2010 JOS

Final Program Environmental Impact Report for the

JOINT OUTFALL SYSTEM 2010 MASTER FACILITIES PLAN

Prepared for:

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

Prepared by:

Jones & Stokes Associates, Inc.

June 1995

State Clearinghouse Number 94021011

Final
Program Environmental Impact Report
for the
Joint Outfall System
2010 Master Facilities Plan

Prepared for:

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INTRODUCTION

The County Sanitation Districts of Los Angeles County (Districts) have prepared a facilities plan to meet the wastewater management needs of the Districts' Joint Outfall System (JOS). The plan, known as the JOS 2010 Master Facilities Plan (2010 Plan), addresses the need to upgrade the level of treatment of all JOS flows to full secondary treatment pursuant to a Consent Decree negotiated between the Districts, the United States, the State of California, and other parties. The 2010 Plan also addresses the need to expand wastewater treatment plants to accommodate projected growth in the JOS service area through 2010 and to provide for biosolids management and water reuse opportunities.

The Districts have prepared the final program environmental impact report (EIR) for the 2010 Plan to comply with the requirements of the California Environmental Quality Act (CEQA) and the State CEQA Guidelines (Sections 15088, 15089, and 15132). This executive summary identifies the significant comments received during public review of the draft EIR and 2010 Plan and the Districts' responses to these concerns.

The final EIR consists of a summary of the public review process for the draft EIR; a list of persons, organizations, and public agencies commenting on the draft EIR; comments and recommendations received on the draft EIR; the Districts' responses to comments received during the review and consultation process; and, where needed, revisions or corrections to the draft EIR. The final EIR has been prepared to be read together with the draft EIR.

BACKGROUND

The Districts circulated the draft EIR and 2010 Plan concurrently for a 60-day public review period from November 14, 1994 through January 17, 1995. The draft EIR and 2010 Plan, or notice of availability of the documents, were distributed to agencies, organizations, and individuals who received the notice of preparation of the EIR in February 1994. The draft documents also were made available for public review at several local libraries and to other interested parties.

COMMENTS RECEIVED ON DRAFT EIR

The Districts solicited public testimony on the draft EIR and 2010 Plan at two public hearings held on January 10, 1995 at the Carson Community Center and on January 12, 1995 at the Districts' Joint Administration Office near Whittier. No formal public testimony was offered at either public hearing. Consequently, only written comments on the draft EIR and 2010 Plan were submitted. Seventeen comment letters were received on the draft EIR from the following federal, state, and local agencies and other interested parties:

- U.S. Fish and Wildlife Service (USFWS);
- Governor's Office of Planning and Research (two letters);
- California Department of Transportation, District 7;
- State Water Resources Control Board;
- County of Los Angeles Department of Parks and Recreation;
- City of El Segundo Department of Planning and Building Safety;
- County of Los Angeles Fire Department;
- County of Los Angeles Department of Public Works;
- City of Cerritos;
- City of Los Angeles;
- City of Compton;
- Metropolitan Water District of Southern California;
- Southern California Association of Governments;
- Ken Malloy Harbor Regional Park Advisory Board;
- Heal the Bay; and
- Surfrider Foundation.

The Districts have prepared specific, detailed responses to all issues and concerns raised. These comment letters and the responses are provided in Chapter 2 of the final EIR, "Responses to Written Comments". In response to some issues raised, the Districts have made changes to the draft EIR. In other cases, clarifications have been provided. These changes and corrections are provided in Chapter 3 of the final EIR, "Changes and Errata to the Draft Environmental Impact Report".

SUMMARY OF SIGNIFICANT COMMENTS ON THE DRAFT EIR

Issues raised in each comment letter are identified in Chapter 2 of the final EIR, "Responses to Written Comments". In most cases, comments on the draft EIR required only clarification by the Districts. Some comments raised substantive environmental issues. These comments and the Districts' responses are summarized below:

Comment: The USFWS expressed concern that the 2010 Plan would result in the loss of habitat suitable for the least Bell's vireo in the vicinity of the Whittier Narrows Water Reclamation Plant (WRP) near South El Monte.

Response: Expansion of the Whittier Narrows WRP is not included in the Districts' recommended alternative, and any proposed expansions at this site would require subsequent environmental review by the Districts, including provisions for avoiding or mitigating the loss of habitat suitable for the least Bell's vireo.

Comment: The USFWS expressed concern that the Districts' biosolids management plan would adversely affect threatened and endangered species and that the Districts should undertake efforts as part of the 2010 Plan to include long-range planning to procure land with high biological value to offset any effects associated with biosolids management.

Response: The Districts have provided additional details of the environmental review completed for the existing disposal and reuse sites and have clarified that, as part of the biosolids management plan, the Districts would require that all new sites have approved environmental documentation and be fully permitted. In addition, the Districts would independently review this documentation for adequacy before entering into any contract. The Districts also have identified in the final EIR the current planning efforts underway in the Los Angeles County area by various agencies and organizations to preserve high-value habitat.

Comment: The Ken Malloy Harbor Regional Park Advisory Board commented that the proposed Phase I digesters adjacent to the Districts' Joint Water Pollution Control Plant (JWPCP) marsh site in Carson should be relocated to another site that would not adversely affect botanical and wildlife resources.

Response: The Districts have provided more detail in the final EIR on the design, construction, and operation criteria used for selection of the site for the proposed Phase I digesters. The Districts have identified other sites that were considered for the proposed Phase I digesters and the reasons for removing those sites from further consideration. Information has been provided to explain why the site adjacent to the JWPCP marsh is the best location based on several factors, including safety, zoning compatibility, and cost-effectiveness. The Districts also have modified the design of the proposed Phase I digesters so that runoff from newly paved areas would be diverted from the marsh. Additionally, the final EIR provides a more detailed mitigation measure that specifies the provisions to be included in the marshland management plan.

Comment: The Ken Malloy Harbor Regional Park Advisory Board commented that the proposed upgrade for the JWPCP should include production of reclaimed water for beneficial reuse.

Response: In response to this request, the Districts analyzed the feasibility of production of reclaimed water at the JWPCP and determined that there would be no demand for reclaimed water at the JWPCP because the cost would be substantially higher (as much as four times the cost for existing potable supplies).

Comment: The City of Cerritos commented that the Districts' proposed project should not eliminate the City's recreational use of the Districts' property currently leased to the City for a driving range and a portion of an adjacent golf course.

Response: Under the recommended alternative, the Districts are not proposing to expand the Los Coyotes WRP on the Districts' property currently leased to the City for the driving range and golf course. Although the land is not needed as part of the 2010 Plan, the existing lease allows the Districts to terminate the lease if the land owned by the Districts is required for the wastewater treatment plant. Any potential future plans by the Districts to change the existing recreational use of the property would be coordinated with the City.

Chapter 1
Introduction

Chapter 1. Introduction

BACKGROUND

The County Sanitation Districts of Los Angeles County (Districts) have prepared a facilities plan for the wastewater treatment facilities in the Joint Outfall System (JOS) to meet wastewater management needs through 2010. This plan, entitled the *JOS 2010 Master Facilities Plan* (2010 Plan), addresses several issues, including the need to upgrade and expand the system's wastewater treatment plants, the split in wastewater flow between inland and coastal treatment facilities, biosolids disposal and reuse, opportunities for water reuse, and provisions for relief of the wastewater conveyance system.

The California Environmental Quality Act (CEQA) requires that the Districts' Board of Directors consider the environmental consequences of the 2010 Plan before taking action to implement the plan. The environmental impact report (EIR) prepared for the 2010 Plan represents both a programmatic environmental analysis for the overall 2010 Plan and a project-specific CEQA document for the construction and operation of secondary treatment facilities at the Joint Water Pollution Control Plant (JWPCP), additional solids processing facilities at the JWPCP needed for expansion of the inland water reclamation plants (WRPs), and certain specific biosolids management options. Consequently, approval of the 2010 Plan by the Districts' Board of Directors in July 1995 would allow the Districts to construct and operate facilities at the JWPCP.

PUBLIC REVIEW OF THE DRAFT EIR

Information Meetings

Two public information meetings were held by the Districts to summarize the 2010 Plan, to present information on the draft EIR, and to answer questions on the 2010 Plan and the draft EIR. The information meetings were held on December 6, 1994 at the Carson Community Center and December 8, 1994 at the Districts' Joint Administration Office (JAO) in Whittier.

Public Hearings

Two public hearings were held by the Districts during the 60-day public review period to solicit public testimony. The public hearings were held on January 10, 1995 at the Carson Community Center and January 12, 1995 at the Districts' JAO in Whittier. Formal testimony related to the draft EIR was solicited but not received at either public hearing. Complete transcripts of the proceedings are available at the Districts' JAO in Whittier.

Written Comments

The agencies, groups, and individuals who responded in writing are listed in Chapter 2 of the final EIR. The review period for receiving written comments was November 14, 1994 through January 17, 1995. The written comments and the responses to them are provided in Chapter 2.

CONTENTS OF THE FINAL EIR

The content and format of the final EIR meet the requirements of CEQA and State CEQA Guidelines (Section 15132), which require that a final EIR consist of a revision of the draft EIR; comments and recommendations received on the draft EIR; a list of persons, organizations, and public agencies commenting on the draft EIR; and the responses of the lead agency to significant environmental points raised in the review and consultation process. This final EIR meets those requirements as follows:

- Chapter 1. "Introduction", describes the background of the 2010 Plan and an overview of the EIR process.
- Chapter 2. "Responses to Written Comments Received on the Draft EIR", includes the written comments of all agencies, organizations, and individuals commenting on the draft EIR, as well as responses to those comments.
- Chapter 3, "Changes and Errata to the Draft EIR", contains corrections to the draft EIR.
- Chapter 4. "References", identifies the documents used (printed references) and individuals consulted (personal communications) during preparation of the final EIR.

