond turtles	MAIN-3 (relocation out of work area per WPTRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Supplemental releases not available during project	Stream may dry up if weather conditions are dry	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
			Construction vehicles may injure/kill western pond turtles crossing roads	MAIN-3 (exclusion fencing)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Western pond turtle foraging or prey availability could be affected by water quality	MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
		Dewatering releases may release non-native species from Reservoir into downstream habitat	Non-native species may increase predation on western pond turtles downstream	MAIN-1 (fish screen during dewatering)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Spillway Improvement Project	Reservoir would be partially dewatered	Temporary increase in flows downstream	May displace individuals (downstream)	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.2 (Covered Herpetofauna Species)
	Temporary impact to 1.45 acres of habitat in the plunge pool		1.45 acres of pool habitat not available during project	MAIN-3 (relocation out of work area per WPTRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
			Installation of BMPs could injure/kill western pond turtles	MAIN-3 (relocation out of work area per WPTRP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Western pond turtle foraging or prey availability could be affected by water quality	MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Capacity of Reservoir would be increased	Reservoir inundation footprint would be larger (estimated once every 10 years)	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
	Reduced supplemental releases during project	Stream may be reduced if weather conditions are dry	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
Future Translocation	Pre-construction fish surveys/monitoring upstream of Reservoir per MAIN-1	Biologist moving through habitat	None anticipated		Section 5.4.2.2 (Covered Herpetofauna Species)
Mitigation Program	Biological surveys/monitoring	Biologist moving through habitat and handling individuals	Handling western pond turtles for relocation could injure/kill them	MAIN-3 (WPTRP approved by agencies)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Notes: cfs: cubic feet per second; WPTRP: Western Pond Turtle Relocation Plan					

5.3.3 COVERED RIPARIAN BIRDS

TABLE 35
COVERED RIPARIAN BIRDS

Project Element	Direct Project Effects	Indirect Project Effects	Impact on Covered Riparian Birds	Conservation Measures for Covered Riparian Birds	Monitoring for Covered Riparian Birds
Flood Control Operations	Water stored in Reservoir and released over a longer time period; reduces peak flows	Dampening of moderate-sized storms (500-3,000 cfs) reduces flood disturbance to 111.20 acres downstream	Indirect effect of reducing flood disturbance may reduce habitat quality and quantity for riparian birds downstream	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.3 (Covered Riparian Bird Species)
		Increased flows downstream	Presence of Dam beneficially minimizes high flows early in the breeding season that have a minimal potential to inundate least Bell's vireo nests close to the water line in upper portion of Reservoir or downstream; an even lower potential that this would affect southwestern willow flycatcher nests; not expected to affect western yellow-billed cuckoo nests.	OPER-1 (outflow comparable to inflow)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.3 (Covered Riparian Bird Species)
Water Conservation	Periodic releases that do not coincide with storm events	Increased flows downstream	Minimal potential to inundate least Bell's vireo nests close to the water line downstream. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	OPER-2 (ramping during fish breeding season)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.3 (Covered Riparian Bird Species)
	Water stored in the Reservoir and released when spreading grounds have capacity	Reservoir pool fluctuates	Minimal potential to inundate least Bell's vireo nests close to the water line in upper portion of Reservoir. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	OPER-2 (ramping during fish breeding season)	Section 5.4.1 (Records of Inflow/Outflow); Section 5.4.2.3 (Covered Riparian Bird Species)
Supplemental Releases	Water stored in Reservoir for non-storm season release	Water held back and not released during the storm season	Additional water released downstream over the growing season may increase the amount of riparian habitat for Covered Riparian Birds	OPER-4 (release strategy)	Section 5.4.2.3 (Covered Riparian Bird Species); Section 5.4.2.5 (Riparian Habitat Quality)
	Increase downstream stream velocity during non-storm season	May increase in-stream vegetation, slow flows, increase sediment deposition, and increase embeddedness	If riparian habitat is dense and mature, additional densification may degrade riparian habitat for Covered Riparian Birds	OPER-4 (release strategy)	Section 5.4.2.3 (Covered Riparian Bird Species); Section 5.4.2.5 (Riparian Habitat Quality)
Inspections/Testing	Periodic releases that do not coincide with storm events	Slight increase in flows downstream	Minimal potential to inundate least Bell's vireo nests close to the water line downstream. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.3 (Covered Riparian Bird Species); Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Reservoir topographical surveys may require lowering the Reservoir temporarily	Reservoir pool reduced	None anticipated		Section 5.4.2.3 (Covered Riparian Bird Species)
Regular Short-term, Small-scale Maintenance	Reservoir may be lowered or held steady	Temporary increase in flows downstream	Minimal potential to inundate least Bell's vireo nests close to the water line downstream. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.3 (Covered Riparian Bird Species); Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Prey availability could be affected by water quality	MAIN-1/MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Infrequent Short-term, Small-scale Maintenance	Maintenance project within 500 feet of riparian habitat	Noise from equipment and human activity	Construction noise could cause a pair to abandon territory or affect nest success	MAIN-4 (pre-construction surveys; reporting per RBCP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Reservoir may be lowered or held steady	Temporary increase in flows downstream	Minimal potential to inundate least Bell's vireo nests close to the water line downstream. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	MAIN-1 (ramping during breeding season)	Section 5.4.2.3 (Covered Riparian Bird Species) Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Releases may be stopped temporarily during maintenance work	Temporary decrease in flows downstream; however, leakage would still occur (1-2 cfs)	None anticipated		Section 5.4.2.3 (Covered Riparian Bird Species)

TABLE 35
COVERED RIPARIAN BIRDS

Project Element	Direct Project Effects	Indirect Project Effects	Impact on Covered Riparian Birds	Conservation Measures for Covered Riparian Birds	Monitoring for Covered Riparian Birds
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Prey availability could be affected by water quality	MAIN-1/MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary impact to up to 2.69 acres of riparian habitat		Temporary impact 2.69 acres of riparian habitat during downstream maintenance (stream channel, stream gages, downstream access road); vegetation removal could affect nests of Covered Riparian Bird Species	MAIN-4 (vegetation removal outside breeding season, pre-construction surveys; reporting per RBCP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary stream diversion may be required for work within stream channel		Installation of BMPs could impact riparian habitat and/or nests of Covered Bird Species	MAIN-4 (pre-construction surveys; reporting per RBCP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Infrequent Long-term, Large-scale Maintenance	Maintenance project within 500 feet of riparian habitat	Noise from equipment and human activity	Construction noise could cause a pair to abandon territory or affect nest success	MAIN-4 (pre-construction surveys; reporting per RBCP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Temporary impact to 0.92 acre of riparian habitat in the upper Reservoir		Sediment removal would affect 0.92 acre of riparian habitat; vegetation removal could affect nests of Covered Riparian Birds	MAIN-4 (vegetation removal outside breeding season, pre-construction surveys)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Reservoir would be fully or partially dewatered	Temporary increase in flows downstream	Minimal potential to inundate least Bell's vireo nests close to the water line downstream. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.3 (Covered Riparian Bird Species)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Prey availability could be affected by water quality	MAIN-1/MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Bypass line in place when Reservoir is dewatered		Installation of BMPs could impact riparian habitat and/or nests	MAIN-4 (pre-construction surveys)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Supplemental releases would not be available during project	Stream may dry up if weather is dry	None anticipated		Section 5.4.2.3 (Covered Riparian Bird Species)
Spillway Improvement Project	Maintenance project within 500 feet of riparian habitat	Noise from equipment and human activity	Construction noise could cause a pair to abandon territory or affect nest success	MAIN-4 (pre-construction surveys; reporting per RBCP)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Reservoir would be partially dewatered	Temporary increase in flows downstream	Minimal potential to inundate least Bell's vireo nests close to the water line downstream. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	MAIN-1 (ramping during fish breeding season)	Section 5.4.2.3 (Covered Riparian Bird Species)
	Runoff from work in areas adjacent to riparian habitat	Water quality could be affected by silt/chemicals washed into the stream during maintenance	Prey availability could be affected by water quality	MAIN-1/MAIN-3 (BMPs), MAIN-6 (minimize disturbance)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
	Capacity of Reservoir would be increased	Reservoir inundation footprint would be larger (estimated once every 10 years)	Inundation of 1.36 acres of riparian habitat in the upper Reservoir if a large spring storm occurred; minimal potential to inundate least Bell's vireo nests close to the waterline in the upper Reservoir. Not expected to affect southwestern willow flycatcher or western yellow-billed cuckoo nests.	OPER-1 (outflow comparable to inflow)	Section 5.4.2.3 (Covered Riparian Bird Species)
	Reduced supplemental releases during project	Stream may be reduced if weather conditions are dry	None anticipated		Section 5.4.2.3 (Covered Riparian Bird Species)
Future Translocation	Pre-construction fish surveys/monitoring upstream of Reservoir per MAIN-1	Biologist moving through habitat	Pre-construction surveys per MAIN-1 could affect nests of Covered Riparian Birds	MAIN-4 (pre-construction surveys) prior to MAIN-1	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)
Mitigation Program	Biological surveys/monitoring	Biologist moving through habitat	Conducting surveys/monitoring through riparian habitat could impact nests or bring human activity that would disturb nests	MAIN-4 (pre-construction surveys)	Section 5.4.3 (Avoidance and Minimization Measures/Environmental Compliance Record)

Notes: cfs: cubic feet per second; RBCP: Riparian Bird Construction Plan

5.4 MONITORING REQUIREMENTS

The ability to track how conditions are changing, as well as the effectiveness of management actions, provides the basis for Adaptive Management; monitoring is key to understanding when a course correction may be needed (Stein et al. 2014). The monitoring program below has been established to ensure that conservation measures are implemented as required and to track the effectiveness of the biological objectives in meeting the HCP's biological goals. Per OPER-4, the HCP Working Group may determine that Adaptive Management is needed to modify conservation measures and/or the monitoring program (see Section 7.3). A description of the Annual Report documenting the monitoring program is in Section 5.6.

5.4.1 RECORDS OF INFLOW/OUTFLOW

As part of the annual reporting requirement, LACFCD (Public Works) shall provide records of daily inflow and outflow throughout the year. This will allow a comparison of outflow to inflow and will show that supplemental releases were made throughout the non-storm season. Annotations may be made as applicable to explain portions of the data record where outflow does not closely track inflow (e.g., water held for supplemental releases, water held during downstream maintenance project, water held for later water conservation release).

Additionally, the number and size of storms (e.g., 1-year, 5-year, 10-year, 25-year, 50-year, and 100-year size storms) that occur within a particular year shall be tracked and quantified for discussion in comparison to vegetation mapping.

5.4.2 MONITORING COVERED SPECIES

Monitoring for Covered Species would rotate so that some monitoring would occur every year; however, monitoring for each group of Covered Species would occur only once every three years. For example, monitoring for Covered Fish would occur in Year 1; monitoring for Covered Herpetofauna would occur in Year 2; and monitoring for Covered Riparian Birds would occur in Year 3. If determined appropriate by the HCP Working Group: (1) additional monitoring for a Covered Species group may occur using accrued budget for Habitat Enhancement (see Section 5.5); (2) monitoring for a Covered Species group may be scaled back in favor of using the budget for additional Habitat Enhancement; (3) monitoring for one Covered Species group may be substituted for another Covered Species group; and/or (4) the timing of monitoring for a Covered Species group can be accelerated or delayed to respond to conditions in the watershed (e.g., following a fire). If the monitoring is accelerated or delayed, the total number of monitoring events shall not change (i.e., 30 monitoring events over the 30-year permit term). Additional monitoring shall only be conducted within the HCP budget available; no additional funding beyond that listed in Section 6 shall be required.

5.4.2.1 COVERED FISH SPECIES

Covered Fish Species populations shall be sampled once every three years for the duration of the permit (i.e., Year 1, 4, 7, 10, 13, 16, 19, 22, 25, and 28). Reaches sampled (22 total) and methods to be used shall follow those established in the ten-year long-term monitoring study (Psomas 2019b; Volume II). Covered Fish Species monitoring shall be conducted along with monitoring of aquatic habitat as described in Section 5.4.2.4. The survey area for Covered Fish Species is shown in Exhibit 28. Covered Fish Species health shall be determined by calculating Fulton's Condition Index for every Santa Ana sucker and Santa Ana speckled dace individual captured and for the first 100 arroyo chub captured in each reach.

Covered Fish Species surveys shall also quantify and record the distribution of non-native wildlife species observed during the surveys (e.g., crayfish, non-native fish, fathead minnow, bullfrog) for discussion of the effects of water management and potential habitat enhancement.

No Covered Fish Species surveys or aquatic habitat shall be assessed upstream of the Reservoir as the species are absent from this portion of the Action Area. If Covered Fish Species are translocated upstream of the Reservoir by another entity, it will be that entity's responsibility to track population status and aquatic habitat quality in the translocation area.

5.4.2.2 COVERED HERPETOFAUNA

Covered Herpetofauna Species populations shall be surveyed once every three years for the duration of the permit (i.e., Year 2, 5, 8, 11, 14, 17, 20, 23, 26, and 29). Arroyo toad surveys shall follow the most current USFWS protocol and shall be conducted upstream of the Reservoir only (i.e., Reservoir to Fall Creek). Western pond turtle trapping shall follow the most current USGS protocol (or newer protocol from USFWS or CDFW) and shall be conducted in suitable habitat in the Action Area (i.e., upstream of the Reservoir, Reservoir, plunge pool, and downstream to Stone Canyon). Areas that are not deep enough to allow for western pond turtle trapping shall be visually surveyed. These efforts shall also record the quantity and distribution of non-native wildlife species (e.g., crayfish, non-native fish, fathead minnow, bullfrog) observed during the surveys for discussion with the HCP Working Group. The survey area for arroyo toad is shown in Exhibit 29, and the survey area for western pond turtle is shown in Exhibit 30.