Chapter 2

Responses to Written Comments

Chapter 2. Responses to Written Comments

Agencies, organizations, and individuals that commented in writing on the draft 2010 Plan and draft EIR are listed below. Comment letters were solicited during the 60-day review period, which extended from November 14, 1994, to January 17, 1995. Some comment letters were received after the deadline. However, all written comments were considered and appropriate changes were made to both the draft 2010 Plan and the draft EIR.

All comment letters and the respective responses have been included in this chapter of the final EIR and in Appendix A-8.2 of the final 2010 Plan. Comments and responses generally apply to the draft 2010 Plan and the draft EIR. However, certain comments received were specific to the 2010 Plan or the EIR only. The responses to these comments are identified separately. The changes to the text resulting from the comments, where applicable, are incorporated in a different manner for each document. In such cases, the final EIR shows the changes in Chapter 3, "Changes and Errata to the Draft Environmental Impact Report", while the changes to the draft 2010 Plan have been made to the actual text of the document.

AGENCIES, ORGANIZATIONS, AND INDIVIDUALS COMMENTING IN WRITING

Responsible Party	Date	Letter Number
Federal Agencies		
U.S. Fish and Wildlife Service	January 27, 1995	1
State Agencies		
Governor's Office of Planning and Research	January 3, 1995	2
Governor's Office of Planning and Research	January 12, 1995	3
California Department of Transportation, District 7	January 6, 1995	4
State Water Resources Control Board	January 17, 1995	5

Local Agencies

County of Los Angeles Department of Parks and Recreation	December 5, 1994	6
City of El Segundo Department of Planning and Building Safety	December 21, 1994	7
County of Los Angeles Fire Department	December 21, 1994	8
County of Los Angeles Department of Public Works	January 19, 1995	9
City of Cerritos	January 13, 1995	10
City of Los Angeles	January 6, 1995	11
City of Compton	February 6, 1995	12

Other Agencies and Organizations

The Metropolitan Water District	January 17, 1995	13
Southern California Association of Governments	January 17, 1995	14
Ken Malloy Harbor Regional Park Advisory Board	January 17, 1995	15
Heal the Bay	January 17, 1995	16
Surfrider Foundation	January 18, 1995	17

Letter 1

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California 92008

January 27, 1995

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whitter, California 90601-1400

Attn: Gary Yoshida

Re: Draft Program Environmental Impact Report Joint Outfall System 2010 Master Facilities Plan

Dear Mr. Carry:

The Fish and Wildlife Service (Service) has review the draft environmental impact report (EIR) for the Joint Outfall System 2010 Master Facilities (2010 Plan). This 2010 Plan addresses long-term wastewater treatment, reuse, and disposal needs through 2010 for the County Sanitation Districts of Los Angeles County (Sanitation Districts). The Service has concerns regarding threatened and endangered species, mitigation to offset project impacts, biosolids and growth-inducing impacts associated with the development of the 2010 Plan.

In a January 3, 1995, conference call with Christine Bailey, Environmental Services Unit, State Water Resources Control Board, Service biologists Marjorie Nelson and Martin Kenney of my staff requested a 10 day extension to review the draft EIR and provide comments on the 2010 Plan. Ms. Bailey approved this request for additional time needed to review the document.

A major concern of the Service is to ensure potential impacts to threatened and endangered species from project construction and operation are avoided. A list of federally listed species that may occur within the project area was provided by the Service in a letter dated November 16, 1994, to Christine Bailey. In addition, Paul Cylinder of Jones and Stokes Associated, Inc., a consultant to the Sanitation Districts, provided Marjorie Nelson a list, dated January 17, 1995, of federal and state special-status wildlife species including threatened and endangered species that could potentially occur at the Joint Water Pollution Control Plant at Carson, California. The draft EIR document identified additional federally listed species that was not included in the Service's November 16, 1994 list. These lists need to be carefully reviewed for species that could occur in the project area. Where recent surveys for a species of concern are not available, the Service recommends a qualified biologist be hired to conduct appropriate surveys to determine the presence or absence of the species in question. 1-1

One state and federal listed endangered species that was identified in the EIR document that may be affected by the project was the least Bell's vireo (Vireo bellii pusillus). The least Bell's vireo (vireo) may be affected by the proposed expansion of the Whitter Narrows Water Reclamation Plant (WRP). This impact would occur with the destruction of 1 to 1.5 acres of riparian scrub habitat associated with the construction of the proposed primary sediment tanks, wet well, pump station and fill placed for a roadway. Chapter 11 "Botanical and Wildlife Resources", page 16 identifies the riparian habitat at the Whitter Narrows WRP as "potential breeding habitat for the least Bell's vireo". In addition to the loss of suitable breeding habitat for the vireo, a proposed roadway fill would impact an undisclosed acreage of ruderal vegetation that has mulefat and arroyo willow vegetation that may provide suitable foraging habitat for this species. Vireo surveys should be regularly conducted between April 1 to July 31 by a qualified biologist familiar with the vocalizations of this species. 1-2

The proposed replacement of this riparian loss at a 2:1 ratio (i.e., 2 acres of riparian habitat would be restored for each acre removed) would be unacceptable given the riparian vegetation being destroyed is of sufficient quality to be classified as potential breeding habitat for the vireo. At a minimum this habitat loss should be replaced at a 3:1 ratio and if surveys determine that this habitat is occupied by a nesting vireo then the loss of riparian habitat should be compensated at a 5:1 ratio. The replacement of riparian habitat impacted should be identified in a specific mitigation plan approved by the Service prior to applying for a Corps of Engineers permit that would alter or destroy this wetland habitat. This mitigation plan should include, at a minimum: (a) the location of the mitigation site, (b) the number, size, and species of plants that would be used in the revegetation effort, (c) a schematic layout depicting the arrangement of the plants within the compensation area, (d) time of year that the planting would occur, (e) identification of the elevation of the groundwater level at the compensation area and if irrigation is proposed to be used, (f) an analysis of soil conditions at the mitigation site, (g) measures to be taken to control exotic vegetation at the site, (h) a detailed monitoring program that includes provisions for replanting areas where planted materials have not survived, and (i) identification of the agency responsible for guaranteeing the successful creation of the mitigation site and perpetual conservation of the restoration area. Mitigation plans should be prepared for project impacts not only to riparian forest and scrub habitats, but also freshwater marsh. 1-3

Other potential riparian habitat could be affected by the project is the excavation of soil and vegetation in the Whitter Narrows Flood Control Basin equal to the volume of floodplain lost with the proposed fill associated with proposed expansion of the Whitter Narrows WRP. Any riparian habitat impacted by the above identified excavation needs to be quantified. If the vegetation that would be impacted is suitable to be occupied by the vireo or the southwestern willow flycatcher (willow flycatcher), a state endangered species and a federally proposed endangered species the area impacted should be surveyed by a qualified biologist that is familiar with the identification and vocalization of these species. 1-4

With this proposed project there needs to be an examination of other practicable less damaging alternatives that can be employed to avoid the fill of wetland habitat. 1-4

Additional impacts to the vireo and other migratory songbirds could result from construction noise and the placement and operation of lights at the Joint Water Pollution Control Plant or at the Whitter Narrows and San Jose Creek Water Reclamation Plant sites. Noise levels from construction or plant operations must be at 60 decibels or below to avoid affects to migratory songbirds, such as, the vireo during the breeding season. Lights should be shielded or be low profile to ensure that they do not laminate riparian or freshwater marsh habitats. 1-5

In conjunction with plant operations next to freshwater marsh habitat, Chapter 11 "Botanical and Wildlife Resources", page 19 states that "In cooperation with the Los Angeles County Department of Public Works, the Districts propose to prepare a marshland management plant to improve irrigation to the marsh and to maintain the marsh. The plan would be implemented by 2004." The Service would like to receive a copy of the draft plan to review and provide comments on. In addition, the final EIR needs to identify measures that would be incorporated into the project avoid impacts associated with construction, lights and increased human activities at marsh adjacent to the Joint Water Pollution Control Plant at Carson. 1-6

Another subject of concern to the Service is the "biosolids management plan". Based on projections developed for the 2010 Plan, it is expected that 2,000 to 2,400 wet tons or 575 dry tons per day of biosolids will be produced in the Joint Outfall System. These biosolids must be disposed or reused. Those biosolids disposed must be placed in appropriate landfills. Landfills currently used include the Puente Hills Landfill; Kellogg Supply, Inc. and Pima Gro Systems in Thermal; Recyc, Inc. in Corona; and Ag Tech Company in Yuma, Arizona. Future sites that may be used include several land application sites in Kern and King Counties; Bolo Station Landfill in San Bernardino County; Eagle Mountain Landfill in Riverside County and Mesquite Regional Landfill in Imperial County. It was stated in Chapter 11 "Botanical and Wildlife Resources " that in the disposal of biosolids the Sanitation Districts would require contractors to demonstrate that wildlife and wildlife have been avoided or that impacts have been reduced to less-than-significant levels through preparation of site-specific environmental documents or compliance with federal, state and local regulations. Since the proposed project would directly result in the generation large quantity of biosolids on a daily basis the biological impacts associated with the proposed disposal of this waste must be simultaneously addressed as part of the Joint Outfall System 2010 Master Facilities Plan. This is an interrelated activity associated with project and has the potential to impact threatened and endangered species. This potential impact must be addressed as part of this planning effort. It is recommended that the existing capacity and projected life of these landfills be described in the final EIR prepared for the project. In addition, a list of threatened and endangered species that occur in the vicinity of each landfill site should be obtained and potential impacts to listed species from landfill 1-7

operations or expansion needs to be addressed. This analysis would provide a solid basis for selecting the least environmentally damaging alternative. 1-7

A final issue of concern is the subject of growth related impacts. Fifteen Sanitation Districts that are located in metropolitan Los Angeles County participate in the Joint Outfall Agreement which provides for combined investment in wastewater conveyance and treatment facilities. These 15 Districts are collectively known as the Joint Outfall Districts (JOD) and are located in the central Los Angeles Basin in the eastern and southern portions of Los Angeles County. The JOD extend south and west from the foothills of the San Gabriel Mountains to the Palos Verdes Peninsula and are bonded to the east by Orange and San Bernardino Counties, to the west by the Cities of Los Angeles and Glendale and Santa Monica Bay, and to the south by San Pedro Bay.