5.4.2.3 COVERED RIPARIAN BIRD SPECIES

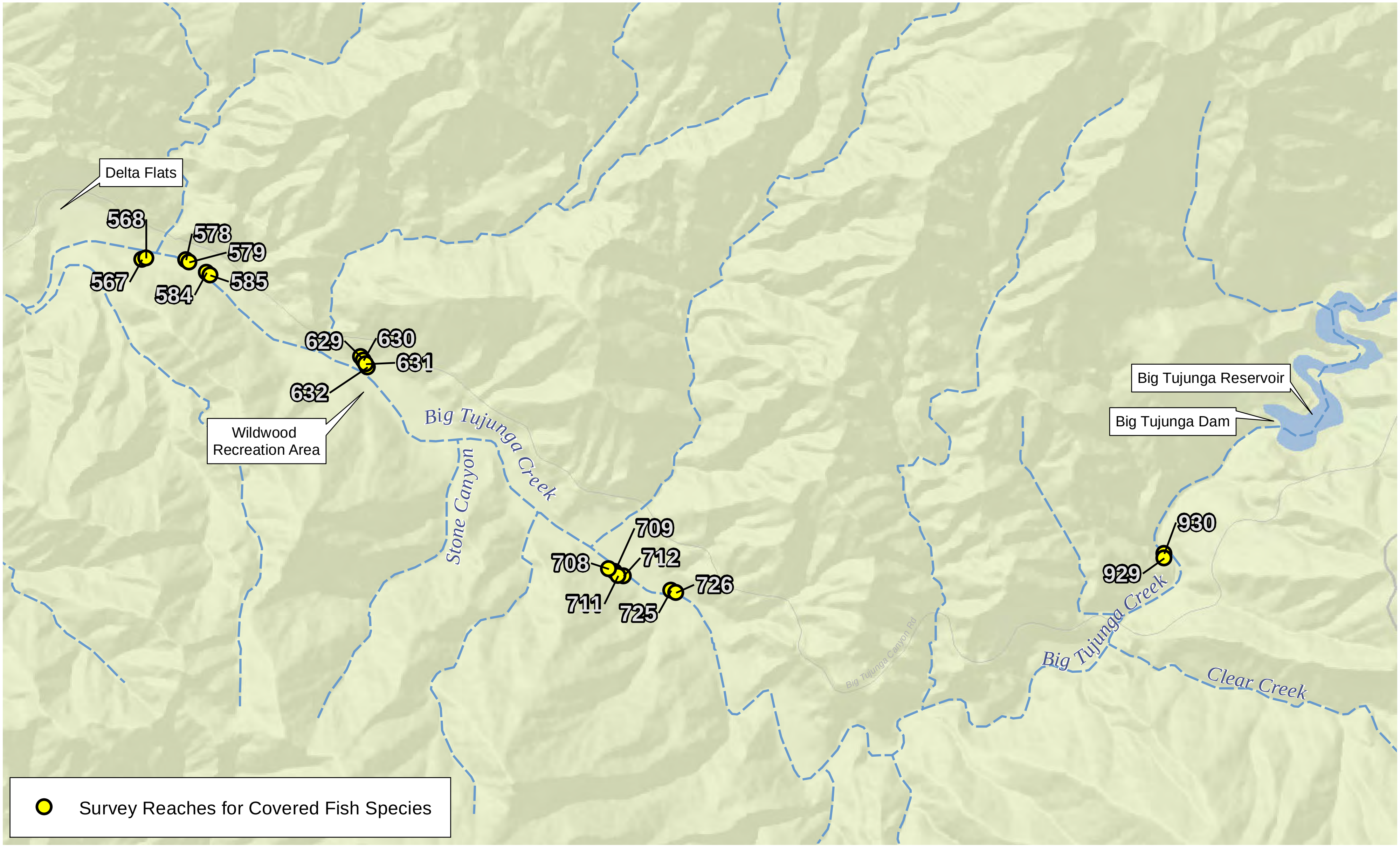
Covered Riparian Bird Species populations shall be surveyed once every three years for the duration of the permit (i.e., Year 3, 6, 9, 12, 15, 18, 21, 24, 27, and 30). Least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo surveys shall follow the most current USFWS protocol for each species and shall be conducted throughout the Action Area where suitable riparian habitat is present (i.e., upper Reservoir upstream to Fall Creek, and from the Dam downstream to Stone Canyon). The survey area for Covered Riparian Bird Species is shown in Exhibit 31.

5.4.2.4 MONITORING OF AQUATIC HABITAT QUALITY

5.4.2.4.1 <u>Quantification of Aquatic Habitat Quality</u>

Benthic macroinvertebrate (BMI) sampling and aquatic habitat quality shall be sampled once every three years for the duration of the permit (in the same years as Covered Fish Surveys). Reaches sampled (22 total) and methods to be used shall follow those established in the ten-year long-term monitoring study (Psomas 2019b; Volume II). Monitoring of aquatic habitat shall be conducted concurrently with surveys for Covered Fish Species described in Section 5.4.2.1. The survey area for aquatic habitat quality is the same as that shown for Covered Fish Species in Exhibit 28.

Aquatic habitat quality shall be determined through the collection of physical habitat (PHab) variables to calculate the Habitat Rank of each of 22 reaches. It shall also include a BMI sampling and calculation of the Benthic Index of Biotic Integrity (BIBI) and California Stream Condition Index (CSCI); quantitative assessment of substrate composition of the creek using pebble counts; quantitative assessment of percent embeddedness; quantitative assessment of overhanging vegetation collected with densiometer; and collection of water quality variables (e.g., dissolved oxygen, water temperature, stream velocity, pH, and turbidity). If the overall Habitat Rank (all reaches combined) is ranked "Fair," habitat enhancement measures shall be required. The HCP Working Group shall determine the appropriate habitat enhancement measures warranted based on habitat conditions observed in combination with recent annual rainfall cycles and anticipated



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Survey Area for Covered Fish Species (22 Reaches)

Exhibit 28

Big Tujunga Dam HCP

N W E S

2,500 1,250 0 2,500 Feet

PSOMAS

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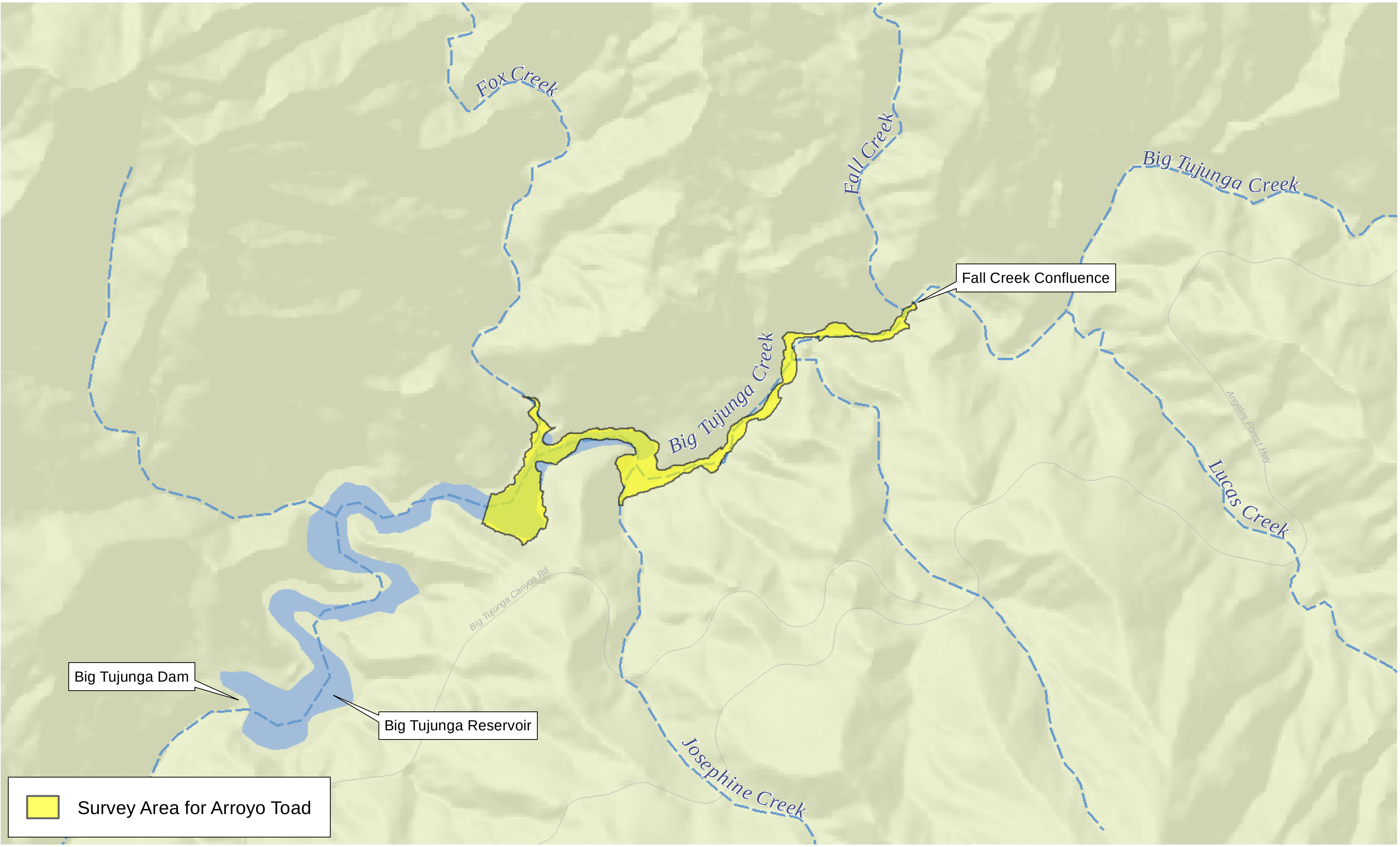

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Survey Area for Arroyo Toad

Exhibit 29

Big Tujunga Dam HCP

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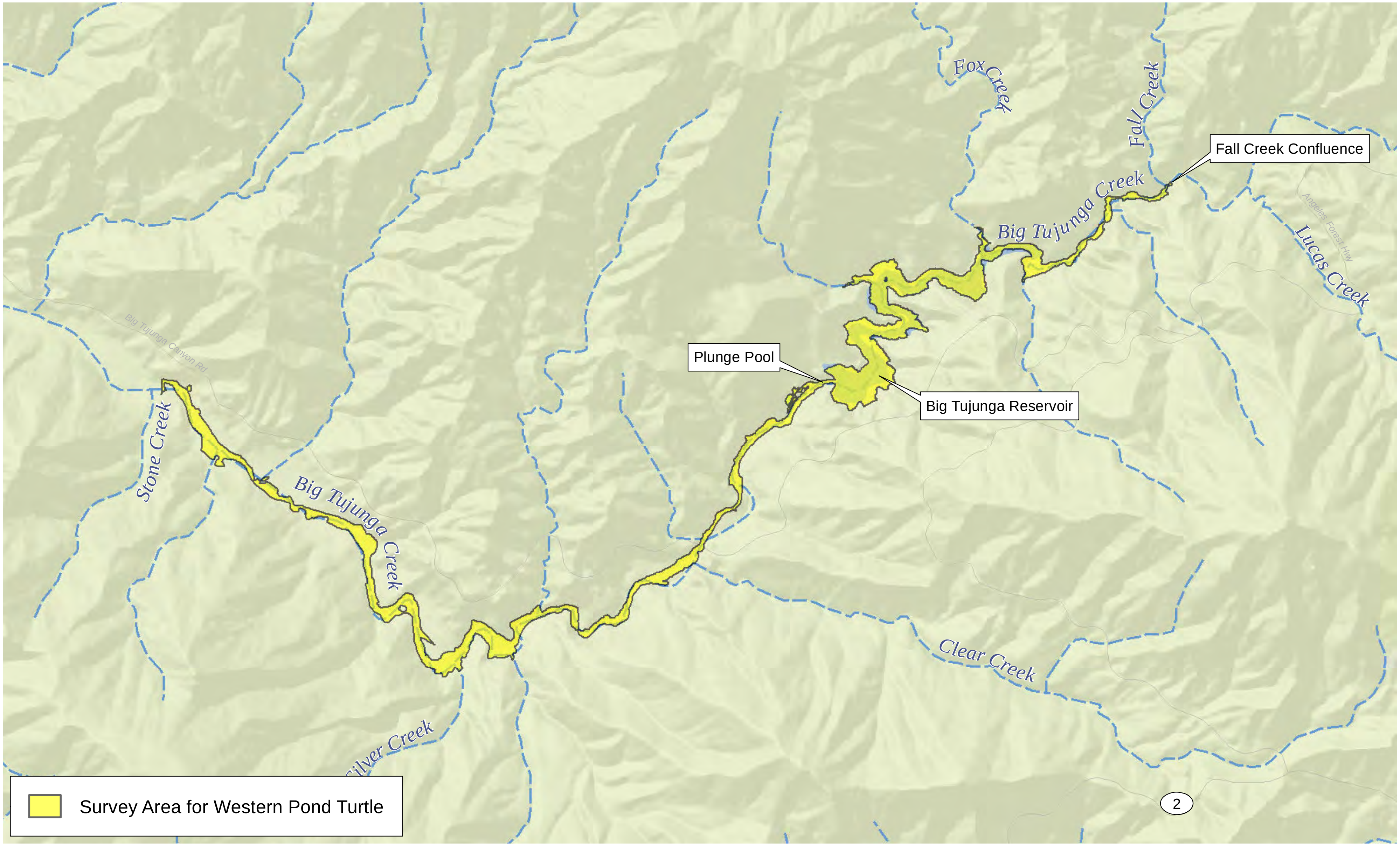

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Survey Area for Western Pond Turtle

Exhibit 30

Big Tujunga Dam HCP

3,000 1,500 0 3,000 Feet

PSOMAS

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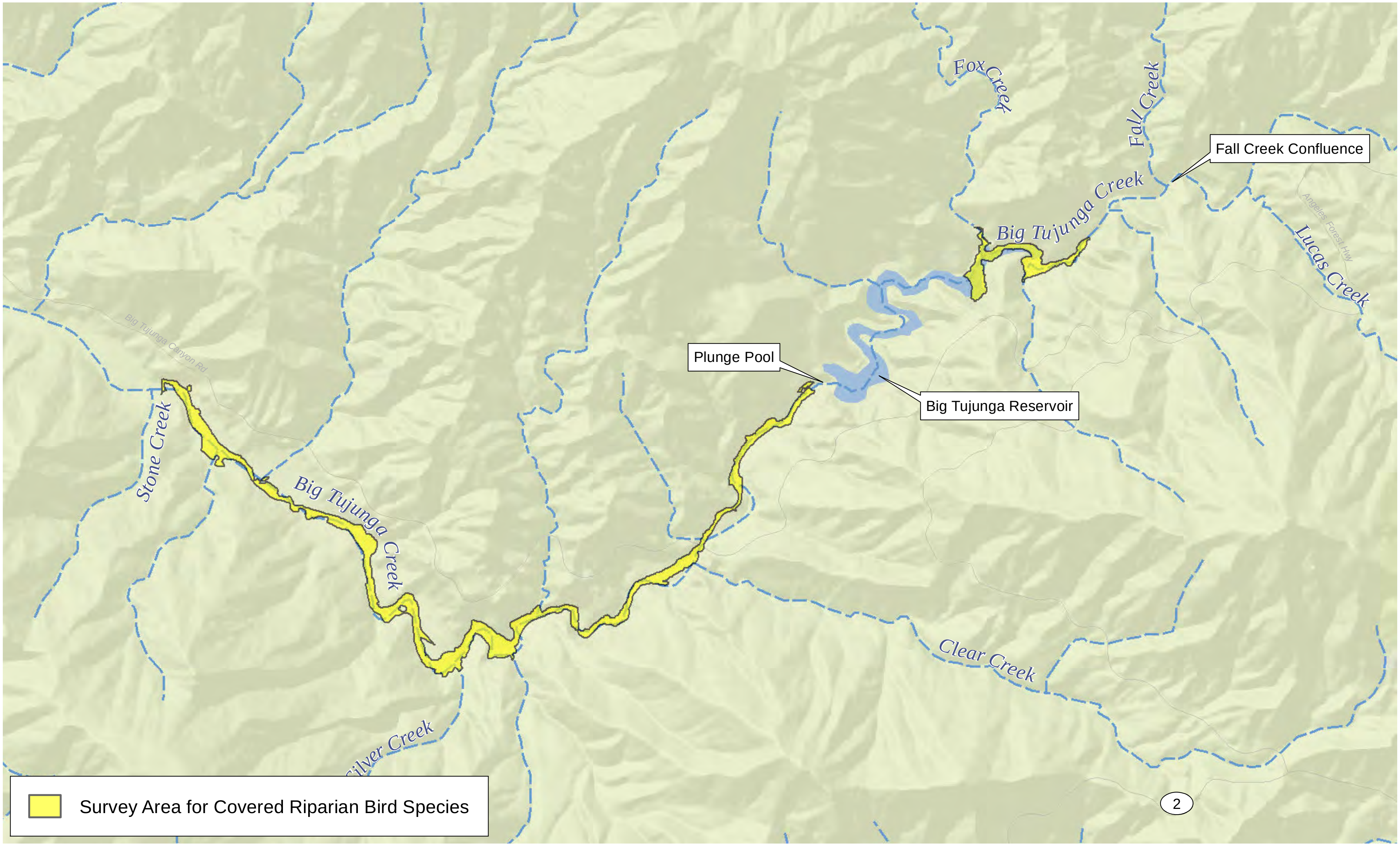

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Survey Area for Covered Riparian Birds

Exhibit 31

Big Tujunga Dam HCP

N W E S

3,000 1,500 0 3,000 Feet

PSOMAS

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rainfall of the coming rainy season. The HCP Working Group may also determine that no habitat enhancement measures are needed if Covered Fish Species and western pond turtles are sustaining adequate populations despite the observed decline in aquatic habitat quality.

No surveys to assess aquatic habitat quality shall occur upstream of the Reservoir, as Covered Fish Species are absent from this portion of the Action Area. If Covered Fish Species are translocated upstream of the Reservoir by another entity, it will be that entity's responsibility to track habitat quality in the translocation area.

5.4.2.4.2 Barrier Mapping

Aquatic habitat surveys shall also map barriers to fish and/or western pond turtle movement once every three years for the duration of the permit (in the same years as Covered Herpetofauna Surveys). Barrier mapping shall include natural features (e.g., down trees) and man-made structures or recreational dams. Barrier mapping shall be continuous from the plunge pool downstream to Stone Canyon (i.e., downstream of Dam on Exhibit 30). The results of the barrier mapping shall be reviewed by the HCP Working Group for discussion of potential habitat enhancement.

No surveys to map barriers shall occur upstream of the Reservoir, as Covered Fish Species are absent from this portion of the Action Area. If Covered Fish Species are translocated upstream of the Reservoir by another entity, it will be that entity's responsibility to track barriers to movement in the translocation area.

5.4.2.4.3 Temperature Monitoring

Aquatic habitat monitoring shall also include installation of two temperature data loggers to monitor stream temperature downstream of the Dam. One data logger shall be placed downstream of the plunge pool and one shall be placed at a location further downstream (Exhibit 32). The purpose of the data loggers will be to provide the HCP Working Group with information to discuss Adaptive Management related to the Supplemental Release strategy. Stream temperature data shall not be used to assess flood control or water conservation releases. The data loggers should remain in the same location over the duration of the permit to provide valuable long-term data (as related to climate change); however, the locations may be moved if determined appropriate by the HCP Working Group. If a data logger malfunctions or is damaged by vandalism or high flows, it will be replaced.

5.4.2.5 MONITORING OF RIPARIAN HABITAT QUALITY

Vegetation shall be mapped throughout the Action Area (upper Reservoir upstream to Fall Creek, Reservoir, from the Dam downstream to Stone Canyon) to determine the extent of riparian and riverine habitat for each Covered Species once every three years for the duration of the permit (in the same years as Covered Riparian Bird Surveys). The extent of habitat for each Covered Species shall be quantified (based on vegetation mapping) for discussion of the effects of water management.

The vegetation mapping effort shall also assess the quantity and distribution of invasive weed species that could degrade habitat quality for Covered Species (e.g., white snakeroot, giant reed, and tamarisk). A list of representative focal species is included in Attachment B. Invasive weed species mapping shall not require mapping of every polygon of non-native plant species. The invasive weed species mapping shall generally map portions of the stream that contain invasive species and describe the approximate percent cover of invasive weed species in the mapped polygon. The results of the invasive weed species mapping shall be reviewed by the HCP Working Group for discussion of potential habitat enhancement.

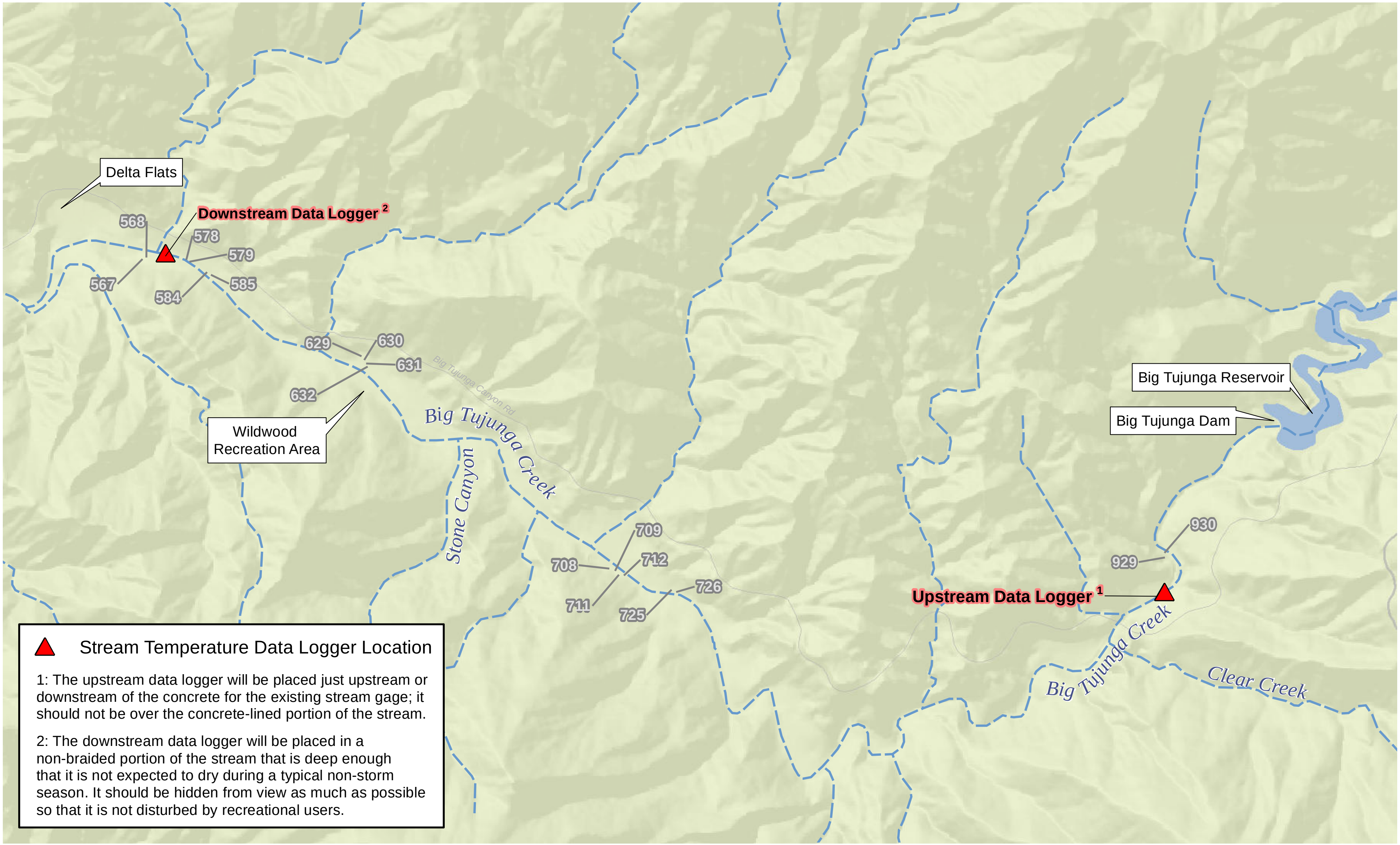
Additionally, vegetation transects shall be conducted throughout the Covered Riparian Bird survey area (Upper Reservoir upstream to Fall Creek; from the Dam downstream to Stone Canyon) to characterize the density of various riparian canopy layers (i.e., understory, mid-layer, canopy) once every three years for the duration of the permit (in the same years as Covered Riparian Bird Surveys). Foliage cover at 3.2-foot (1-meter) height intervals shall be estimated using the "stacked cube" method developed specifically to characterize canopy architecture in structurally diverse riparian habitat (Kus 1998, described below). This effort shall include establishing permanent linear transects approximately every 0.5 mile throughout the stream portions of the Covered Riparian Bird survey area. Transects shall be positioned perpendicular to the stream course and shall extend across the entire stream channel (including all riparian habitat). If the stream course changes over time, the angle of the transect shall be adjusted to keep it perpendicular to the stream (and the adjustment noted in the data). Sampling points shall consist of 6.4x6.4-foot (2x2-meter) quadrats located at 32-foot (10-meter) intervals along each transect; the number of sampling points will vary with the length of each transect. At each sampling point, the canopy height and the percent cover of vegetation (by species) within 3.2-foot (1-meter) height intervals will be recorded using a modified Daubenmire (1959) scale with percent cover classes: <1, 1-10, 11-25, 26-50, 51-75, 76-90, and >90. The sampling units will be 6.4x6.4x3.2-foot (2x2x1-meter) stacked cubes stacked vertically between the ground and the top of the canopy. The results of the vegetation transects shall be reviewed by the HCP Working Group for discussion on the effects of water management and potential habitat enhancement.

5.4.3 MONITORING FOR MAINTENANCE ACTIVITIES – ENVIRONMENTAL COMPLIANCE RECORD

Monitoring of maintenance activities would follow Conservation Measures MAIN-1 through MAIN-6 and would vary depending on the type of maintenance activity conducted.

LACFCD (Public Works) shall record the following for each maintenance project conducted each year:

- Date of valve testing, duration of testing, maximum release (cfs), and downstream stream flowrate (cfs) measurements taken by the downstream stream gage before and after the test.
- List of maintenance projects and the date(s) when each occurred. Note when project schedules were coordinated to minimize multiple disturbances within the same area.
- Physical disturbance footprint of each maintenance project (e.g., areas where activities were conducted as shown in HCP Exhibits 18–22). Note when impacts on aquatic or riparian habitat (i.e., Covered Species' habitat) were specifically avoided or minimized.
- Dates when alteration to the release regime was needed to accommodate maintenance project(s). For example, include the dates of increase releases to lower the Reservoir or the dates when valves were closed while work occurred downstream.
- Dates of vegetation removal (if applicable) associated with each maintenance project and the types of vegetation removed; verify that all work was within impact boundaries identified in Exhibits 18–22.
- List Conservation Measures applicable to each maintenance project (i.e., MAIN-1, MAIN-2, MAIN-3, MAIN-4, MAIN-5, MAIN-6). Include copies of pre-construction survey and monitoring reports.
- Briefly list BMPs used by each maintenance project to minimize indirect impacts on habitat value (e.g., water quality, preventing the spread of weed seeds, preparing for quick emergency response).



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Conceptual Location for Stream Temperature Data Loggers

Exhibit 32

Big Tujunga Dam HCP

N W E S

2,500 1,250 0 2,500 Feet

PSOMAS

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5.5 HABITAT ENHANCEMENT

Covered Species in the Action Area experience multiple stresses that may or may not be related to Covered Activities. Further, climate change may exacerbate existing stressors (e.g., fire, flood, spread of invasive species). Understanding the synergies between multiple stressors is a necessary element of a forward-thinking conservation strategy (Stein et al. 2014). Habitat enhancement actions may help achieve the biological goal of sustaining species populations while indirectly affecting their habitat through Covered Activities.

LACFCD (Public Works) shall establish an annual budget (subject to inflation) to fund habitat enhancement measures to sustain aquatic and riparian habitat quality to support Covered Species. The budget shall accrue cumulatively so that budget not spent in one year shall roll over to the next year to fund larger habitat enhancement efforts in future years. Habitat enhancement projects selected for implementation by the HCP Working Group must be within the habitat enhancement budget accrued to date. If the habitat enhancement fund accrued exceeds five years of the annual budget, subsequent contribution to the habitat enhancement budget shall be waived until a habitat enhancement action is implemented.

The appropriate habitat enhancement measures shall be determined by the HCP Working Group based on the results of the monitoring program described in Sections 5.3 and 5.4. Potential habitat enhancement measures are described below. Habitat enhancement projects shall be designed to minimize impacts on all Covered Species. For example, a non-native invasive removal project designed to benefit Covered Fish Species shall not impact active nests of Covered Riparian Bird Species. Habitat enhancement measures would occur in areas under the jurisdiction of USACE, CDFW, RWQCB, and/or USFS and may require additional permit approvals prior to implementation. If agreed to by the HCP Working Group, the Habitat Enhancement budget can also be used to fund additional monitoring of Covered Species.

5.5.1 REMOVAL OF NON-NATIVE VEGETATION

If non-native vegetation is degrading the habitat quality for Covered Species, non-native vegetation (e.g., white snakeroot, giant reed, tamarisk) shall be removed within the Big Tujunga Creek watershed, preferably within the Action Area. Prior to removal of riparian vegetation, regulatory permitting with the USACE, CDFW, RWQCB, and/or USFS may be needed to allow removal within riparian habitat. Alternatively, funding[46] could be provided to an entity conducting a coordinated vegetation removal effort (e.g., USFS, Council for Watershed Health, or National Forest Foundation).

5.5.2 REMOVAL OF NON-NATIVE WILDLIFE

If non-native wildlife are degrading the habitat quality for Covered Species through increased predation or competition for resources, non-native wildlife (e.g., bullfrog, largemouth bass, crayfish, fathead minnow) shall be removed within the Big Tujunga Creek watershed, preferably within the Action Area. Additional permitting with the USACE, CDFW, RWQCB, and/or USFS may be needed to allow removal within riparian habitat. Alternatively, funding[47] could be provided to an entity conducting a coordinated non-native wildlife removal effort (e.g., USFS).

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46 A Memorandum of Understanding would be required between Public Works and the entity conducting the habitat enhancement.