The JOD have constructed a regional, interconnected system of wastewater conveyance and treatment facilities, known as the Joint Outfall System (JOS). The JOS sewage treatment and disposal services for residential, commercial, and industrial users and presently includes six wastewater treatment plants with a combined capacity of approximately 576 mgd, more than 1,000 miles of main trunk sewers, and 48 pumping plants. The JOS service area encompasses 71 cities and unincorporated territory in the Los Angeles Basin and currently serves approximately 45 million people and treats approximately 480 mgd of wastewater.

The construction and expansion of Joint Water Pollution Control Plant at Carson and associated water reclamation plants would provide critical infrastructure necessary for continue growth in Los Angeles County. This growth will directly impact wildlife resources and habitat and will undoubtedly lead to the eventual listing additional state and federal threatened and endangered species. Addressing project impacts on a case-by-case basis is largely ineffective in dealing with bird and mammal populations that need large contiguous tracts of land if their populations are to persist within a region. 1-8 We recommend that this project, that encompasses 71 cities, be used as a focus point to initiate long range planning to identify key parcels of land that have high biological value and that can be purchased for the purpose of protecting fish and wildlife resources and open space. This type of planning effort is currently being done in San Diego, Orange, Riverside, and San Bernardino Counties with emphasis on the California gnatcatcher and Stephens' kangaroo rat. It is recommended that a similar planning effort be initiated for Los Angeles County as part of this overall project. 1-9

If you have any questions regarding this letter, please contact Marjorie Nelson or Martin Kenney. They can be reached at (619) 431-9440.

Sincerely,

Gail C. Kobetich
Field Supervisor

1-6-95-TA-098

1-1. Table 11-1 in the draft EIR, "Special-Status Plant Species Potentially Occurring at JOS Facilities Proposed for Expansion" and Table 11-2 in the draft EIR, "Special-Status Wildlife Species Potentially Occurring at JOS Facilities Proposed for Expansion", have been revised pursuant to conversations with U.S. Fish and Wildlife Service (USFWS) staff since release of the draft EIR. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR", for changes to these tables.

Section 7 of the Endangered Species Act requires a lead agency to consider the effects of the preferred alternative on endangered species (in this case, Alternative 1: Upgrade JWPCP/Expand Los Coyotes WRP/San Jose Creek WRP). For Section 7 compliance requirements, USFWS staff concluded that project boundaries would be focused on the JWPCP project element of the 2010 Plan because only the proposed modifications to the JWPCP are subject to State Revolving Fund ESA compliance (Nelson pers. comm.). The inland WRPs included in Alternative 1 (the Los Coyotes and San Jose Creek WRPs) were not considered further for Section 7 compliance because:

- proposed expansion areas for these WRPs do not support suitable habitat for special-status species,
- no records of special-status plant or wildlife occurrences were found in a search of the Natural Diversity Data Base, and
- no special-status plant or wildlife species were observed during site visits to these WRPs.

Upon further consideration of the JWPCP site, USFWS staff concluded that special-status species surveys need not be conducted and that a biological assessment need not be prepared for the JWPCP project element (U.S. Fish and Wildlife Service 1995). Furthermore, 2010 Plan project elements other than modifications to the JWPCP and certain specific biosolids management options are analyzed on a program level; project-specific effects of these elements on threatened and endangered species will be reexamined during subsequent environmental review.

1-2. Impacts associated with the Whittier Narrows WRP expansion were evaluated in the draft EIR on a program level. The mitigation measures proposed for this expansion are program-level measures and are not meant to replace subsequent project-specific mitigation. Furthermore, the Whittier Narrows WRP expansion is not part of the 2010 Plan recommended alternative and therefore is not part of the project the Districts plan to approve after certification of this EIR. If the Districts decided to expand the Whittier Narrows WRP in the future, all significant environmental impacts of the Whittier Narrows WRP expansion, including those related to breeding and foraging habitat for the least Bell's vireo, would be examined in detail. Surveys for the least Bell's vireo would be coordinated and conducted by a qualified biologist consistent with USFWS protocol for the species if expansion of this WRP were pursued by the Districts.

1-3. Mitigation Measure 11-3 on page 11-21 of the draft EIR states that <u>at least</u> 2 acres of riparian scrub habitat would be restored for each acre removed from the project (emphasis added). The Whittier Narrows WRP expansion, which is not part of the Districts' recommended alternative, is analyzed in the draft EIR on a program-level. Consequently, the proposed footprint of the proposed expansion could be modified in the future and any future proposals to expand the Whittier Narrows WRP would require subsequent environmental review separate from that analyzed in the draft EIR. Specific mitigation measures for this 2010 Plan element, including specific replacement ratios for the loss of riparian scrub and its value as breeding habitat for the least Bell's vireo, could not be refined until the Districts identified this expansion as a preferred project-specific alternative. If the Districts decide to pursue the Whittier Narrows expansion in the future, mitigation measures would be developed based on the results of surveys and consultation with the USFWS. The Districts have modified Mitigation Measure 11-3 to incorporate additional elements into the riparian habitat restoration plan requested by USFWS. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR", for modifications to Mitigation Measure 11-3.

1-4. The Districts plan to avoid riparian habitat or other habitat suitable for special-status species when they identify replacement sites for lost storage capacity in the Whittier Narrows Flood Control Basin from the import of fill to elevate the proposed Whittier Narrows WRP expansion. If the Districts decide to pursue this project, specific replacement sites would be identified at that time and if any habitat considered suitable for special-status species would be lost, the Districts would take appropriate actions to survey the affected areas and ensure that appropriate mitigation is adopted. No change to the draft EIR is required.

1-5. The JWPCP and the inland WRP areas currently experience traffic noise and several sources of light because of the existing treatment plant operations and adjacent land uses. Page 9-5 of the draft EIR indicates that the noise environment in the JWPCP area is currently dominated by traffic noise mostly associated with the elevated Harbor Freeway (I-110), which is adjacent to the JWPCP marsh. Existing noise levels near the JWPCP range from 62 to 64 dB. Additionally, the City of Carson general plan designates the JWPCP site as industrial and the City of Los Angeles general plan designates the JWPCP site as heavy industrial; both general plans identify expected ambient noise levels for such land use as 70 dB. Furthermore, Mitigation Measure 9-1 requires all construction contractors to implement noise-reducing construction practices.

Page 11-20 of the draft EIR identifies the potential for disturbance of wildlife at the riparian and marsh habitats from increased human activity associated with modifications to the JWPCP. The proposed project's effects on nearby wildlife was determined to be less than significant because the area is already surrounded on all sides by major light and noise sources, including the elevated Harbor Freeway (approximately 200 feet from the marsh), Sepulveda Boulevard, Figueroa Street, the Atchison-Topeka and Santa Fe Railroad (AT-SF), a strip shopping mall, and commercial bedding plant nurseries.

Construction- and operations-related noise impacts at the San Jose Creek and Whittier Narrows WRPs were determined to be less than significant in the draft EIR (see pages 9-16 through 9-19 in the draft EIR). No change to the draft EIR is required.

1-6. The Districts have revised Mitigation Measure 11-2, "Prepare and Implement a Marshland Management Plan", for the JWPCP marsh site to enhance the riparian forest and convert ruderal vegetation. USFWS' request to review the draft plan has been incorporated into the mitigation measure. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR", for modifications to Mitigation Measure 11-2.

As described above in response to Comment 1-5, page 11-20 of the draft EIR addresses the potential for disturbance of wildlife at the riparian and marsh habitats from increased human activity associated with the JWPCP modifications. Specifically, the area adjacent to the marsh is currently surrounded by a freeway to the west, the AT-SF to the south, and a commercial nursery to the north and east (see Figure 11-2 of the draft EIR). Because the current land uses surrounding the marsh site have already acclimated wildlife to human disturbance, it was determined that the proposed modifications would have a less-than-significant effect on the wildlife. Consequently, no mitigation is necessary. No change to the draft EIR is required.

1-7. USFWS identified five sites used by the Districts as "landfills", but most of these are reuse sites. The only landfill currently used by the Districts for biosolids disposal is the Puente Hills Landfill. Table 6-3 of the draft EIR listed the reuse contractors and sites:

- Kellogg Supply, Inc.,
- Recyc Inc.,
- Ag Tech Company, and
- Pima Gro Systems.