47 A Memorandum of Understanding would be required between Public Works and the entity conducting the habitat enhancement.

5.5.3 REMOVAL OF IN-STREAM VEGETATION

If adequate flood disturbance is not occurring, habitat enhancement measures may include clearing of select areas of in-stream vegetation (e.g., cattails within the active channel) and/or selective removal of mature canopy vegetation (e.g., removal of a few individual or small patch of willow trees to open up the canopy to allow an increase in understory). Prior to removal of riparian vegetation, regulatory permitting with the USACE, CDFW, RWQCB, and/or USFS may be needed to allow removal of riparian habitat.

5.5.4 REMOVAL OF BARRIERS TO FISH MOVEMENT

If adequate flood disturbance is not occurring, habitat enhancement measures may include removal of barriers to fish movement (e.g., recreational dams created by forest users or downed logs blocking flow) as identified during barrier mapping described in Section 5.4. The specific barriers to be removed shall be determined by the HCP Working Group based on access to the stream, stream dynamics, and existing habitat quality at each location. Prior to removal of barriers, regulatory permitting with the USACE, CDFW, RWQCB, and/or USFS may be needed to allow work within the creek. Alternatively, funding[48] could be provided to the USFS to carry out the removal of fish barriers.

5.5.5 SUPPLEMENT COBBLE/GRAVEL SUBSTRATE

When the Reservoir undergoes sediment removal, coarse sediment will be stockpiled for future uses. This may include but would not be limited to placement of gravel and cobble in one or more specified locations downstream to supplement cobble substrate to enhance spawning opportunities downstream. This would be helpful if natural substrate has a high level of embeddedness.

If habitat enhancement is necessary, the quantity and appropriate placement of coarse sediment (i.e., cobble [64–255 mm], gravel [2–64 mm]) shall be determined by the HCP Working Group based on access to the stream, stream dynamics, and existing habitat quality at each location. Prior to placement of gravel and cobble downstream, regulatory permitting with the USACE, CDFW, RWQCB, and/or USFS may be needed to allow deposition of sediment in the creek.

5.5.6 SUPPLEMENT WOODY DEBRIS

If stream complexity is low, habitat enhancement may include limited placement of woody debris in one or more specified locations downstream to add habitat complexity to the stream. This would benefit Covered Fish and western pond turtle by providing additional refugia and microclimates. The quantity and appropriate placement of woody debris shall be determined by the HCP Working Group based on access to the stream, stream dynamics, and existing habitat quality at each location. Prior to placement of woody debris, regulatory permitting with the USACE, CDFW, RWQCB, and/or USFS may be needed to allow deposition in the creek.

5.5.7 REMOVAL OF HOMELESS ENCAMPMENTS/TRASH

If human encroachment into Big Tujunga Creek is degrading the habitat quality, habitat enhancement measures may include removal of homeless encampments and trash. The specific locations shall be determined by the HCP Working Group in cooperation with the USFS. Prior to removal of human encampments, regulatory permitting with the USACE, CDFW, RWQCB, and/or

[48] A Memorandum of Understanding would be required between Public Works and the entity conducting the habitat enhancement.

USFS may be needed to allow work within the creek. Alternatively, funding[49] may be provided to the USFS to carry out the removal of human encampments and trash.

5.6 ANNUAL REPORTS

5.6.1 CONTENTS OF THE ANNUAL REPORT

The Annual Report shall include the following information:

Covered Operational Activities

1. Provide inflow/outflow records including a quantification of the number of each size storm that occurred over the storm season per Section 5.4.1.
2. Report Covered Species population monitoring results per Section 5.4.2.
3. Report aquatic habitat quality and BMI results (if applicable that year) per Section 5.4.2.4. Discuss the distribution of non-native wildlife and barrier mapping and whether they are affecting habitat value.
4. Report vegetation mapping and quantify the amount of habitat present for each Covered Species (if applicable that year) per Section 5.4.2.5. Discuss the extent of non-native vegetation and whether it is affecting habitat value.
5. Report the vegetation transect results (if applicable that year) per Section 5.4.2.5. Discuss whether the vegetation includes a mosaic of habitat types and structure and whether the vegetation structure is affecting habitat value for Covered Species.
6. Recommend potential habitat enhancement measures for discussion with the HCP Working Group.
7. Describe any habitat enhancement actions that were implemented and their results.

Covered Maintenance Activities

1. List the Covered Maintenance Activities executed during the reporting period and include the Environmental Compliance Record per Section 5.4.3.
2. Quantify total permanent and/or temporary impact on habitat for each Covered Species (i.e., vegetation removed, area physically disturbed) for all Maintenance Activities.
3. Include pre-construction survey and biological monitoring reports for each Covered Maintenance Activity.

Plan Implementation

1. State whether any take of Covered Species occurred as a result of Covered Operation or Maintenance Activities.
2. Describe any changed or unforeseen circumstances that occurred and explain how they were addressed.
3. Quantify funding expenditures, balance, and accrual.
4. Summarize any minor or major amendments.

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[49] A Memorandum of Understanding would be required between Public Works and the entity conducting the habitat enhancement.

5. Describe any noncompliance issues and how they were resolved.

5.6.2 RESPONSIBILITIES OF LACFCD (PUBLIC WORKS)

LACFCD shall be responsible for implementation of the Conservation Measures (described in Section 3.7), monitoring requirements (described in Section 5.4), and habitat enhancement measures deemed necessary by the HCP Working Group (described in Section 5.5). LACFCD will organize the HCP Working Group meetings (OPER-4) and will maintain accounting of the budget available for carrying out the HCP.

LACFCD shall be responsible for preparation of the Annual Report, including submittal of each Draft Annual Report to LADWP for review and incorporating their comments prior to submittal to the USFWS.

5.6.3 RESPONSIBILITIES OF LADWP

LADWP shall be responsible for reviewing the Annual Report and providing comments to LACFCD (Public Works) each year so that the comments may be incorporated prior to submittal of the Annual Report to the USFWS.

5.6.4 REPORT DUE DATE

The Annual Report will be prepared based on the calendar year (January 1 to December 31). The report shall be submitted to the USFWS by March 1 of the following year for each year of the permit term. The first Annual Report will cover activities from implementation of the HCP (spring 2022) to December 31, 2022, and shall be submitted on or before March 1, 2023. Storm season data in the first report shall be October 15, 2021, to April 15, 2022; and non-storm season data in the first report shall be April 16, 2022, to October 14, 2022.

All data delivered to the USFWS shall have fully compliant metadata that meets Federal Geographic Data Committee (FGDC) or ISO 19115 metadata standards.

6.0 Funding

To appropriately fund the HCP, the costs of implementing the HCP must be estimated over the life of the plan, including adjustments for inflation (USFWS 2016a). LACFCD (Public Works) shall ensure that adequate funding to implement the plan shall be provided.

This section describes the costs of Covered Species and associated habitat monitoring, HCP Annual Reports, annual HCP Working Group meetings, and administrative changes to the HCP. The cost of conducting each type of event is described in detail below (e.g., number of staff, hours to complete various portions of the work). The final table shows the cost of each type of event multiplied throughout the 30-year permit term with costs adjusted for inflation. An inflation rate of 2 percent per year was assumed based on the 2010–2020 average inflation rate as reported by the Consumer Price Index.[50] At Years 10 and 20, the inflation rate will be examined for the previous decade and the assumed inflation rate will be adjusted as needed. All funding for costs described in this section will be provided by the LACFCD Flood Control District Fund. This fund has an overall annual operating budget of about $300 million. Implementation of the HCP would represent a relatively small increase in the annual operating budget (i.e., <0.15 percent). LACFCD (Public Works) is financially stable and is committed to funding the conservation strategy by allocating funds through its annual budget process.

This section does not include the costs of implementing avoidance and minimization measures described in MAIN-1 through MAIN-6 (e.g., pre-construction surveys, biological monitoring, and BMPs). The cost for these measures will be included in the cost of implementing each maintenance project, which would each be funded separately by Public Works.

LADWP will not provide any funding for HCP activities and will have no financial obligation associated with the HCP.

6.1 COVERED FISH SPECIES/AQUATIC HABITAT MONITORING

Covered Fish Species Monitoring (see Section 5.4.2.1) and Aquatic Habitat Monitoring (see Section 5.4.2.4.1) will be conducted once every three years throughout the permit term. It is assumed that Covered Fish Species Monitoring and Aquatic Habitat Monitoring would occur concurrently. The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year term is used and assumes a 10-percent increase over current Public Works contract rates. The rates for the upcoming contract period will include overhead costs. This budget assumes that the first Covered Fish Species/Aquatic Habitat Monitoring would occur in fall 2022 (as determined by the HCP Working Group). Subsequent monitoring would be conducted every three years for a total of ten monitoring events. An inflation rate of 2 percent per year has been applied (i.e., 6 percent from one event to the next event three years later). The initial cost of this monitoring is shown in Table 36.

50 Rate based on January 2010 through August 2020; https://data.bls.gov/cgi-bin/surveymost?cu

TABLE 36
COVERED FISH SPECIES/AQUATIC HABITAT MONITORING COST ESTIMATE

	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2022)
Covered Fish Species Monitoring – Fieldwork			
Wildlife Biologist	286	$144.00	$41,184.00
Associate Wildlife Biologist	584	$127.00	$74,168.00
Project Manager	24	$202.00	$4,848.00
Principal	2	$272.00	$544.00
Administrative	6	$105.00	$630.00
Direct Costs - Equipment Rental (Electrofishing)			$3,850.00
Direct Costs - Equipment Rental (Flow Meter)			$770.00
Total Covered Fish Species Monitoring - Fieldwork			**$125,994.00**
Aquatic Habitat Monitoring (BMI/PHab) – Fieldwork			
Wildlife Biologist	118	$144.00	$16,992.00
Associate Wildlife Biologist	81	$127.00	$10,287.00
GIS Specialist	4	$174.00	$696.00
Project Manager	10	$202.00	$2,020.00
Principal	2	$272.00	$544.00
Administrative	4	$105.00	$420.00
Direct Costs - Equipment (Jars/Ethanol/Shipping to Lab)			$385.00
Direct Cost - BMI Sample Processing			$4,620.00
Total Aquatic Habitat Monitoring - Fieldwork			**$35,964.00**
Covered Fish Species Monitoring/Aquatic Habitat Monitoring – Analysis			
Wildlife Biologist	128	$144.00	$18,432.00
Associate Wildlife Biologist	104	$127.00	$13,208.00
GIS Specialist	32	$174.00	$5,568.00
Technical Editor	12	$110.00	$1,320.00
Word Processing	12	$105.00	$1,260.00
Project Manager	64	$202.00	$12,928.00
Principal	8	$272.00	$2,176.00
Administrative	4	$105.00	$420.00
Total Covered Fish Species/Aquatic Habitat Monitoring - Report			**$55,312.00**
TOTAL COVERED FISH SPECIES/AQUATIC HABITAT MONITORING			***$217,270.00***
**Rates assume a 10% increase over current contract rates*			

6.2 COVERED HERPETOFAUNA SPECIES MONITORING/BARRIER MAPPING

Covered Herpetofauna Species Monitoring (see Section 5.4.2.2) and Barrier Mapping (see Section 5.4.2.4.2) will be conducted once every three years throughout the permit term. It is assumed that Covered Herpetofauna Species Monitoring and Barrier Mapping would occur concurrently. The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year term is used and assumes a 10-percent increase over current Public Works contract rates. The rates for the upcoming contract period will include overhead costs. This budget assumes that the first Covered Herpetofauna Species Monitoring/Barrier Mapping would occur in spring/summer 2023. Subsequent monitoring would be conducted every three years for a total of ten monitoring events. An inflation rate of 2 percent per year has been applied (i.e., 6 percent from one event to the next event three years later). The initial cost of this monitoring is shown in Table 37.

TABLE 37
COVERED HERPETOFAUNA SPECIES MONITORING/BARRIER MAPPING

	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2023)
Covered Herpetofauna Monitoring - Western Pond Turtle			
Wildlife Biologist	246	$144.00	$35,424.00
Associate Wildlife Biologist	206	$127.00	$26,162.00
GIS Specialist	20	$174.00	$3,480.00
Technical Editor	8	$110.00	$880.00
Word Processing	8	$105.00	$840.00
Project Manager	30	$202.00	$6,060.00
Principal	6	$272.00	$1,632.00
Administrative	6	$105.00	$630.00
Direct Costs - Equipment (Traps/Bait)			$2,000.00
Total Covered Herpetofauna Monitoring - Western Pond Turtle			**$77,108.00**
Covered Herpetofauna Monitoring - Arroyo Toad			
Wildlife Biologist	92	$144.00	$13,248.00
Associate Wildlife Biologist	72	$127.00	$9,144.00
GIS Specialist	8	$174.00	$1,392.00
Technical Editor	4	$110.00	$440.00
Word Processing	4	$105.00	$420.00
Project Manager	12	$202.00	$2,424.00
Principal	4	$272.00	$1,088.00
Administrative	4	$105.00	$420.00
Total Covered Herpetofauna Monitoring - Arroyo Toad			**$28,576.00**
TOTAL COVERED HERPETOFAUNA MONITORING			***$105,684.00***
**Rates assume a 10% increase over current contract rates*			

6.3 COVERED RIPARIAN BIRD SPECIES/RIPARIAN HABITAT MONITORING

Covered Riparian Bird Species Monitoring (see Section 5.4.2.3) and Riparian Habitat Monitoring (see Section 5.4.2.5) will be conducted once every three years throughout the permit term. It is assumed that Covered Riparian Bird Species Monitoring and Riparian Habitat Monitoring would occur in the same season. The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year term is used and assumes a 10-percent increase over the current Public Works contract rates. The rates for the upcoming contract period will include overhead costs. This budget assumes that the first Covered Riparian Bird Species/Riparian Habitat Monitoring would occur in spring/summer 2024. Subsequent monitoring would be conducted every three years for a total of ten monitoring events. An inflation rate of 2 percent per year has been applied (i.e., 6 percent from one event to the next event three years later). The initial cost of this monitoring is shown in Table 38.

TABLE 38
COVERED RIPARIAN BIRD SPECIES/RIPARIAN HABITAT MONITORING

	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2024)
Covered Riparian Bird Monitoring			
Wildlife Biologist	568	$144.00	$81,792.00
Associate Wildlife Biologist	528	$127.00	$67,056.00
GIS Specialist	20	$174.00	$3,480.00
Technical Editor	8	$110.00	$880.00
Word Processing	8	$105.00	$840.00
Project Manager	30	$202.00	$6,060.00
Principal	6	$272.00	$1,632.00
Administrative	6	$105.00	$630.00
Total Covered Riparian Bird Monitoring			**$162,370.00**
Riparian Habitat Monitoring (Transects)			
Senior Botanist	188	$144.00	$27,072.00
Associate Biologist	142	$127.00	$18,034.00
GIS Specialist	20	$174.00	$3,480.00
Project Manager	20	$202.00	$4,040.00
Principal	4	$272.00	$1,088.00
Administrative	4	$105.00	$420.00
Direct Costs - Equipment (Permanent Transect Markers, Transect Tape, Stacked Cube)			$250.00
Total Riparian Habitat Monitoring (Transects)			**$54,384.00**
TOTAL RIPARIAN BIRD/RIPARIAN HABITAT MONITORING			***$216,754.00***
**Rates assume a 10% increase over current contract rates*			

6.4 STREAM TEMPERATURE MONITORING

As part of the Aquatic Habitat Monitoring (see Section 5.4.2.4.3), data loggers will be placed downstream of Big Tujunga Dam to monitor stream temperature. It is assumed that the temperatures recorded will be downloaded twice per year and reported in the Annual Report (per OPER-4). The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year term is used and assumes a 10-percent increase over current Public Works contract rates. The rates for the upcoming contract period will include overhead costs. This budget assumes that monitoring of stream temperature would begin in summer 2022 and would continue twice per year for a total of 30 years. This budget assumes data loggers will be replaced once every five years. An inflation rate of 2 percent per year has been applied to labor costs, and an inflation rate of 10 percent has been applied to the equipment costs for each replacement event. The initial cost of this monitoring is shown in Table 39.

TABLE 39
STREAM TEMPERATURE MEASUREMENT

Download Data Loggers (Twice per Year)	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2022)
Wildlife Biologist	14	$144.00	$2,016.00
Associate Wildlife Biologist	14	$127.00	$1,778.00
Project Manager	6	$202.00	$1,212.00
Principal	1	$272.00	$272.00
Administrative	1	$105.00	$105.00
Subtotal			$5,383.00
Direct Costs - Equipment (Data Logger/Software; assumes replacement every five years)			$450.00
		Total Stream Temperature Measurement	**$5,833.00**
**Rates assume a 10% increase over current contract rates*			

6.5 ANNUAL REPORT/HCP WORKING GROUP MEETINGS

Each year, an Annual Report will be prepared to report the results of Operation and Maintenance and Covered Species/Habitat Monitoring (see Section 5.6). The results of the Covered Species Monitoring will be presented annually to the HCP Working Group for discussion (per OPER-4). The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year rate is used and assumes a 10-percent increase over the current Public Works contract rates. The rates for the upcoming contract will include overhead costs. This budget assumes that the first Annual Report would occur in early 2023. Annual Reports would be prepared each year for a total of 30 monitoring events. An inflation rate of 2 percent per year has been applied. The initial cost of this reporting is shown in Table 40.

TABLE 40
HCP ANNUAL REPORT/WORKING GROUP MEETING

	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2023)
Annual Report			
Biologist	70	$144.00	$10.080.00
Project Manager	46	$202.00	$9,292.00
GIS Specialist	20	$174.00	$3,480.00
Technical Editor	10	$110.00	$1,100.00
Word Processing	8	$105.00	$840.00
Principal	10	$272.00	$2,720.00
Administrative	4	$105.00	$420.00
Total Annual Report			**$27,932.00**
HCP Working Group Meeting			
Wildlife Biologist	36	$144.00	$5,184.00
Project Manager	36	$202.00	$7,272.00
Technical Editor	2	$110.00	$220.00
Principal	4	$272.00	$1,088.00
Administrative	2	$105.00	$210.00
Total HCP Working Group Meeting			**$13,974.00**
TOTAL HCP ANNUAL REPORT/HCP WORKING GROUP MEETING			**$41,906.00**
**Rates assume a 10% increase over current contract rates*			

6.6 HABITAT ENHANCEMENT

As described in Section 5.5, LACFCD (Public Works) shall include a line item in the HCP budget to conduct Habitat Enhancement Projects. For simplicity during implementation, this amount will be fixed for ten-year periods rather than increased annually. The amount for each ten-year period was determined by starting with a contribution of $25,000, calculating the annual 2 percent increase over the 30-year permit term, and then averaging the amount for each ten-year period. The initial amount contributed will be $30,000 annually for Years 1 to 10; $35,000 annually from Years 11 to 20; and $45,000 annually from Years 21 to 30; the amount is increased each decade to adjust for inflation. The budget shall accrue cumulatively so that budget not spent in one year shall roll over to the next year to fund larger habitat enhancement efforts in future years. Habitat enhancement projects selected for implementation by the HCP Working Group must be within the habitat enhancement budget accrued to date. If the habitat enhancement budget accrued exceeds five years of the annual budget, subsequent contribution to the habitat enhancement budget shall be waived until a habitat enhancement action is implemented. As described in Section 5.5, the HCP Working Group can elect to spend these funds on additional Covered Species Monitoring or to use funds from Covered Species Monitoring toward additional habitat enhancement projects (see Section 5.4.2).

The annual contribution amount listed above does not include regulatory permitting that may be required for Habitat Enhancement Projects.

6.7 ADMINISTRATIVE CHANGES TO THE HCP

It is assumed that some changes to the HCP would be required over the permit term, which would require administrative changes or minor amendments to the HCP (see Section 7.3). This cost estimate assumes that administrative changes/minor amendments would be required approximately once every three years over the life of the HCP. The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year term is used and assumes a 10-percent increase over the current Public Works contract rates. The rates for the upcoming contract will include overhead costs. This budget assumes that the first administrative changes would occur in 2023. An inflation rate of 2 percent per year has been applied (i.e., 6 percent from one event to the next event three years later). The initial cost of administrative changes to the HCP is shown in Table 41. A major amendment may require additional funding depending on the level of analysis needed (see Section 6.8).

TABLE 41
ADMINISTRATIVE CHANGES TO THE HCP

Administrative Changes to HCP	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2023)
Project Manager	30	$202.00	$6,060.00
Technical Editor	8	$110.00	$880.00
Principal	8	$272.00	$2,176.00
Administrative	4	$105.00	$420.00
Total HCP Working Group Meeting			**$9,536.00**
**Rates assume a 10% increase over current contract rates*			

6.8 CHANGED/UNFORESEEN CIRCUMSTANCES

It is assumed that some changed or unforeseen circumstances would occur over the permit term (see Section 7.1 and 7.2). LACFCD (Public Works)shall establish a budget to respond to changed or unforeseen circumstances. The changed or unforeseen circumstances budget will be available each year; however, if the changed or unforeseen circumstances budget is not used, it will not accrue cumulatively over time.

Revisions to the HCP related to Covered Species and/or Critical Habitat would be addressed through an amendment to the HCP (RM-1/RM-2; Section 7.1.2/7.1.3). It is assumed that major amendments (i.e., to include new species proposed for federal listing that could be affected by Dam operation or maintenance) would be infrequent. The HCP budget assumes they could occur once every ten years at Years 5, 15, and 25. The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year term is used and assumes a 10-percent increase over the current Public Works contract rates. The rates for the upcoming contract will include overhead costs. An inflation rate of 2 percent per year has been applied, or a total of 20 percent from one event to the next. The initial cost of a major amendment is shown in Table 42.

TABLE 42
MAJOR AMENDMENT

Stream Monitoring	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2026)
Wildlife Biologist	60	$144.00	$8,640.00
GIS Specialist	20	$174.00	$3,480.00
Technical Editor	10	$110.00	$1,100.00
Word Processing	10	$105.00	$1,050.00
Project Manager	100	$202.00	$20,200.00
Principal	25	$272.00	$6,800.00
Administrative	4	$105.00	$420.00
		Total Major Amendment	**$41,690.00**
**Rates assume a 10% increase over current contract rates*			

Stream monitoring over the non-storm season could be required in the changed circumstances of drought or an emergency inspection following an earthquake requiring the release of stored water for supplemental releases (RM-3/RM-4; Sections 7.1.6/7.1.7). Stream monitoring would occur monthly throughout the non-storm season (i.e., April through October); seven monthly visits are included. It is assumed that the first emergency inspection would occur in 2023. The rates for biological work would occur in a new contract period. Because Public Works awards contracts over different terms, a five-year term is used and assumes a 10-percent increase over the current Public Works contract rates. The rates for the upcoming contract will include overhead costs. An inflation rate of 2 percent per year has been applied. The initial cost of this monitoring is shown in Table 43.

TABLE 43
STREAM MONITORING

Stream Monitoring	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2023)
Wildlife Biologist	96	$144.00	$13,824.00
Associate Wildlife Biologist	84	$127.00	$10,668.00
GIS Specialist	6	$174.00	$1,044.00
Technical Editor	4	$110.00	$440.00
Word Processing	4	$105.00	$420.00
Project Manager	24	$202.00	$4,848.00
Principal	2	$272.00	$544.00
Administrative	2	$105.00	$210.00
		Total Stream Monitoring	**$31,998.00**
**Rates assume a 10% increase over current contract rates*			

If the changed circumstances of a hazardous materials spill (that was the responsibility of Public Works) occurred, Public Works would be required to remediate the spill and conduct a visual inspection with regard to Covered Species impacts (RM-5; Sections 7.1.8). This budget does not include remediation of the spill because it is expected that the spill kit and clean-up would be included in the budget for the construction or maintenance work. The HCP includes budget for a visual inspection and follow-up correspondence with the HCP Working Group. This budget assumes that the first hazardous materials spill could occur in 2022. Therefore, the rates follow current contract rates approved by Public Works; the rates include overhead costs. An inflation rate of 2 percent per year has been applied. The initial cost of this activity is shown in Table 44.

TABLE 44
HAZARDOUS MATERIALS SPILL DOCUMENTATION

Hazardous Materials Spill Documentation	Hours	Public Works On-Call (Anticipated 2022-2026 Rates)*	Total Cost (2022)
Wildlife Biologist	24	$144.00	$3,456.00
Associate Wildlife Biologist	12	$127.00	$1,524.00
GIS Specialist	8	$174.00	$1,392.00
Technical Editor	4	$110.00	$440.00
Word Processing	4	$105.00	$420.00
Project Manager	24	$202.00	$4,848.00
Principal	4	$272.00	$1,088.00
Administrative	2	$105.00	$210.00
Total Hazardous Materials Spill Documentation			**$13,378.00**
**Rates assume a 10% increase over current contract rates*			

If a non-native invasive species threaten the persistence of a Covered Species in the Action Area, LACFCD (Public Works) will provide additional funding toward removal of the non-native invasive species until at least 25 percent of known populations in the Action Area are no longer threatened (RM-6; Section 7.1.10). Per RM-6, funding would match the habitat enhancement budget. The required funding would be $30,000 for Years 1 through 10, $35,000 from Years 11 through 20, and $45,000 from Years 21 through 30; the amount is increased each decade to adjust for inflation. These matching funds would be required only in years when the changed circumstance criteria apply. The matching funds would not accrue cumulatively.

It is assumed that in any year, only one changed circumstance would be in effect; therefore, the changed circumstance with the highest budget is assumed for the Changed and Unforeseen Circumstances budget. If more than one changed circumstance occurs within a given year, the HCP Working Group will determine the proportion of the budget that will be used toward each changed circumstance.

6.9 TOTAL

Each of the costs detailed above has been multiplied over the 30-year permit term, including an adjustment of 2 percent per year for inflation to applicable budget items (i.e., all except Habitat Enhancement that has already been adjusted for inflation). The total cost of the HCP is shown in Table 45.

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TABLE 45
HCP COST OVER 30-YEAR PERMIT TERM

Event Type	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Covered Fish Species/Aquatic Habitat Monitoring	$217,270	$-	$-	$230,306	$-	$-	$244,125	$-	$-	$258,772	$-	$-	$274,298	$-	$-
Covered Herpetofauna Monitoring	$-	$105,684	$-	$-	$112,025	$-	$-	$118,747	$-	$-	$125,871	$-	$-	$133,424	$-
Covered Riparian Bird Species/Riparian Habitat Monitoring	$-	$-	$216,754	$-	$-	$229,759	$-	$-	$243,545	$-	$-	$258,157	$-	$-	$273,647
Stream Temperature Measurement[a]	$5,833	$5,491	$5,600	$5,712	$5,827	$6,438	$6,062	$6,183	$6,307	$6,433	$7,107	$6,693	$6,827	$6,963	$7,103
Stream Temperature Measurement Labor	*$5,383*	*$5,491*	*$5,600*	*$5,712*	*$5,827*	*$5,943*	*$6,062*	*$6,183*	*$6,307*	*$6,433*	*$6,562*	*$6,693*	*$6,827*	*$6,963*	*$7,103*
Data Logger Replacement	*$450*	*$-*	*$-*	*$-*	*$-*	*$495*	*$-*	*$-*	*$-*	*$-*	*$545*	*$-*	*$-*	*$-*	*$-*
Annual Report	$27,932	$28,491	$29,060	$29,642	$30,234	$30,839	$31,456	$32,085	$32,727	$33,381	$34,049	$34,730	$35,425	$36,133	$36,856
Annual HCP Meeting	$13,974	$14,253	$14,539	$14,829	$15,126	$15,428	$15,737	$16,052	$16,373	$16,700	$17,034	$17,375	$17,722	$18,077	$18,438
Habitat Enhancement Fund	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$35,000	$35,000	$35,000	$35,000	$35,000
Administrative Changes to HCP/Misc.	$-	$9,536	$-	$-	$10,108	$-	$-	$10,715	$-	$-	$11,358	$-	$-	$12,039	$-
Changed or Unforeseen Circumstances[b]	$30,000	$31,998	$32,638	$33,291	$41,690	$34,636	$35,328	$36,035	$36,756	$37,491	$38,241	$39,005	$39,785	$40,581	$50,028
Stream Monitoring	*$-*	*$31,998*	*$32,638*	*$33,291*	*$33,957*	*$34,636*	*$35,328*	*$36,035*	*$36,756*	*$37,491*	*$38,241*	*$39,005*	*$39,785*	*$40,581*	*$41,393*
Hazardous Materials Spill	*$13,378*	*$13,646*	*$13,918*	*$14,197*	*$14,481*	*$14,770*	*$15,066*	*$15,367*	*$15,674*	*$15,988*	*$16,308*	*$16,634*	*$16,967*	*$17,306*	*$17,652*
Non-native Invasives	*$30,000*	*$30,000*	*$30,000*	*$30,000*	*$30,000*	*$30,000*	*$30,000*	*$30,000*	*$30,000*	*$30,000*	*$35,000*	*$35,000*	*$35,000*	*$35,000*	*$35,000*
Major Amendment	*$-*	*$-*	*$-*	*$-*	*$41,690*	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$50,028*
Total Annual Cost	**$325,009**	**$225,453**	**$328,591**	**$343,780**	**$245,010**	**$347,100**	**$362,708**	**$249,817**	**$365,708**	**$382,777**	**$268,660**	**$390,960**	**$409,057**	**$282,217**	**$421,072**