Since circulation of the draft EIR, some changes in the reuse sites have occurred. The Thermal composting site that served Kellogg Supply and Pima Gro has closed. Ag Tech has opened an additional land application site near Delano, California, that now receives some of the Districts' biosolids. The Districts also have initiated new land application contracts with the Yakima Company near Buttonwillow, California; McCarthy Family Farms near Corcoran, California; and one short-term contract with Bio Gro Systems near Blythe, California. The current distribution of biosolids reuse and disposal (disposal is only at the Puente Hills Landfill) is shown in Table 2-1.

Table 2-1. Current Distribution of Biosolids Disposal and Reuse (in wet tons per week)

Contractor/Site	Biosolids Delivered in January 1995	Maximum Contract Amount Allowed
Recyc Inc. (reuse)	0	1,000
Ag Tech Company (reuse)	1,346	2,000
Bio Gro Systems (reuse)	812	2,000
McCarthy Family Farms (reuse)	1,699	2,000
Yakima Company (reuse)	580	1,000
Puente Hills Landfill (disposal)	5,565	not applicable

The sites listed in Table 2-1 are not designated exclusively for Districts operations; many of them receive biosolids from other generators either now or will in the future. The Puente Hills Landfill receives primarily municipal refuse and the projected site life is expected to continue through 2013. The projected site life of any land application site is based on the metals concentrations of the applied biosolids and the application rate. Assuming a typical application rate of 7.5 tons per acre, Districts-generated biosolids could be applied to a site for more than 150 years. The permitted capacity and environmental documentation for the current sites are listed in Table 2-2.

Because both biosolids reuse technology and the availability of reuse sites are rapidly changing, the Districts are limited in their ability to select a range of alternative site locations proposed by private contractors. The three landfills identified in the draft EIR as potential future sites were established to develop travel routes and distances from the JWPCP for the transportation and air quality analyses. These landfill sites are not Districts facilities. They are in the planning stages and would be operated by private contractors. However, the Districts require contractors to demonstrate compliance with applicable local, state, and federal laws (including the Endangered Species Act) for biosolids end-use sites. The contractor must have an approved environmental document for each site before the Districts will consider its use. The lead agencies considering the environmental documentation would be required to address the environmental impacts of the sites and alternatives similar to the review

Table 2-2. Environmental Documentation for Existing Biosolids Disposal and Reuse Sites

Site	Permitted Capacity (wet tons per week)[a]	Environmental Documentation
Recyc Inc.	3,500	EIR (12/7/89); State Clearinghouse number 88100318
Ag Tech Company	7,600	Yuma: ND (1991) State Clearinghouse number 91051081 Kern: Mitigated ND (9/16/94) Resolution number 94-252, Central Valley RWQCB[c]
Bio Gro Systems	9,500	Mitigated ND (3/25/93) Bio Gro Sludge Management Plan for the County of Riverside; State Clearinghouse number 93022027 Mitigated ND (1990) Bio Gro Colorado Basin RWQCB; State Clearinghouse number 89031307 ND (1/28/91) Riverside County Ordinance Regulating Land Application of Sewage Sludge; State Clearinghouse number 91012065
McCarthy Family Farms	10,000	Mitigated ND (8/5/94) Resolution number 94-214, Central Valley RWQCB[c]
Yakima Company	800	Mitigated ND (1/27/95) Resolution number 95-011, Central Valley RWQCB[c]
Puente Hills Landfill	12,000[b]	EIR (3/23/94); State Clearinghouse number 91121070

Note: ND = Negative Declaration.

[a] Assumes 25% total solids and an application rate of 7.5 dry tons/acre on the permitted acreage for land application sites.

[b] 72,000 wet tons per week capacity and a minimum of 5 parts refuse to 1 part biosolids.

[c] Waste discharge requirements for site require a preapplication report that includes a species survey by a qualified biologist.

process established by existing contractors, including the effect of the development on threatened and endangered species. The Districts would not consider use of any sites until the sites were fully permitted. Additionally, page 14-11 of the draft EIR states that disposal of the Districts' biosolids in landfills would contribute to less than 1% of existing landfill space. No change to the draft EIR is required.

1-8. In Chapter 17 of the draft EIR, "Cumulative, Growth-Inducing, and Growth-Related Impacts", the Districts have acknowledged that the 2010 Plan can be seen as removing an obstacle to growth in the JOS service area and that under a strict CEQA definition of growth inducement, the 2010 Plan can be considered growth inducing, even though the plan is not an important factor affecting regional economic and population growth. Several factors affect the magnitude, timing, and type of economic and population growth, and include local government planning, economic climate, quality of life, and availability of public services and natural resources. Chapter 17 of the draft EIR identifies those impacts related specifically to growth inducement. Page 17-13 specifically identifies the loss of special-status wildlife species habitat and at-risk biological communities as growth-related impacts associated with the 2010 Plan. The mitigation measure proposed for this impact calls for the preservation of special-status species habitat and at-risk habitat by implementing local and SCAG RCP policies, which would reduce the impact to less than significant. Furthermore, SCAG concurred with this conclusion in its comment letter on the draft EIR (see Comment 12-4 in Letter 12 of the final EIR). No change to the draft EIR is required.

1-9. The Districts recognize the need for efforts to conserve and enhance large contiguous tracts of land with high biological value. The Districts, however, do not have the authority to take the lead in planning efforts for habitat conservation. Figure 11-1 of the draft EIR identifies areas in the JOS service area and the greater Los Angeles County supporting natural habitats. Plans currently underway to preserve these natural areas include the Palos Verdes Peninsula Natural Communities Conservation Plan, which encompasses 1,500 acres, and the Ocean Trails Habitat Conservation Plan, which encompasses approximately 170 acres. Additional conservation efforts include those of the Palos Verdes Peninsula Land Conservancy and those at the Puente Hills Landfill. The Palos Verdes Peninsula Land Conservancy has created two preserves in Los Angeles County: 20 acres in Lunada Canyon and 28.5 acres in the City of Rolling Hills Estates. The Palos Verdes Peninsula Land Conservancy plans to acquire 900 acres for the proposed Portuguese Bend Nature Preserve in Los Angeles County. Conservation efforts at the Puente Hills Landfill include preservation and enhancement of approximately 230 acres of natural habitat, planting of over 1,700 trees grown from coast live oak acorns gathered onsite, and creation of the Puente Hills Landfill Native Habitat Preservation Authority, which will be funded by as much as $75 million from the landfill operation.

Letter 2

STATE OF CALIFORNIA PETE WILSON, Governor

GOVERNOR'S OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET
SACRAMENTO, CA 95814

January 3, 1995

GARY YOSHIDA
COUNTY SANITATION DISTRICTS, LOS ANGELES
1955 WORKMAN MILL ROAD
WHITTIER, CA 90601

Subject: JOINT OUTFALL SYSTEM 2010 MSATER FACILITIES PLAN SCH #: 94021011

Dear GARY YOSHIDA:

The State Clearinghouse submitted the above named environmental document to selected state agencies for review. The review period is closed and none of the state agencies have comments. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. 2-1

Please call Mark Goss at (916) 445-0613 if you have any questions regarding the environmental review process. When contacting the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.

Sincerely,

Michael Chiriatti, Jr.
Chief, State Clearinghouse

Appendix C

Notice of Completion

SCH # 94021011

Project Title: JOINT OUTFALL SYSTEM 2010 MASTER FACILITIES PLAN
Lead Agency: COUNTY SANITATION DISTRICTS OF LA COUNTY Contact Person: GARY YOSHIDA
Street Address: 1955 WORKMAN MILL ROAD Phone: 310-699-7411
City: WHITTIER Zip: 90601 County: LOS ANGELES

Project Location

County: LOS ANGELES City/Nearest Community: VARIES (72 CITIES & UNINCORPORATED)
Cross Streets: NA Zip Code: VARIES Total Acres: NA
Assessor's Parcel No. NA
Within 2 Miles: State Hwy #: I-110, I-605, SR-90 Waterways: SAN GABRIEL RIVER, RIO HONDO, PACIFIC OCEAN
Railways: ATCHISON TOPEKA, SANTA FE Schools: VARIES

Document Type

Local Action Type

Development Type

Project Issues Discussed in Document

Present Land Use/Zoning/General Plan Use

VARIES

Project Description: THE COUNTY SANITATION DISTRICTS OF L.A. COUNTY HAVE PREPARED A DRAFT FACILITIES PLAN (2010 PLAN) FOR THE JOINT OUTFALL SYSTEM TO ADDRESS LONG-TERM WASTEWATER MANAGEMENT NEEDS THROUGH 2010. THE PLAN INVOLVES UPGRADING THE JOINT WATER POLLUTION CONTROL PLANT IN CARSON TO FULL SECONDARY TREATMENT AND A COMBINATION OF EXPANSIONS OF WATER RECLAMATION PLANTS. THE PLAN ADDRESSES WASTEWATER TREATMENT, REUSE, AND DISPOSAL SERVICES.

CLEARINGHOUSE CONTACT: Mark Goss
(916) 445-0613

STATE REVIEW BEGAN: 11-17-94
DEPT REV TO AGENCY: 12-27
AGENCY REV TO SCH : 12-30
SCH COMPLIANCE : 1-3

PLEASE NOTE SCH NUMBER ON ALL COMMENTS

PLEASE FORWARD LATE COMMENTS DIRECTLY TO THE LEAD AGENCY ONLY

AQMD/APCD: 33 (Resources: 11/17)

CNT SNT
Resources
Boating
Coastal Comm
Coastal Consv
Colorado Rvr Bd
3 Conservation
3 Fish & Game 5
3 Forestry
3 Parks & Rec/OHP
Reclamation
BCDC
3 DWR
Bus Transp Hous
Aeronautics
CHP
3 Caltrans # 7
Trans Planning
Housing & Devel
Health & Welfare
Drinking H20
Medical Waste

CNT SNT
State/Consumer Svcs
General Services
OLA (Schools)
Cal/EPA
3 ARB
3 CA Waste Mgmt Bd
3 SWRCB:--Grants
SWRCB:--Delta
SWRCB:--Wtr Quality
SWRCB:--Wtr Rights
3 Reg. WQCB # 4
DTSC/CTC
Yth/Adlt Corrections
Corrections
Independent Comm
Energy Comm
NAHC
3 PUC
Santa Mn Mtns
State Lands Comm
Tahoe Rgl Plan
Other:

2-1. The Districts considered and responded to all written comments received.