[a] The budget for Stream Temperature Measurement is the total of the two subcategories below (i.e., stream temperature measurement labor and data logger replacement cost).
[b] The budget for Changed and Unforeseen Circumstances is the highest of the four subcategories below (i.e., stream monitoring, hazardous materials spill, non-native invasives, and major amendments)

Event Type	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Total Cost Per Event Type
Covered Fish Species/Aquatic Habitat Monitoring	$290,756	$-	$-	$308,202	$-	$-	$326,694	$-	$-	$346,295	$-	$-	$367,073	$-	$-	$2,863,791
Covered Herpetofauna Monitoring	$-	$141,429	$-	$-	$149,915	$-	$-	$158,910	$-	$-	$168,444	$-	$-	$178,551	$-	$1,393,000
Covered Riparian Bird Species/Riparian Habitat Monitoring	$-	$-	$290,066	$-	$-	$307,470	$-	$-	$325,918	$-	$-	$345,473	$-	$-	$366,201	$2,856,990
Stream Temperature Measurement[a]	$7,844	$7,390	$7,537	$7,688	$7,842	$8,658	$8,159	$8,322	$8,488	$8,658	$9,556	$9,008	$9,188	$9,372	$9,559	$221,848
Stream Temperature Measurement – Labor	*$7,245*	*$7,390*	*$7,537*	*$7,688*	*$7,842*	*$7,999*	*$8,159*	*$8,322*	*$8,488*	*$8,658*	*$8,831*	*$9,008*	*$9,188*	*$9,372*	*$9,559*	*$218,375*
Data Logger Replacement	*$599*	*$-*	*$-*	*$-*	*$-*	*$659*	*$-*	*$-*	*$-*	*$-*	*$725*	*$-*	*$-*	*$-*	*$-*	*$3,473*
Annual Report	$37,593	$38,345	$39,112	$39,894	$40,692	$41,505	$42,336	$43,182	$44,046	$44,927	$45,825	$46,742	$47,677	$48,630	$49,603	$1,133,149
Annual HCP Meeting	$18,807	$19,183	$19,567	$19,958	$20,357	$20,765	$21,180	$21,604	$22,036	$22,476	$22,926	$23,384	$23,852	$24,329	$24,816	$566,897
Habitat Enhancement Fund	$35,000	$35,000	$35,000	$35,000	$35,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$1,100,000
Administrative Changes to HCP/Misc.	$-	$12,761	$-	$-	$13,527	$-	$-	$14,339	$-	$-	$15,199	$-	$-	$16,111	$-	$125,693
Changed or Unforeseen Circumstances[b]	$42,221	$43,065	$43,926	$44,805	$45,701	$46,615	$47,547	$48,498	$49,468	$60,034	$51,467	$52,496	$53,546	$54,617	$55,709	$1,297,218
Stream Monitoring	*$42,221*	*$43,065*	*$43,926*	*$44,805*	*$45,701*	*$46,615*	*$47,547*	*$48,498*	*$49,468*	*$50,458*	*$51,467*	*$52,496*	*$53,546*	*$54,617*	*$55,709*	*$1,241,274*
Hazardous Materials Spill	*$18,005*	*$18,365*	*$18,732*	*$19,107*	*$19,489*	*$19,879*	*$20,277*	*$20,682*	*$21,096*	*$21,518*	*$21,948*	*$22,387*	*$22,835*	*$23,291*	*$23,757*	*$542,720*
Non-native Invasives	*$35,000*	*$35,000*	*$35,000*	*$35,000*	*$35,000*	*$45,000*	*$45,000*	*$45,000*	*$45,000*	*$45,000*	*$45,000*	*$45,000*	*$45,000*	*$45,000*	*$45,000*	*$1,100,000*
Major Amendment	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$-*	*$60,034*	*$-*	*$-*	*$-*	*$-*	*$-*	*$151,752*
Total Annual Cost	**$432,221**	**$297,173**	**$435,208**	**$455,547**	**$313,034**	**$470,013**	**$490,916**	**$339,855**	**$494,956**	**$527,390**	**$358,417**	**$522,103**	**$546,336**	**$376,610**	**$550,888**	**$11,558,586**

[a] The budget for Stream Temperature Measurement is the total of the two subcategories below (i.e., stream temperature measurement labor and data logger replacement cost).
[b] The budget for Changed and Unforeseen Circumstances is the highest of the four subcategories below (i.e., stream monitoring, hazardous materials spill, non-native invasives, and major amendments)

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7.0 Changed and Unforeseen Circumstances

During the permit term, circumstances may change in the HCP area that can be reasonably anticipated and for which we can plan. Unforeseen circumstances may also occur for which we cannot plan; these circumstances cannot be controlled. The degree and frequency to which these events occur is generally what separates changed from unforeseen circumstances (USFWS 2016).

Changed circumstances are defined in the No Surprises Rule (50 CFR 17.3, 1722(6)(5) and 17.32(6)(5)). Changed circumstances are circumstances that could affect a Covered Species and/or the HCP's geographic area and can be reasonably anticipated and planned for and could result in a substantial or adverse change in the status of a Covered Species. The section below identifies changed circumstances and remedial measures that will be taken if the circumstance occurs during the permit term; cost estimates and assured funding for these remedial measures are included in Section 6. Per the No Surprises Rule, the USFWS will not require additional remedial measures beyond those identified for changed circumstances identified in the HCP. However, remedial measures may be adapted through Adapted Management (USFWS 2016a).

Unforeseen circumstances are defined in the No Surprises Rule. Unforeseen circumstances are circumstances that could affect a Covered Species and/or the HCP's geographic area and could not have been reasonably anticipated or planned for and could result in a substantial or adverse change in the status of a Covered Species. These circumstances would be considered highly unlikely and not reasonably foreseeable. As described in the No Surprises Rule, it is the USFWS' responsibility to demonstrate the existence of unforeseen circumstances using the best scientific and commercial data available. The section below will identify the process to address the circumstance. If unforeseen circumstances occur, the HCP Working Group will determine how to best redirect resources from the HCP (i.e., HCP budget outlined in Section 6) to address the circumstance. If there is any disagreement in how the funds should be redirected, the decision will be made by USFWS, LACFCD (Public Works), and LADWP. Per the No Surprises Rule, the USFWS will not require additional financial compensation or restoration of lost habitat or impose additional restrictions to operation/maintenance that would otherwise be allowed under the HCP. However, the USFWS or other entities (e.g., CDFW, USFS) may take additional actions (outside the HCP) on behalf of the affected species (USFWS 2016a).

In the event that Covered Activities in addition to changed or unforeseen circumstances would result in jeopardy of a Covered Species, and the jeopardy cannot be avoided through response to changed circumstances provided in the HCP or through voluntary actions of the permittee, USFWS, or others in response to an unforeseen circumstance, the permit must be revoked (USFWS 2016a).

This section will also describe the process to make minor or major amendments to the HCP if they are needed during the permit term.

7.1 CHANGED CIRCUMSTANCES

The following are circumstances that can be reasonably anticipated to occur over the permit term. Remedial measures (RMs) that would be taken in response to each changed circumstance are included where applicable. If the changed circumstance occurs, LACFCD (Public Works) will implement the remedial measure without awaiting notice from the USFWS. As noted above, no remedial measures beyond those identified in the HCP will be required by the USFWS.

7.1.1 COVERED SPECIES BECOMES LISTED

No action would be required if a Covered Species becomes listed because these species have been treated in the HCP as if they are formally listed. LACFCD (Public Works) requests that the USFWS include all Covered Species in the federal ITP. The Covered Species that are not currently listed are Santa Ana speckled dace, arroyo chub, and western pond turtle.

7.1.2 NON-COVERED SPECIES BECOMES LISTED

If a new species becomes listed that is not already a Covered Species, and operation and maintenance of the Dam may affect the species, the HCP will need to be amended to address the species. The process of amending the HCP is described in Section 7.3.3.

RM-1 The HCP will be amended to address the newly listed species in the Action Area. This will include an analysis of operation and maintenance effects on the species and its habitat and determination of new conservation measures and/or monitoring that would be needed.

7.1.3 NEW CRITICAL HABITAT DESIGNATION AFFECTS HCP AREA

If a new Critical Habitat designation or a revised Critical Habitat designation is issued within the HCP Action Area, the HCP may need to be amended to address the effect on Critical Habitat. The process of amending the HCP is described in Section 7.3.3.

RM-2 The HCP will be amended to address the new designation of Critical Habitat in the Action Area where the Covered Activities may result in adverse modification of Critical Habitat. This will include an analysis of operation and maintenance effects on the physical and biological features listed in the Critical Habitat designation and determination of new conservation measures and/or monitoring that may be needed to avoid adverse modification of Critical Habitat.

7.1.4 FIRE

As described in Section 2.1.1, large wildfires occurred in or near the Action Area in 2009 (Station Fire), 2017 (Creek Fire), and 2020 (Bobcat Fire). Large fires are expected to occur periodically in the Action Area and could affect Covered Species and their habitats. Vegetation in Southern California is fire-adapted and expected to recover naturally without active restoration. Shrubs and trees will often crown-sprout, and fire-adapted seeds in the soil (i.e., seed bank) will germinate. Due to its characteristic moisture, riparian habitat rarely burns severely unless it has been infested with weeds (CNPS 2019). As described in Section 5.5, habitat enhancement projects may include removal of non-native invasive plants, which would serve as protection against the effects of fire. Following fire events, natural regeneration is considered the best option in most scenarios (CNPS 2019). Following both the Station Fire and Creek Fire, the ecosystem recovered naturally, without active restoration, although the USFS conducted some non-native invasive plant removal after the Station Fire. If a fire occurs in the Action Area, it will be assumed that the ecosystem will recover naturally; no remedial measures will be taken as part of the HCP.

Following the Station Fire, the resource agencies were concerned that the winter rains would cause mudslides, which would impact the creek with sediment and debris flows, in turn affecting special status fish. The resource agencies coordinated an effort to capture Santa Ana sucker, Santa Ana speckled dace, and arroyo chub from Big Tujunga Creek and brought them into captivity. The winter that followed the Station Fire was a high rainfall year (2010-2011), and large mudslides did not occur. Rescued fish were released back into the wild the following spring. Based on this past experience, if a large fire were to occur in the future, it is assumed that Covered Fish Species would be left in place rather than being brought into captivity. Therefore, no remedial measures (e.g., fish rescue) will be taken as part of the HCP.

7.1.5 FLOOD

Riparian systems are dynamic systems that depend on flooding to create disturbance to periodically scour the vegetation and redistribute sediment needed to regenerate habitat; flooding is generally considered beneficial to the Big Tujunga Creek system. As described in Section 4.1.1, it is expected that a spillway event (inflows greater than 3,000 cfs) would be needed to move a substantial amount of sediment and remove a substantial amount of in-stream vegetation. As determined by the Hydraulic Analysis, an event large enough to go to spillway has a 4-percent chance of occurring in any year, but on average would be expected to occur once every 25 years (Psomas 2020b). The Dam most recently went to spillway in Winter 2004-2005 and Winter 2010-2011; both of these spillway events occurred during above-average rainfall years. The second spillway event occurred during the ten-year long-term monitoring of Santa Ana sucker. Following the Winter 2010-2011 spillway event, Covered Fish Species numbers were higher than in any other year during the ten-year long-term monitoring study (Psomas 2019b). Periodic spillway events are generally considered beneficial; no remedial measures will be taken as part of the HCP.

7.1.6 DROUGHT

Multiple years of below-average rainfall (as measured at the Big Tujunga Dam rain gage) would be a natural occurrence but would be expected to affect the number of Covered Fish Species in the Action Area. Multiple years of below-average rainfall occurred from 2014 through 2017. A below average year would be considered less than 17 inches of rainfall, which is 35 percent below the average rainfall of 26.05 inches. To the extent possible, Public Works will capture storm-attenuated water in the Reservoir during the winter rains to provide Supplemental Releases through the warm summer months. However, if a below-average rainfall year occurs, and rainfall is not adequate to allow Public Works to capture water during the storm season, there is no other source of water. In a review of rainfall totals for the past 10 years, it was determined that 50 percent of years would be considered below-average rainfall (i.e., less than 17 inches) (Saunders 2020). As changed circumstances should be considered unusual events, the following criteria were developed.

RM-3 A below-average year would be considered less than 17 inches of rainfall, which is 35 percent below the average rainfall of 26.05 inches. If three consecutive years of below-average rainfall occur (i.e., less than 17 inches between October 1 and September 30), followed by a fourth storm season with below-average rainfall (i.e., less than 14.9 inches between October 1 and April 15)[51], LACFCD will provide monthly biological monitoring of the downstream system throughout the non-storm season (i.e., April 15 through October 15) immediately following the fourth storm season of below-average rainfall. During the initial monitoring survey, the Biologist will establish at least five monitoring stations along Big Tujunga Creek where water depth will be recorded monthly. The monitoring stations will be located in deeper pools, which would be expected to function as refugia for Covered Fish (and western pond turtle). Monthly monitoring results will be reported to the HCP Working Group.

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51 On average, 2.10 inches of rainfall occurs at Big Tujunga Dam from April 15 to September 30. This amount was subtracted from the 17 inches of annual dry year rainfall to obtain 14.9 inches.

If Covered Fish species are observed in pools that could dry, the HCP Working Group will be notified so the resource agencies may consider relocating Covered Fish to suitable habitat. Covered Fish Species will be moved upstream/downstream to suitable habitat within Big Tujunga Creek if suitable pools are present. If no suitable pools are present along Big Tujunga Creek, Covered Fish species may be taken into captivity until winter rainfall restores suitable conditions to Big Tujunga Creek. Because this would be a result of weather conditions, LACFCD shall not be responsible for relocating the fish (if needed) but shall cooperate with resource agency efforts to rescue fish.

7.1.7 EARTHQUAKE

Earthquakes occur regularly in Southern California. Earthquakes would not be expected to directly affect the riparian system. However, a large earthquake could damage the Dam structure. The Dam is built to withstand the Maximum Credible Earthquake (MCE) of magnitude 7.5 on the Richter Scale from the Sierra Madre fault[52] (MWH 2007). As described in Section 4.1.4.1, if a large earthquake occurs, the Reservoir may need to be lowered to inspect the integrity of the Dam structure. This could interfere with storage of water for the Supplemental Releases. If the water needs to be released during the storm season, it may be possible to capture storm-attenuated water over the remainder of the storm season. However, if a substantial water release occurs during the non-storm season, it may not be possible to recover the water released to perform a facility inspection. If 100 percent of the Supplemental Release water needs to be released for an emergency inspection during a below-average rainfall year (i.e., less than 17 inches), the same monitoring strategy described above for drought shall be conducted throughout the non-storm season.