Letter 3

STATE OF CALIFORNIA PETE WILSON, *Governor*

GOVERNOR'S OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET
\CRAMENTO, CA 95814

January 12, 1995

GARY YOSHIDA
COUNTY SANITATION DISTRICTS, LOS ANGELES
1955 WORKMAN MILL ROAD
WHITTIER, CA 90601

Subject: JOINT OUTFALL SYSTEM 2010 MSATER FACILITIES PLAN SCH #: 94021011

Dear GARY YOSHIDA:

The enclosed comments on your draft environmental documents were received by the State Clearinghouse after the end of the state review period. We are forwarding these comments to you because they provide information or raise issues which may assist you in project review. 3-1

Lead agencies are not required to respond to late comments. However, you may wish to incorporate these additional comments into the preparation of your final environmental document.

Please contact Mark Goss at (916) 445-0613 if you have any questions concerning the review process. When you contact the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.

Sincerely,

Michael Chiriatti, Jr.
Chief, State Clearinghouse

Enclosures
cc: Resources Agency

3-1. The comment letter prepared by the California Department of Transportation was sent directly to the Districts and is not considered late. However, the Districts have responded to all comments received on the 2010 Plan and the draft EIR after the close of the comment period.

Letter 4

State of California

Business, Transportation and Housing Agency

Memorandum

To : Mr. Mark Goss
State Clearinghouse
1400 Tenth Street, Room 121
Sacramento, CA 95814

Date : January 6, 1995

File No.: IGR/CEQA/DEIR
County of Los Angeles
JOINT OUTFALL SYSTEM
2010 MASTER FACILITIES
PLAN

Vic. LA-1, 60, 110,
605-Various

From : Wilford Melton -District 7
DEPARTMENT OF TRANSPORTATION

Subject: Project Review Comments

SCH No.94021011

Caltrans has reviewed the above-referenced Joint Outfall System 2010 Master Facilities Plan. Based on the information received, and in addition to our previous comments made on February 25, 1994, we are not satisfied with the document's traffic analysis.

We would like to see an Intersection Capacity Utilization (ICU) analysis for the intersection of Pacific Coast Highway (SR-1) and Figueroa Street similar to that done for Sepulveda Boulevard and Figueroa Street. 4-1

Any transport of hazardous waste or heavy construction equipment which requires the use of oversize transport vehicles on State Freeways/Highways will require a Caltrans transportation permit. 4-2 We recommend that large size trucks that are transporting construction materials, equipment, and exporting contaminated soil be limited to off-peak commute periods. 4-3

The applicant shall comply with all applicable hazardous waste safety measures when transporting materials from the sites. 4-4

If you have any questions regarding this response, please call me at (213) 897-1338.

Wilford Melton

WILFORD MELTON
Senior Transportation Planner
IGR/CEQA Coordinator
Office of Advance Planning

RECEIVED
JAN 11 1995
STATE CLEARINGHOUSE

cc: Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400
Attention: Gary Yoshida

4-1. In response to this comment, a level of service (LOS) analysis was conducted for the Pacific Coast Highway or State Route 1 (SR 1)/Figueroa Street intersection for the morning and evening peak hours during the period when construction activities generate the most traffic. The Intersection Capacity Utilization (ICU) methodology was used for this analysis.

Existing morning and evening peak-hour turning movement counts were conducted at the SR 1/Figueroa Street intersection in February 1995. Figure 7-6, which has been added to the final EIR (see Chapter 3), shows the existing turning movement volumes at this intersection. Results of the ICU analysis are shown in Table 7-4a (see Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR"). Results indicate that this intersection is currently operating at LOS F during the morning peak hour and at LOS E during the evening peak hour.

The number of construction employees at the JWPCP will be highest between July 1999 and June 2002 when several contracts overlap. During this period, an average of about 255 construction employees would be present at the JWPCP site. Table 7-3 in the draft EIR presents a summary of the construction trip generation analysis for the JWPCP construction activities.

To account for the background traffic growth that may occur at the SR 1/Figueroa Street intersection by 2002, a growth rate was applied to the existing traffic volumes. Because the trends show that the traffic volumes on SR 1 in the vicinity of Figueroa Street have declined in the last few years (California Department of Transportation 1990 and 1993), a growth rate of 1% per year was applied to the 1995 traffic volumes to project the 2002 volumes.

Figure 7-6 shows the projected 2002 turning movement volumes at the SR 1/Figueroa Street intersection and Table 7-4a shows the results of the ICU analysis for this intersection. The increase in morning and evening traffic volumes caused by construction employees would not increase above the threshold of significance established by the Congestion Management Program for Los Angeles County (Los Angeles County Metropolitan Transportation Authority 1993). Therefore, this impact is considered less than significant. The draft EIR is hereby changed to incorporate the discussion of this less-than-significant impact. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

It should be noted that the capacity analyses performed in the draft EIR reflect a higher number of employees than are considered here. Since the capacity analysis was performed for the draft EIR, changes have been made to the construction schedule and, consequently, the number of construction employees needed for the project has decreased. The analysis provided in the final EIR reflects the updated data, while the analysis in the draft EIR reflects a more conservative scenario.

4-2, 4-3. Oversize vehicles used to transport equipment or materials to the proposed project site will include multiple-axle tractor trailers transporting large processing equipment including pumps, compressors, tanks, engines, separation towers, and materials such as structural steel members. Oversize vehicles could also transport large and heavy construction equipment such as cranes, tracked excavators, and bulldozers. The construction contracts will restrict use of these transport vehicles to off-peak hours. Contractors transporting equipment or hazardous waste materials to the project site via state freeways or highways would be required to obtain transportation permits from Caltrans. No change to the draft EIR is required.

4-4. Shipment of hazardous materials or waste to or from the Districts' facilities will be performed by licensed private contract haulers who comply with applicable federal and state regulations regarding equipment certification, personnel training, and documentation. These regulations are enforced by the California Highway Patrol. Bulk shipments and storage are arranged whenever possible to minimize the number of trips required.

Because of the JWPCP's proximity to the Sepulveda Boulevard off-ramp from the Harbor Freeway (I-110), truck transport of chemicals and other hazardous materials to and from the JWPCP is generally via I-110. Vehicles exit I-110 at Sepulveda Boulevard, travel east to Figueroa Street and south to the JWPCP. Additionally, the AT-SF Railroad has sidings at the JWPCP for material transported by railcar. No change to the draft EIR is required.

Letter 5

STATE OF CALIFORNIA - CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
PETE WILSON, Governor

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF CLEAN WATER PROGRAMS
2014 T STREET, SUITE 130
P.O. BOX 944212
SACRAMENTO, CA 94244-2120
(916) 227-4525
(916) 227-4595 FAX

JAN 17 1995

Mr. Gary K. Yoshida
Division Engineer
Planning and Property Management
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400

Dear Mr. Yoshida:

REVIEW OF ENVIRONMENTAL IMPACT REPORT (EIR): COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY, JOINT OUTFALL SYSTEM 2010 MASTER FACILITIES PLAN, STATE CLEARINGHOUSE NO. 94021011, STATE REVOLVING FUND (SRF) LOAN NO. 4001-220, FINAL INCREMENT SECONDARY TREATMENT

Thank for the opportunity to review the above-referenced document. The EIR is adequate for our purposes and we have no comments. 5-1

We look forward to continuing to work with you and the U.S. Environmental Protection Agency to coordinate SRF loan program requirements with National Environmental Policy Act reviews necessary because of the 1994 special appropriation from Congress for this project. We hope this coordinated effort will eliminate redundant work for you whenever it is possible to do so.

As part of the SRF review process, on November 18, 1994, we circulated the draft EIR to agencies responsible for implementing federal environmental laws and regulations. The time has passed for comments and only the U.S. Fish and Wildlife Service (Service) has responded. The Service has requested, and we have granted, a time extension to January 26, 1995.

On December 6, 1994, we received concurrence from the State Historic Preservation Office on our Determination of No Effect for this project. 5-2

If you have any questions, please feel free to contact me at (916) 227-4525.

Sincerely,

Christine Bailey

Christine Bailey
Environmental Services Unit

cc: State Clearinghouse
1400 Ninth Street
Sacramento, CA 95814

Los Angeles Regional Water Quality Control Board
101 Centre Plaza Drive
Monterey Park, CA 91754-2156

Ms. Elizabeth Borowiec
U.S. EPA, Water Management Division
75 Hawthorne Street
San Francisco, CA 94105-3901

Al Herson/Maggie Townsley
Jones & Stokes
2600 V Street, Suite 100
Sacramento, CA 95818-1914

5-1. The SWRCB's review and concurrence with the contents of the draft EIR are hereby noted.

5-2. Concurrence from the State Historic Preservation Office on the Determination of No Effect for this project is hereby noted.

Letter 6

COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION

Rodney E. Cooper, Director

December 5, 1994

Mr. Charles W. Carry
Chief Engineer & General Manager
SANITATION DISTRICTS
County of Los Angeles
1955 Workman Mill Road
Whittier, CA 90601-1400

Attention: Mr. Gary Yoshida

Dear Mr. Carry:

**DRAFT PROGRAM ENVIRONMENTAL IMPACT REPORT
FOR THE JOINT OUTFALL SYSTEM
2010 MASTER FACILITIES PLAN**

Thank you for the opportunity to review and comment on the Draft Joint Outfall System 2010 Master Facilities Plan/Program EIR. The Draft 2010 Plan thoroughly addresses long term waste water treatment, use of reclaimed water and disposal needs for the County through the year 2010. The Department has prioritized the use of reclaimed water at selected facilities and anticipates future expansion of it's use of reclaimed water.

The Program Alternatives 3 and 4 respectively, would impact the Whittier Narrows Recreational Area, which is leased by the Department from the Army Corps of Engineers. This impact would consist of the loss of riparian scrub and forest habitat which provides potential breeding habitat for the least Bell's vireo. The least Bell's vireo is classified as an endangered species according to both state and federal Endangered Species Acts.

The document also states that, "impacts can be mitigated to a less than significant level, by restoring riparian scrub and forest habitats" (Page ES 8 of the Executive Summary). This potential loss of habitat would result from construction activity for the Whittier Narrows Water Reclamation Area expansion fill roadway and the alignment of an approximately 2 mile long trunk sewer system, south of the proposed expansion area. 6-1

Executive Offices • 433 South Vermont Avenue • Los Angeles, CA 90020-1975 • (213) 738-2961

As indicated by a discussion with Mr. Sagar Raksit of your staff, Alternatives 3 and 4 are only conceptual program plans and are not the recommended or preferred program alternatives. 6-2

Potential impacts to County facilities cannot be assessed until an alignment for the trunk sewer system has been determined. 6-3

If you have any questions regarding this matter, please contact Frank Moreno, Jr. at (213) 738-2972.

Sincerely,

Joan Rupert

Joan A. Rupert
Departmental Facilities Planner II

cab2:1105jr1

6-1. The alignments of proposed sewer projects identified in the 2010 Plan, including the alignment for a 2-mile-long trunk sewer proposed under Alternative 4, cannot be accurately defined at this time. Therefore, the environmental impact analysis conducted in the draft EIR was on a program level. However, the Districts typically locate sewers in existing public rights-of-way to minimize disruption of access, services, and utilities to private property and to reduce other impacts. If the Districts decide to construct this sewer, the Districts will consider alignment options and evaluate each alignment based on cost and potential impacts. As stated on page 11-20 of the draft EIR, constructing the proposed sewer would not result in the loss of sensitive biological communities because the Districts plan to avoid such communities. No change to the draft EIR is required.

6-2. The draft EIR identifies the recommended alternative as "Alternative 1: Upgrade JWPCP/Expand Los Coyotes WRP/San Jose Creek WRP". Modifications to the Whittier Narrows WRP are not proposed under the recommended alternative. If the Districts were to consider expansion of the Whittier Narrows WRP at a future date, they would need to evaluate the environmental impacts on the project level under a separate environmental review process.

6-3. Several potential impacts related to sewer relief are identified in the draft EIR. The impacts were determined to be less than significant based on standard construction practices implemented by the Districts and the location of sewer alignments along existing roadways and paved areas. Also, see response to Comment 6-1.

Letter 7

City of El Segundo

DEPARTMENT OF PLANNING
AND BUILDING SAFETY

• City Hall • 350 Main Street • El Segundo, California 90245-0989
• (310) 322-4670 • FAX: (310) 322-4167

HYRUM B. FEDJE
Director

December 21, 1994

Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400
Attention: Gary Yoshida

Re: Draft Program Environmental Impact Report (EIR) for the Joint Outfall System 2010 Master Facilities Plan

Dear Mr. Carry:

The City of El Segundo has reviewed the Draft Program Environmental Impact Report (EIR) for the Joint Outfall System 2010 Master Facilities Plan. The City appreciates the opportunity to comment on the project and would like to submit the following comments to be incorporated into the Final EIR to allow for a more accurate assessment of the project's impacts:

1.) The area east of Sepulveda Boulevard in El Segundo is served by the LACSD. The service charge and the connection fee for the properties in this area will be increased (pages 2 - 8) to finance the program. Although the actual fee increase is not known at this time, the City is concerned about the economic impact that the increase may have on businesses in El Segundo. 7-1

2.) The construction activities to implement the program should indicate the impacts for the "maintenance of facilities including roads" under the Public Facilities Section of the Table 3 checklist (pages 3 - 17). The document currently indicates no impact. 7-2

Again, thank you for the opportunity to comment. We look forward to receiving the Final EIR. If you have any questions, please contact Jean Baaden at (310) 322-4670, Ext. 402 or any other Planning Division staff member.

Sincerely,

Hyrum B. Fedje
Director of Planning
and Building Safety

cc: Jim Morrison, City Manager
EIR Response File

7-1. Project financing is discussed in Section 7.5 of the 2010 Plan. As indicated in that section, different elements of the 2010 Plan will be funded through separate financial programs: service charge and connection fee programs. Existing users of the sewerage system will fund the upgrade elements of the recommended alternative (Alternative 1) through their annual service (user) charges. Section 7.5 provides a more detailed analysis of the impact on the service charge rates.

New users will finance the expansion elements of the 2010 Plan through payment of connection fees. Under the existing Master Connection Fee Ordinance, connection fee rates are based on the next anticipated configuration of an expanded treatment plant. Because this anticipated configuration is already assumed to be a tertiary-level inland WRP with full associated downstream solids-handling facilities, the recommended alternative would have no effect on the connection fee rates for businesses in the City of El Segundo. No change to the draft EIR is required.

7-2. Page 3 of 5 in Table 3 of the notice of preparation (NOP) for the EIR (dated February 3, 1994) was developed by the Districts to identify potential impacts associated with the 2010 Plan. As stated in the NOP, the identification of the potential impacts did not necessarily mean that the impact would occur, only that there was potential for the impact to occur. In the draft EIR, the Districts identified several construction-related impacts on roadways; where impacts were found to be significant, the Districts proposed mitigation to reduce the impacts to less-than-significant levels. Chapter 7 of the draft EIR identifies increased traffic on existing roadways, alteration of current vehicle circulation, and increases in traffic hazards from construction activities.

Mitigation measures proposed in the draft EIR for air quality impacts resulting from construction at the JWPCP also address concerns related to the maintenance of roads. Specifically, the Districts propose to water active sites at least twice daily, pave the first 100 feet of all unpaved, heavily traveled construction roads on the site and sweep streets at the end of the day with water sweepers if visible soil is carried onto adjacent public roads. No change to the draft EIR is required.

Letter 8

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294

(213) 881-2481

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

December 21, 1994

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400

Attention Gary Yoshida

Dear Mr. Carry:

SUBJECT: DRAFT ENVIRONMENTAL IMPACT REPORT -- JOINT OUTFALL SYSTEM 2010 MASTER FACILITIES PLAN, SCH #94021011

There is a factual error in the Fire Protection - Local Setting Section in Chapter 14. The first Paragraph on Pages 14-7 states that Stations #87 and #90 can supply three engines to the San Jose Creek WRP. Please note that these stations have only one engine company each. 8-1

FORESTRY DIVISION

We have reviewed the Draft Environmental Impact Report for the Joint Outfall System 2010 Master Facilities Plan located at the County Sanitation Districts of Los Angeles County.

The areas germane to the statutory responsibilities of the Forestry Division have been addressed.

If you have any additional questions, please contact this office at the phone number shown above.

Very truly yours,

Michael A. Ullberson for

PAUL H. RIPPENS, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

PHR:jmb

8-1. The draft EIR is hereby changed to state that stations #87 and #90 can each supply one engine to the San Jose Creek WRP. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

Letter 9

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (818) 458-5100

HARRY W. STONE, Director

ADDRESS ALL CORRESPONDENCE TO
P O BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

February 13, 1995

IN REPLY PLEASE REFER TO FILE H-2

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400

Attention Mr. Gary Yoshida

Dear Mr. Carry:

JOS 2010 MASTER FACILITIES PLAN

We have reviewed the draft Joint Outfall System 2010 Master Facilities Plan and Environmental Impact Report and have the following comments:

<u>JOS Draft Plan</u>

1. Page 2-8, last paragraph - The entire reach of Rio Hondo Channel downstream of Whittier Narrows Dam is lined with concrete. 9-1

2. Page 2-21, last paragraph 9-2

   a. Rio Hondo Coastal Basin Spreading Grounds is operated and owned by the Los Angeles County Department of Public Works (LACDPW).

   b. San Gabriel Coastal Basin Spreading Grounds is operated by the LACDPW. However, it is only partially owned by us. We have a long-term lease for the grounds. The operation and maintenance of the river was transferred to us on April 29, 1969 by the U.S. Army Corps of Engineers.

   c. Both spreading grounds are operated on a battery cycle. The time it takes to fill a battery is dependent upon the inflow, size of the battery, and the percolation rate.

   d. The water is switched to another battery to disrupt the breeding cycle of vectors and to allow the battery to rejuvenate and restore the percolation rate.

   e. San Gabriel Coastal Basin Spreading Grounds has an inflow capacity of 350 cfs (226 mgd) and Rio Hondo Coastal Basin Spreading Grounds has an intake capacity of 2,000 cfs (1293 mgd). 9-2

3. Page 3-1, Table 3.1-1 - Waste Discharge and water reuse permits expired in August 1994 for Long Beach, Los Coyotes, Whittier Narrows, and Pomona Water Reclamation Plants (WRP); the permits for the San Jose Creek WRP expired in March 1994. Have these permits been renewed or extended? If so, the JOS Plan should state the new expiration date(s). 9-3

4. Page 3-11, last paragraph - The official name for San Gabriel Spreading Grounds is San Gabriel Coastal Basin Spreading Grounds. This facility consists of two batteries: a) the off-channel spreading grounds and b) the river basins. 9-4

5. Figure 4.1-2 9-5

   a. Water from SJCWRP can be spread at either Rio Hondo or San Gabriel Coastal Basin Spreading Grounds.

   b. Likewise, for water from WNWRP.

   c. Reimbursement for the reclaimed water is made by the Water Replenishment District (WRD) but the water is spread by the LACDPW.