RM-4 If 100 percent of the Supplemental Release water needs to be released for an emergency inspection in a year with below-average rainfall (i.e., less than 17 inches), LACFCD will provide monthly biological monitoring of the downstream system throughout the non-storm season (i.e., April 15 through October 15; or the portion of the non-storm season remaining after the emergency release). During the initial monitoring survey, the Biologist will establish at least five monitoring stations along Big Tujunga Creek where water depth will be recorded monthly. The monitoring stations will be located in deeper pools, which would be expected to function as refugia for Covered Fish (and western pond turtle). Monthly monitoring results will be reported to the HCP Working Group.

If Covered Fish species are observed in pools that could dry, the HCP Working Group will be notified so the resource agencies may consider relocating Covered Fish to suitable habitat. Covered Fish Species will be moved upstream/downstream to suitable habitat within Big Tujunga Creek if suitable pools are present. If no suitable pools are present along Big Tujunga Creek, Covered Fish species may be taken into captivity until winter rainfall restores suitable conditions to Big Tujunga Creek. Because this would be a result of a natural disaster (earthquake), LACFCD shall not be responsible for relocating the fish (if needed) but shall cooperate with resource agency efforts to rescue fish.

[52] Although the San Andreas fault could produce a MCE of 8.5, the Sierra Madre fault is closer to the Dam and likely to produce a higher excitation level; therefore, it was selected as the controlling fault (MWH 2007).

7.1.8 HAZARDOUS MATERIALS SPILLS

As described in Sections 4.3, 4.4, and 4.5, if a hazardous materials spill occurs in the Action Area, it could affect water quality, which would potentially affect Covered Species. MAIN-1, MAIN-3, and MAIN-6 require BMPs that would protect Covered Species during maintenance projects. If LACFCD[53] is responsible for spilling hazardous materials, LACFCD will remediate the spill as quickly as possible.

RM-5 If LACFCD or their designee (e.g., Contractor) is responsible for a hazardous materials spill, LACFCD shall contain the spill as quickly as possible and conduct any remediation measures necessary to restore water quality within 24 hours.

If the hazardous materials spill for which LACFCD is responsible affects Big Tujunga Creek or the Reservoir, LACFCD will direct a Biologist to visit the location to describe the location with respect to known Covered Species occurrences. The Biologist will conduct a visual survey for dead or sick individuals of Covered Species. The Biologist will not be expected to delineate the specific hazardous materials spill boundary and/or specific effects on water quality but should map the approximate habitat area that is directly affected. A memorandum documenting the visual survey will be submitted to the HCP Working Group and included with the Annual Report.

If a hazardous materials spill occurs along Big Tujunga Creek within the Action Area but was not caused by LACFCD, it shall not be LACFCD's responsibility to contain or remediate the spill. If any member agency of the HCP Working Group becomes aware of a hazardous materials spill along Big Tujunga Creek, they will provide information to the HCP Working Group so the incident can be noted in the Annual Report.

7.1.9 ILLEGAL DUMPING/VANDALISM

If illegal dumping or vandalism occurs within the Action Area, it shall not be LACFCD's or LADWP's responsibility to clean up the illegal dumping/vandalism. If any member agency of the HCP Working Group becomes aware of illegal dumping/vandalism along Big Tujunga Creek, they will provide information to the HCP Working Group so the incident can be noted in the Annual Report.

7.1.10 NON-NATIVE INVASIVE SPECIES

Non-native plant and wildlife species are known to occur in the Action Area. Two of the habitat enhancement options described in Section 5.5 are to remove non-native invasive plant or wildlife species from the Action Area. Additionally, the USFS is also working to remove non-native invasive species per the Biological Opinions covering their ongoing land management activities (USFWS 2013c, 2015b, 2015c, 2016c). It is expected that the HCP's habitat enhancement projects, combined with the USFS' invasive removal efforts, would keep the distribution of non-native species from increasing to a point where they would jeopardize Covered Species in the Action Area. However, if the persistence of a Covered Species in the Action Area is threatened by a non-native plant or wildlife species, additional non-native eradication efforts will be implemented.

53 LADWP is not responsible for operation or maintenance of the Dam and would therefore not be responsible for any hazardous materials spills related to Covered Activities.

RM-6 If non-native plant or wildlife species threaten the persistence of a Covered Species in the Action Area (i.e., the last 25 percent of known locations in the Action Area are threatened by a non-native plant or wildlife species; known locations based on the most recent Covered Species monitoring), the budget for removal of non-native species (i.e., total habitat enhancement budget) will be matched annually by the changed circumstances budget until at least 25 percent of the Covered Species' known locations in the Action Area are no longer threatened by the non-native plant or wildlife species.

7.2 UNFORESEEN CIRCUMSTANCES

The following are circumstances that are not reasonably anticipated to occur over the permit term. If unforeseen circumstances occur, LACFCD will work with USFWS to redirect HCP funding to address the unforeseen circumstance to the extent possible. Additionally, other entities (e.g., USFWS, CDFW, USFS, and other applicable agencies) may undertake additional actions at their own expense to protect and conserve Covered Species. This HCP does not specify a response from LACFCD for unforeseen circumstances.

7.2.1 STRUCTURE FAILURE

The Dam structure is not anticipated to fail over the life of the permit term; it is inspected regularly to ensure its structural and operational integrity. The Dam is designed to withstand an earthquake of up to 7.5[54] on the Richter Scale. An earthquake larger than 7.5 on the Richter Scale could cause the structure to fail and would be considered an unforeseen circumstance. Additionally, wind damage or a terrorist act targeted at the Dam could cause the Dam structure to fail. If the structure failed, water would be released from the Reservoir, either proactively through the valves by Operations, or through a surge in flow that would be similar to a flood event. If a high release or surge in flow occurs during the breeding season, it could affect reproductive success of Covered Species breeding downstream of the Dam. As floods are natural events, Covered Species may recover with no action taken.

If a structural failure occurs, the Dam would be unable to hold water for the Supplemental Releases until the Dam structure can be repaired or re-built.

7.2.2 DISEASE

A disease that affects the health, survival, or reproductive success of a Covered Species would be an unforeseen circumstance.

7.3 MODIFICATIONS TO THE PLAN

Potential modifications to the HCP can be initiated by either LACFCD/LADWP or USFWS. Per OPER-4, the HCP Group will meet at least annually; LACFCD (Public Works), LADWP, and the USFWS will discuss potential changes. In the context of the No Surprises Policy, changes to biological objectives and conservation measures should be voluntary and within the original budget estimate (USFWS 2016a). The exception to this would be the addition of a new Covered Species, which may add conservation measures and additional budget needs. The process for making changes to the HCP is described below.

54 Although the San Andreas fault could produce a MCE of 8.5, the Sierra Madre fault is closer to the Dam and likely to produce a higher excitation level; therefore, it was selected as the controlling fault (MWH 2007).

7.3.1 ADMINISTRATIVE CHANGES

Corrections and clarifications that do not change the analysis or intended meaning would be considered administrative changes. Modifying the monitoring methodology to align with updated resource agency protocols for Covered Species would also be considered administrative changes. Administrative changes would not require additional impact analysis, changes to the conservation strategy, or changes to decision documents.

Administrative changes will be approved by the HCP Working Group, documented in an Administrative Change Memorandum, and attached to the Annual Report. The Administrative Change Memorandum will be numbered for long-term tracking purposes. The Annual Report will include a section listing all Administrative Change Memorandums since the implementation of the HCP and date of each (i.e., to reference the Annual Report where it can be found). The USFWS will note the administrative changes in the permit's case file.

7.3.2 MINOR MODIFICATIONS

Minor modifications are those that would not result in adverse impacts to Covered Species beyond those analyzed in the HCP or limit the ability to achieve biological goals/objectives. Most Adaptive Management changes would be considered minor modifications. These may include: (1) modification of the Covered Activities per Adaptive Management, (2) minor changes to the biological goals and objectives, (3) addition or modification of conservation measures that improve the likelihood of meeting the biological goals and objectives, (4) removal of ineffective conservation measures, (5) modification of monitoring strategy or survey design to increase effectiveness, and/or (6) adding additional monitoring. Changes in reporting requirements would also be considered minor modifications. Minor modifications would not require changes to the decision documents or permits but would require authorization by the USFWS prior to implementation.

Minor modifications will be approved by the HCP Working Group, documented in a Minor Modification Report, and attached to the Annual Report. The Minor Modification Report will include the proposed minor modification, rationale for the modification, and analysis and/or justification demonstrating that the change would not result in adverse impacts on Covered Species beyond those analyzed in the HCP and that it would not limit the ability to achieve the HCP's biological goals and objectives. The USFWS will provide written approval of the minor modification. If the USFWS does not approve the proposed minor modification, they will provide a written explanation. The USFWS' findings will be attached to the Minor Modification Report as an appendix.

The USFWS will not approve the minor modification if they determine that the modifications would result in adverse impacts to Covered Species beyond those analyzed in the HCP and that would limit the ability to achieve the HCP's biological goals and objectives. If the USFWS denies a minor modification for this reason, it can be proposed as an amendment.

The Minor Modification Report will be numbered for long-term tracking purposes. The Annual Report will include a section listing all Minor Modification Reports since the implementation of the HCP and the date of each (i.e., to reference the Annual Report where it can be found). The USFWS will note the minor modification in the permit's case file.

7.3.3 AMENDMENTS

An amendment to the HCP may result in adverse effects on Covered Species beyond those analyzed in the HCP and/or would substantially change the biological goals and/or objectives described in the conservation strategy. An amendment to the HCP and ITP would follow the same process as the original HCP, including undergoing NEPA analysis (or completing the checklist to determine that a Low-Effect HCP is appropriate), publishing the amendment and analysis in the Federal Register for public review, and undergoing an internal Section 7 Consultation. Amendments may include, but would not be limited to: (1) addition of a new Covered Species, (2) coverage for impacts to a newly designated or revised Critical Habitat not included in the HCP, (3) providing an increase in take allowed for Covered Species, (4) adding new Covered Activities, (5) making major changes to the biological goals or objectives affecting the overall conservation strategy, (6) revising the HCP Action Area; and/or (7) extending the permit term beyond 30 years.

The Proposed Amendment will include a description of the proposed major modification, purpose and need for the amendment, analysis of the additional effects on Covered Species and/or Critical Habitat, changes to the biological goals and objectives and/or monitoring strategy, funding for additional monitoring, and alternatives to the amendment (e.g., continuing with the current process with no amendment). The Proposed Amendment and appropriate NEPA document will be submitted to the USFWS with an application for an amendment to the ITP. The USFWS will publish a Notice of Intent in the Federal Register, initiating the amendment review process. After public comment, the USFWS will approve or deny the amendment application.

The Annual Report will include a section listing any amendments proposed during implementation of the HCP, the date of each, and whether the amendments were approved. The USFWS will note the amendment in the permit's case file.

7.3.4 RENEWAL

If LACFCD/LADWP would like to renew the HCP, the renewal will require a formal review in light of current information and circumstances at the time of the renewal (USFWS 2016a).

LACFCD/LADWP may request a renewal of the permit by submitting an application for a renewal of an ITP at least 30 days prior to the expiration of the existing permit (Federal Fish and Wildlife Permit Application Form 3-200-56). If changes to HCP terms are proposed, the application will also include the appropriate level of NEPA documentation for the updated HCP. Permit renewals must be published in the Federal Register for public review, even if no revisions were made. All reporting requirements must be met before a renewal can be issued.

8.0 Alternative Actions to the Taking in the HCP

Section 10 of the ESA requires that a HCP describe actions the applicant considered as an alternative to the take that would result from the proposed action and the reasons why the alternatives were not selected. HCP Alternatives should be related to HCP Covered Activities and result in no take or less take (USFWS 2016a).

8.1 STATUS QUO ALTERNATIVE

Under this alternative, there would be no HCP; LACFCD (Public Works) would continue to operate the Dam for flood control and water conservation purposes, which could affect Covered Species. If take of Covered Species occurred under this alternative, LACFCD would potentially be in violation of the ESA. Therefore, this alternative was not selected.

8.2 NO TAKE ALTERNATIVE

Under this alternative, LACFCD (Public Works) would not pursue the proposed action (i.e., HCP) and would cease operation of activities that could result in take of Covered Species. If Public Works could not carry out portions of its proposed action (e.g., periodic maintenance), the facility would become inoperable and Public Works could not complete its mission to provide flood control and water conservation. Therefore, this alternative was not selected.

8.3 ACTIVITY BY ACTIVITY PERMITTING

Under this alternative, LACFCD (Public Works) would still be required to obtain a HCP for operations, but each maintenance activity would obtain separate ITPs or Biological Opinions. This would require Public Works to prepare multiple HCPs and Biological Assessments, multiple consultations with USFWS, and multiple public review processes. Public Works would then be required to track and comply with multiple permit requirements for the duration of each permit. Monitoring of species would be limited to specific areas near the maintenance activities rather than providing an overall view of the population status in Big Tujunga Creek. This approach was not selected because it would be inefficient; ESA permitting would be more costly and time-consuming, and monitoring would be less effective in conserving Covered Species.

8.4 REDUCED SPECIES ALTERNATIVE

Under this alternative, the HCP would cover only species that are currently listed as Threatened and Endangered that could be affected by operations or maintenance (i.e., Santa Ana sucker, arroyo toad, and least Bell's vireo). If an additional listed species were to occupy the Action Area in the future (e.g., southwestern willow flycatcher, yellow-billed cuckoo) or if currently non-listed species that occur in the Action Area were to become listed in the future (e.g., Santa Ana speckled dace, arroyo chub, or western pond turtle), LACFCD would need to amend the HCP to address these species. LACFCD (Public Works) did not select this alternative because they desired coverage for species that may become listed during the permit term.

8.5 ALTERNATIVE PERMIT DURATION

LACFCD (Public Works), LADWP, and the USFWS discussed permit durations ranging from 10 years to 50 years. As preparation of the HCP is a substantial investment of time and finances, LACFCD/LADWP desired to have a permit term that was as long as possible. The USFWS was amenable to issuing a long-term permit but was uncomfortable with issuing a take permit of a longer duration. A permit term of 30 years was agreed upon by LACFCD, LADWP, and USFWS.

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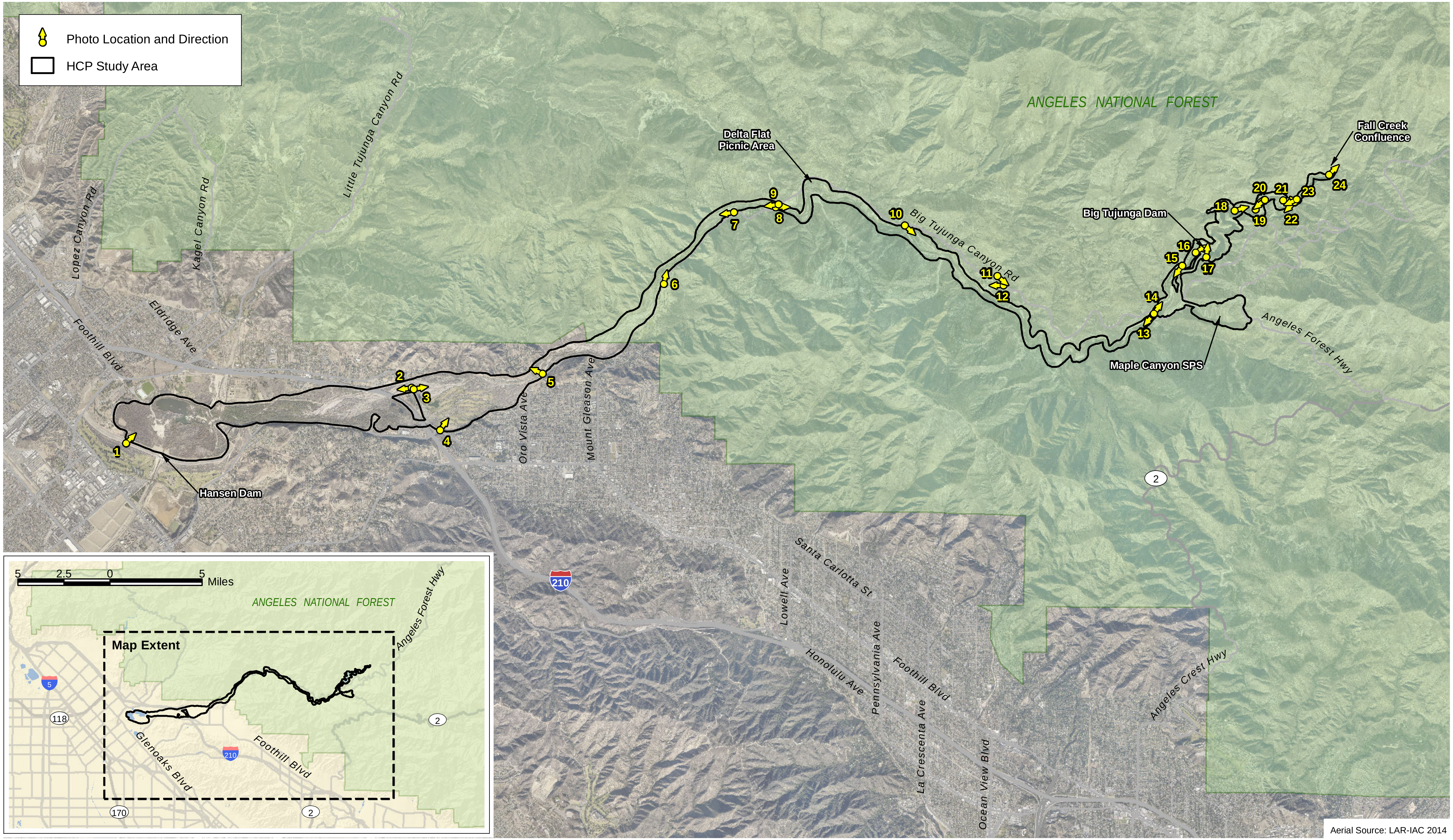
Attachment A

Representative Photographs



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Site Photograph Locations

Big Tujunga Dam HCP

Attachment A

N S E W

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PSOMAS

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Photo 1 - Representative site photograph taken from Hansen Dam, looking northeast.
Photo shows black willow thicket and developed/ornamental (riprap) in the foreground.

Photo 2 - Representative site photograph taken from Foothill Boulevard, looking west.
Photo shows scale broom scrub with some mulefat thicket along the active channel.

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Representative Site Photographs

Attachment A-1

Big Tujunga Dam HCP

PSOMAS

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Photo 3 - Representative site photograph taken from Foothill Boulevard, looking east. Photo shows scale broom scrub along the alluvial channel.

Photo 4 - Representative site photograph of the Angeles National Golf Club, looking northeast. Photo shows developed ornamental areas with scale broom scrub following alluvial braids (drainages) through the golf course.

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Representative Site Photographs

Attachment A-2

Big Tujunga Dam HCP

PSOMAS

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Photo 5 - Representative site photograph at Oro Vista Avenue, looking northwest. Photo shows Fremont cottonwood forest and Fremont cottonwood forest-arroyo willow thicket in the background along the creek, mulefat thicket and sandbar willow thicket in the foreground along the creek, and upland mustards in the foreground next to the road mapped as developed/ornamental.

Photo 6 - Representative site photograph north of Graveyard Truck Trail, looking upstream. Photo shows Fremont cottonwood forest and black willow thicket-Fremont cottonwood forest along the creek and California sagebrush-California buckwheat scrub in the foreground.

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Representative Site Photographs

Attachment A-3

Big Tujunga Dam HCP

PSOMAS

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Photo 7 - Representative site photograph south of Delta Flats, looking downstream. Photo shows scale broom scrub along the main creek, black willow thicket-Fremont cottonwood forest along the creek edges, and California sagebrush-California buckwheat scrub along the banks.

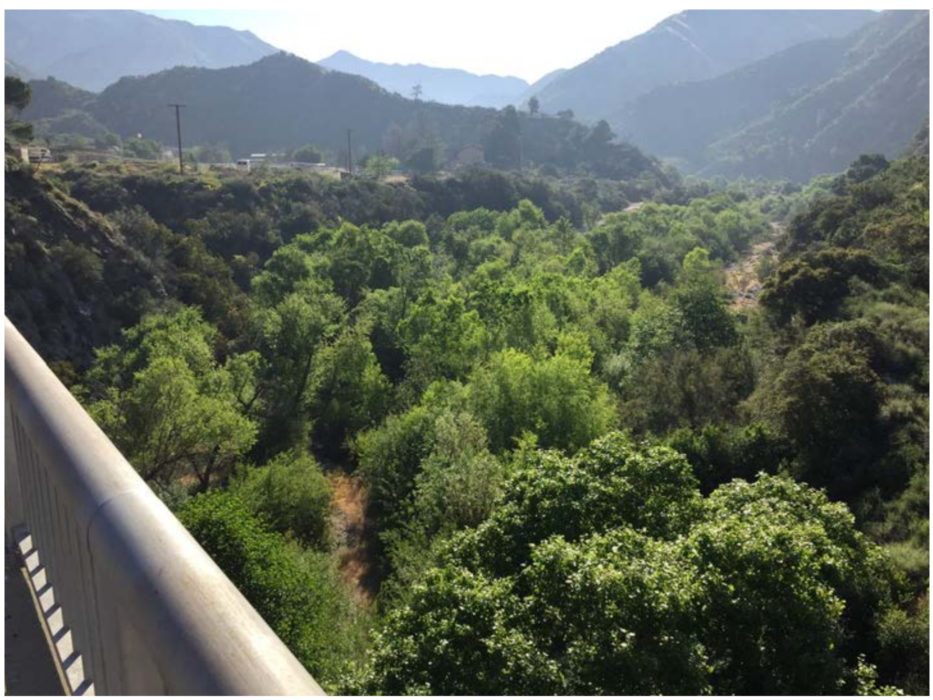

Photo 8 - Representative site photograph taken from the lower Big Tujunga Canyon Road crossing (i.e., Big Tujunga Canyon Road Bridge No. 1), looking upstream. Photo shows black willow thicket-Fremont cottonwood forest along Big Tujunga Creek and laurel sumac scrub in the adjacent upland.

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Photo 9 - Representative site photograph taken from the lower Big Tujunga Canyon Road crossing (i.e., Big Tujunga Canyon Road Bridge No. 1), looking downstream. Photo shows black willow thicket-Fremont cottonwood forest along Big Tujunga Creek, laurel sumac scrub on the adjacent hillsides, and birch leaf mountain mahogany chaparral on the cliff in the foregound.

Photo 10 - Representative site photograph near the Wildwood Picnic Area, looking upstream. Photo shows scale broom scrub along the main channel, black willow thicket-Fremont cottonwood forest along the creek edges, California sagebrush-California buckwheat scrub on the stream terrace, and laurel sumac scrub and thick leaf yerba santa scrub on the hillsides.

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Representative Site Photographs

Attachment A-5

Big Tujunga Dam HCP

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Photo 11 - Representative site photograph north of the Vogal Flat Picnic Area, looking upstream. Photo shows scale broom scrub transitioning to black-willow thicket-Fremont cottonwood forest along Big Tujunga Creek with coast live oak woodland on the adjacent slope. Photo also shows laurel sumac scrub on the upland slopes in the foreground and birch left mahogany chaparral on the upland slopes in the background.

Photo 12 - Representative site photograph of the Vogal Flat Picnic Area, looking downstream. Photo shows scale broom scrub along the main channel and coast live oak woodland and developed/ornamental areas in the upland.

Representative Site Photographs

Attachment A-6

Big Tujunga Dam HCP

PSOMAS

Photo 13 - Representative site photograph taken from the upper Big Tujunga Canyon Road crossing (i.e., Big Tujunga Canyon Road Bridge No. 2), looking downstream. Photo shows white alder grove-willow thicket along the main channel with mulefat thicket along the creek edges. Coast live oak woodland, laurel sumac scrub, and yerba santa scrub are located in the upland.

Photo 14 - Representative site photograph taken from the upper Big Tujunga Canyon Road crossing (i.e., Big Tujunga Canyon Road Bridge No. 2), looking upstream. Photo shows white alder grove-willow thicket along the creek. Laurel sumac scrub and yerba santa scrub are located along the adjacent upland to the west, while a disturbed manufactured slope is located to the east.

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Representative Site Photographs

Attachment A-7

Big Tujunga Dam HCP

PSOMAS

Photo 15 - Representative site photograph taken from the Big Tujunga Dam access road, looking downstream. Photo shows white alder grove-willow thicket along the creek and disturbed areas adjacent to the road.

Photo 16 - Photo of Big Tujunga Dam and plunge pool from the Dam Access Road, looking upstream. Photo shows the developed Dam, cliffs on each side of the Dam, open water of the plunge pool, and white alder grove-willow thicket in the foreground.

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Photo 17 - Overview of lower Big Tujunga Reservoir from the south abutment, looking upstream. Photo shows the developed Dam, open water of the Reservoir, cliff along the water's edge, thick leaf yerba santa scrub on the closer slopes and birch leaf mountain mahogany chaparral on the further slopes.

Photo 18 - View of upper Big Tujunga Reservoir from a boat, looking upstream. Photo shows open water, cliff along the water's edge, and birch leaf mountain mahogany chaparral on the upper slopes.

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Photo 19 - Representative site photograph taken from the north end of the Big Tujunga Reservoir, looking upstream. Photo shows dry wash and smartweed-cocklebur patch along the creek, arroyo willow thicket in the background, and cliff and birch leaf mahogany chaparral in the uplands.

Photo 20 - Representative site photograph south of Josephine Creek, a tributary to Big Tujunga Creek upstream of the Reservoir, looking downstream. Photo shows dry wash and arroyo willow thicket along the creek and birch leaf mountain mahogany in the adjacent upland.

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Photo 21 - Representative site photograph of Josephine Creek, a tributary to Big Tujunga Creek upstream of the Reservoir, looking upstream. Photo shows dry wash and mulefat thicket in the foreground and arroyo willow thicket in the background along the creek. The surrounding upland slopes are composed of birch leaf mountain mahogany chaparral.

Photo 22 - Representative site photograph north of Big Tujunga Creek, upstream of the Reservoir (upstream of Josephine Creek). Photo shows open water along the creek and freshwater seep on the adjacent cliff.

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Photo 23 - Representative site photograph of Big Tujunga Creek upstream of the Reservoir (just downstream of Fall Creek). Photo shows dry wash and scale broom scrub in the foreground, arroyo willow thicket in the background along the creek, and birch leaf mahogany chaparral on the adjacent cliffs.

Photo 24 - Representative site photograph taken at the confluence of Big Tujunga Creek and Fall Creek, looking upstream. Photo shows white alder grove-California sycamore woodland and open water along the stream with birch leaf mountain mahogany on the adjacent cliffs.

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Attachment B

Representative Target List of Invasive Weed Species

*Representative Target List of Invasive Weed Species**

**This list is expected to change over the permit term as new invasive species become introduced in the region. The list of target species will be updated at the HCP Working Group meeting prior to the Invasive Weed mapping effort. The intent of the weed mapping is to map the distribution of weed species that could degrade the habitat quality for Covered Species and therefore should focus efforts on aquatic and riparian species rather than upland species. The effort should also focus on high and moderate invasive species rather than species ranked as limited invasive potential.*

Scientific Name	Common Name	Cal_IPC_Rank	Arid West Wetland Rank	ANF Weed List	Reported from riparian areas
Ageratina adenophora	white snakeroot/ crofton weed/ eupatory	Moderate	FACU	yes	Riparian areas specifically in ANF
Ailanthus altissima	tree of heaven	Moderate	FACU	yes	Riparian areas
Arundo donax	giant reed	High	FACW	yes	
Conium maculatum	poison hemlock	Moderate	FACW	yes	
Cortaderia selloana	pampas grass	High	FACU	yes	Riparian areas specifically in ANF
Delairea odorata	cape ivy	High		yes	Riparian areas
Ficus carica	edible fig	Moderate	FACU	yes	Riparian areas specifically in ANF
Foeniculum vulgare	fennel	High		yes	Riparian areas
Hedera canariensis	Canary Islands ivy	High			Riparian areas specifically in ANF
Hedera helix	English ivy	High	FACU	yes	Riparian areas specifically in ANF
Lepidium latifolium	perennial pepperweed	High	FAC	yes	
Myriophyllum spicatum	Eurasian water-milfoil	High	OBL		Riparian areas specifically in ANF
Ricinus communis	castor bean	Limited	FACU	yes	
Rubus armeniacus	Himalayan blackberry	High	FAC	yes	
Schinus molle	pepper tree	Limited	FACU	yes	
Schinus terebinthifolius	Brazilian pepper tree	Limited	FAC		
Spartium junceum	Spanish broom	High		yes	Riparian areas specifically in ANF
Tamarix parviflora	smallflower tamarix	High	FAC		Riparian areas specifically in ANF
Tamarix ramosissima	saltcedar	High		yes	Riparian areas specifically in ANF
Vinca major	greater periwinkle	Moderate		yes	Riparian areas

Cal-IPC Rank:	
Limited	These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
Moderate	These species have substantial and apparent—but generally not severe—ecological impacts on the surrounding habitat. They have moderate to high rates of dispersal. Distribution may range from limited to widespread.
High	These species have severe ecological impacts on the surrounding habitat. They have moderate to high rates of dispersal and establishment, and most are widely distributed.

Wetland Designations:	
OBL	Wetland-dependent plants that require standing water or seasonally saturated soils near the surface.
FACW	Plants dependent on and predominantly occur with hydric soils, standing water, or seasonally high water tables in wet habitats.
FAC	These plants can occur in wetlands or non-wetlands. They can grow in hydric, mesic, or xeric habitats.
FACU	Plants that are not wetland dependent. They are non-wetland plants by habitat preference.