6. Page 4-4, third paragraph - The WRD does not spread the water. The water is spread at LACDPW groundwater recharge facilities. We operate the facility, control the inflow, and determine where the water is spread. 9-6

7. Page 4-6, last paragraph - Same comments as noted in Item No. 6. 9-7

8. Page 5-40, third paragraph - Revise the title WRD of Southern California to LACDPW. 9-8

9. Page 5-49 - Same comment as noted in Item No. 8. 9-9

10. Page 5-54, third paragraph - The Main San Gabriel Basin includes the following LACDPW groundwater recharge facilities: 9-10

a.	Ben Lomond S.G.	e.	Irwindale S.B./Manning Pit
b.	Buena Vista S.B.	f.	Peck Road Water Conservation Park
c.	Citrus S.G.	g.	Walnut S.B.
d.	Eaton S.B.	h.	Santa Fe S.G.

The only facility capable of replenishing 28,000 AF is Santa Fe Spreading Grounds. 9-10

11. Page 5-55, second paragraph - This paragraph discusses the work that WRD initiated but the facilities are operated by the LACDPW. 9-11

12. Page 6-102, third paragraph - Typographical error; VSS, not VVS should be used for volatile suspended solids. 9-12

Draft EIR

1. Page 3-4, third paragraph

   a. The Rio Hondo Channel originates from the spillway of Peck Road Water Conservation Park.

   b. Flow data for the Rio Hondo Channel is available from Gaging Station Nos. F192B-R, F64-R, and F45B-R. Gaging Station F45B-R is the last station on the Rio Hondo Channel before the confluence with the Los Angeles River.

   c. Flow data for the Los Angeles River is available from Gaging Station Nos. F300-R, F285-R, F57C-R, F34D-R, and F319-R. Station F319-R is the last gaging station on the Los Angeles River before it discharges to the Pacific Ocean. 9-13

   d. The above-noted gaging station data is available to the public and can be obtained at the LACDPW's public counter in Hydraulic/Water Conservation Division or by contacting Mr. George Farag of that Division at (818) 458-6112. In addition, the U.S. Army Corps of Engineers also has gaging stations on the Rio Hondo Channel and Los Angeles River.

2. Page 3-10, second paragraph

   a. Rio Hondo Coastal Basin Spreading Grounds has 430 acres of wetted area.

   b. San Gabriel Coastal Basin Spreading Grounds has a total of 252 acres of wetted area, 96 acres in the off-channel spreading grounds, and 156 acres in the river basins. 9-14

   c. Remove the parenthetical documentation "(County Sanitation Districts of Los Angeles City, 1992b)."

3. Page 3-10, third paragraph - Please refer to our Comment No. 2 under JOS Draft Plan on page 2 of this letter. 9-15

4. Page 3-24, first paragraph - Use either Los Angeles County Flood Control District or LACDPW not DPW Flood Control Division. 9-16

Please contact Mr. Cung Nguyen at (818) 458-6302 if you have any questions or if we may be of assistance.

Very truly yours,

HARRY W. STONE
Director of Public Works

Robert D. Pedigo

ROBERT D. PEDIGO
Hydraulic/Water Conservation Division

CTN:adg
JOSPLN

Response to Comments on the Draft 2010 Plan

9-1. Change made to Section 2.1.3, page 2-8, final paragraph.

9-2. Changes made to Section 2.2.4, page 2-21, Central Groundwater Basin subsection.

9-3. The permits for these plants have been extended until the Regional Water Quality Control Board considers the applications for their renewal, which have been submitted by the Districts. No change to the Draft 2010 Plan is required.

9-4. Changes made to Section 3.1.2, page 3-11, final paragraph.

9-5. Comment noted. At both sites, the reclaimed water is purchased by the Water Replenishment District and recharged in facilities operated by the Los Angeles County Department of Public Works. No change to the Draft 2010 Plan is required.

9-6. Changes made to Section 4.1.1, page 4-4, third paragraph.

9-7. Changes made to Section 4.1.1, page 4-6, last paragraph.

9-8. Change made to Section 5.5.2, page 5-40, title has been revised to read: "San Gabriel Coastal Basin Spreading Grounds/Rio Hondo Coastal Basin Spreading Grounds."

9-9. Change made to Section 5.5.2, page 5-49, title has been revised to read: "San Gabriel Coastal Basin Spreading Grounds/Rio Hondo Coastal Basin Spreading Grounds."

9-10. Comment noted. The proposed recharge would occur at the Santa Fe Spreading Grounds. No change to the Draft 2010 Plan is required.

9-11. Comment noted. No change to the Draft 2010 Plan is required.

9-12. Change made to Section 6.13.1, page 6-102, third paragraph.

Response to Comments on the Draft EIR

9-13. The draft EIR is hereby changed to reflect these corrections. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

9-14. The draft EIR is hereby changed to reflect these corrections. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

9-15. The draft EIR is hereby changed to reflect these corrections. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

9-16. The draft EIR is hereby changed to reflect these corrections. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

Letter 10

CITY OF CERRITOS

CIVIC CENTER • 18125 BLOOMFIELD AVENUE • P.O. BOX 3130
CERRITOS, CALIFORNIA 90703-3130 • FAX: (310) 865-7277
PHONE: (310) 860-0311 • (714) 523-3710

January 3, 1995

Mr. Charles W. Carry
Chief Engineer and
General Manager
County Sanitation Districts
of Los Angeles County
1955 Workman Mill Road
Whittier, CA. 90601-1400

Dear Mr. Carry:

RE: REVIEW OF THE DRAFT OUTFALL SYSTEM 2010 MASTER FACILITIES PLAN AND THE DRAFT ENVIRONMENTAL IMPACT REPORT

Thank you for your letter dated November 14, 1994, requesting that the City of Cerritos review and comment on the draft Outfall System 2010 Master Facilities Plan, and the draft Environmental Impact Report. We recognize that your staff is reviewing various alternatives designed to meet the wastewater management needs of the District's Joint Outfall System (JOS).

We have reviewed the four proposed alternatives which are outlined in the plan. The City is primarily concerned with any modifications proposed at the Los Coyotes Plant in Cerritos because the City-owned and operated Iron-wood Golf course and driving range may be impacted. 10-1

Upon reviewing the four alternatives, the City prefers Alternative #3 which involves no modifications to the Los Coyotes Plant as our first choice. The City's next preference is Alternative #1 which involves increasing the capacity of the Los Coyotes Plant from 37.5 mgd to 50 mgd. However, this expansion will be to the south of the existing driving range and will not impact any existing City facilities. Alternatives #2 and #4 are the least desirable options to us. 10-2

Should the District select Alternative #1 as its primary choice, the City would request that the District provide a Traffic Management Plan which would include the storage of on-site material and equipment, mitigation of any vehicular/pedestrian circulation and noise concerns, and a landscaping plan which would address aesthetic concerns. 10-3 The City would strongly oppose Alternatives #2 and #4 if they were selected because of their substantial impact on the City's recreational facility. 10-4

We are requesting that your office keep us informed relative to any final decisions which may develop regarding this matter. 10-5 If you have any questions or desire any additional information from my office, please feel free to contact Ron Babel, Water Superintendent at (310) 860-0311, Ext. 245 at your convenience.

Sincerely,

Vince Brar
Director of Public Works

10-1. As explained on page 12-7 of the draft EIR, the land on which the Ironwood Golf Course and Driving Range is located is owned by the Districts and has been leased to the City of Cerritos since 1975. The lease agreement allowed the City to develop the property for open space landscaping and park and recreational uses until the land would be required for wastewater treatment plant expansion. All proposed modifications to the Los Coyotes WRP would occur on Districts-owned land. It should be noted, however, that the proposed modifications to the Los Coyotes WRP under the Districts' recommended alternative (Alternative 1) would not require the use of the driving range or golf course (See Figure 2-9 in the draft EIR). No change to the draft EIR is required.

10-2. The Districts recognize the City's desire to minimize effects on the existing golf course and driving range and have made several design modifications to the Los Coyotes WRP expansions under each of the alternatives to minimize impacts. Impacts from the proposed modifications at the Los Coyotes WRP are identified in several resource areas of the draft EIR and mitigation measures to reduce these impacts, where appropriate, are proposed. No change to the draft EIR is required.

10-3. Several mitigation measures identified in the draft EIR already address the issues raised by the City. Mitigation Measure 7-1, described on pages 7-17 and 7-18 of the draft EIR, calls for the development and implementation of a traffic control plan to minimize the effects of construction activities on the roadway system. Mitigation Measure 9-1, described on pages 9-16 and 9-17 of the draft EIR, calls for the implementation of noise-reducing construction practices to minimize construction noise.

Mitigation Measure 15-1, described on page 15-10 of the draft EIR, calls for the location of staging, equipment storage, and construction material storage areas outside visually sensitive areas where feasible. If this is not feasible, this measure requires that these areas be screened from general view. Furthermore, Mitigation Measures 15-5, 15-8, and 15-10 call for partially screening new project elements from public view, establishing parkway planting strips, and improving existing greenbelt areas to minimize visual effects of project operations. No change to the draft EIR is required.

10-4. See response to Comments 10-1 and 10-2.

10-5. The City of Cerritos is on the distribution list for the final EIR and updates on 2010 Plan activities, including public information meetings and public hearings relevant to the Los Coyotes WRP. The Districts will also keep the city apprised of any proposed modifications to the Los Coyotes WRP that might affect the City.

Letter 11

CITY OF LOS ANGELES

CALIFORNIA

RICHARD J. RIORDAN
MAYOR

DEPARTMENT OF
CITY PLANNING
ROOM 561, CITY HALL
200 N. SPRING ST
LOS ANGELES, CA 90012-4801

CON HOWE
DIRECTOR

FRANKLIN P. EBERHARD
DEPUTY DIRECTOR

(213) 237-1986

MELANIE S. FALLON
DEPUTY DIRECTOR

ROBERT H. SUTTON
DEPUTY DIRECTOR

(213) 237-1818
FAX (213) 237-0552

January 6, 1995

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400
Attention: Mr. Gary Yoshida

RE: JOINT OUTFALL SYSTEM 2010 MASTER FACILITIES PLAN

Thank you for the opportunity to review the Draft Program EIR for the Joint Outfall System 2010 Master Facilities Plan. The Los Angeles City Planning Department, Community Planning Bureau has the following comments:

Land Use

The Joint Water Pollution Control Plant (JWPCP) site is located primarily within the City of Carson, however, a portion of the property south of Lomita Boulevard and East of the Harbor Freeway is located in the City of Los Angeles. That portion in Los Angeles is located within the Wilmington-Harbor City Community Plan which was adopted by the Los Angeles City Council on June 15, 1989. The District Plan's land use designation for the subject property is Open Space/Public/Quasi Public corresponding to the OS, A1 and PF zones. Currently the property is zoned R1, however, the City is in the process of changing the zoning east of Figueroa Street to OS and west of Figueroa Street to PF to correspond to the Plan. The expansion and upgrade of the JWPCP is planned only for the portion of the site located within the City of Carson. The use of the property within the City of Los Angeles is a recreation area east of Figueroa Street and an essentially unimproved publicly owned parcel containing some oil wells west of Figueroa Street. These uses are consistent with the Wilmington-Harbor City District Plan. 11-1

CITYWIDE PLANNING DIVISION
221 S. FIGUEROA ST., SUITE 410, LOS ANGELES, CA 90012
TELEPHONE (213) 237-0127 FAX (213) 237-0141

Aesthetics

Objectives of the Wilmington-Harbor City District Plan include enhancing the aesthetic quality and design of the built environment and establishing a system of open space landscaped buffers for recreational and aesthetic purposes and for the separation of incompatible land uses. Mitigation measures should include extensive landscape buffers to screen the project from public view, reducing bulk of buildings and structures as much as possible, and placing any new power lines underground. 11-2

Transportation

It is an Objective of the Wilmington-Harbor City District Plan "to improve traffic safety and control industrial truck traffic in residential neighborhoods." It is also a policy of the Wilmington-Harbor City District Plan "to develop Designated Bikeways (...) in accordance with the standards and criteria contained in the Bicycle Plan, a part of the Circulation Element of the City's General Plan, to permit safe bicycle use and to link residents to other bikeway systems which provide access to schools and recreational facilities." The backbone bicycle trail system proceeds north along Figueroa Street to Lomita Boulevard, traveling east along Lomita Boulevard to Wilmington Street/Main Street and continuing north into the City of Carson. Mitigation measures contained in the EIR address industrial truck traffic safety, however the backbone bicycle trail system has not been addressed. 11-3

Air Quality

To contribute to the process of oxygen regeneration, cleansing of the air of harmful pollutants, and removal of air-born particulates, all projects should be landscaped for air quality enhancement. Trees used in such landscaping should be selected for their ability to maximize air quality benefits including absorption of gases that may contribute directly or indirectly to atmospheric warming, for their ability to maximize energy conservation and with a view to their long term maintenance requirements. The use of vines should be encouraged on walls, buildings, and structures. 11-4

Public Health

It is an objective of the Wilmington-Harbor City District Plan to reduce and manage the risks associated with the handling, storage, transfer and disposal of hazardous materials and hazardous wastes. The Draft Program EIR discusses the potential for accidental release of acutely hazardous material at the JWPCP. This discussion focuses on the risks associated with the handling and storage of these materials on the plant site, but lacks discussion regarding the transfer and disposal of these materials off site. 11-5 Particularly with the proximity of this plant to residential areas and schools, the DEIR should discuss the procedures for the transfer and disposal of these materials.

These comprise our comments on this project, if you have any further questions, please call Nancy Scrivner at (213) 485-6647.

Very truly yours,

CON HOWE
Director of Planning

Jack Sedwick
Principal City Planner

CH:JS:ME:JY:NS
A:EIRLTR.WIL

11-1. Consistency of existing land uses at the JWPCP with the Wilmington-Harbor City District Plan is noted.

11-2. Mitigation Measure 15-5 described on pages 15-12 and 15-13 of the draft EIR, calls for partially screening new project elements from public view. Mitigation Measure 15-7, described on page 15-13 of the draft EIR, calls for restricting structures to minimum necessary heights (e.g., proposed digesters along streets would range in height from 15 to 18 feet and have diameters of approximately 125 feet) and reducing large-scale elements to smaller component elements as feasible.

Additionally, the proposed digesters would be painted in shades of brown earth tones and the total height of 15-18 feet would include a 3-foot-high screen wall constructed of painted metal to shield motorists' views of piping and equipment from Figueroa Street and Lomita Boulevard. The Districts have designed the other proposed structures to minimize the scale and have proposed new landscaping that will blend with the existing landscape to the extent feasible.

The Districts do not anticipate the need for additional power lines because the current demand for power is substantially below the existing capacity of transmission facilities. To the extent feasible, all new onsite power lines will be underground. No change to the draft EIR is required.

11-3. Mitigation Measure 7-1 in the draft EIR is hereby changed to include safety provisions for bicyclists on the bicycle backbone trail in the project area. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

11-4. Mitigation Measure 15-8 in the draft EIR specifically calls for the establishment of parkway planting strips and trees along the north and south sides of Lomita Boulevard, along Figueroa Street south of Lomita Boulevard, and around the perimeter of the Wilmington Jay-Cee athletic field. Bougainvillea vines are planted along certain perimeter chain-link fences to add color, improve aesthetics, and discourage trespassing. Vines, however, are not planted against walls or buildings at the JWPCP because of maintenance issues associated with the vines. No change to the draft EIR is required.

11-5. See response to Comment 4-3. Also, all hazardous materials used in quantity by the Districts are consumed in the treatment process, and the containers in which they are delivered are returned to the manufacturer. No change to the draft EIR is required.

Letter 12

DEPARTMENT OF PUBLIC WORKS
205 South Willowbrook Ave.
Compton, California 90220
(310) 605-5505

ANGEL ESPIRITU
Director

CITY OF COMPTON

February 6, 1995

MR. CHARLES W. CARRY
CHIEF ENGINEER AND GENERAL MANAGER
COUNTY SANITATION DISTRICTS OF LA CO.
1955 WORKMAN MILL ROAD
WHITTIER, CA 9061-1400

Atten: Mr. Gary Yoshida

RE: Joint Outfall System 2010 Draft EIR

The report deals mainly on the expansion and upgrade of the various existing Wastewater Treatment Plants to secondary treatment system to comply with- Consent Decree, and to accommodate wastewater increase through the year 2010. This report did not address any specific work in connection with the collection of wastewater and/or distribution systems for "gray" water to existing and potential users. 12-1

Since these wastewater treatment plants are miles away from the City of Compton, such project seem to have no immediate or direct impact to the City, at this time.

Should there be any work to be done within the City in connection with these projects, whether it will be on the collection system or distribution system, it will be necessary that you provide us with the studies and plans for our review in connection with the City's requirements; it's environmental impact; or on other factors affecting the health, convenience, social and economic life of the citizens.

Additionally, there is a need to provide the City with access to the use of reclaimed or "gray" water for landscaping, irrigation, and other non-potable, non-toxic uses, such as for street cleaning, storm drain cleaning, concrete mixing, etc. Accordingly, extension and/or stub-outs for such reclaimed water distribution mains should be constructed to the City limits on major arterial streets, parks, etc., such as on Rosecrans Avenue, Compton Boulevard and Alondra Boulevard, to name a few. 12-2

Thank you for giving us this opportunity to comment on this EIR.

Sincerely,

DANTE SEGUNDO
ACTING DIRECTOR/PUBLIC WORKS

DS/b

cc: City Manager
Assistant City Manager
Planning Director
Water Dept. Manager

12-1. Reclaimed water (different from "gray water", which is used, untreated water) produced at the inland WRPs is not sold by the Districts to reclaimed water users. The Districts sell reclaimed water produced at the inland WRPs to water purveyors or other agencies who supply reclaimed water either directly or indirectly to water consumers. The Districts' primary role in promoting reuse is providing the resource to be reused. The Districts have attempted to take more of a lead role in the distribution of reclaimed water. However, these efforts have been impeded in the past because of statutes that discourage service duplication.

Such statutes discourage the use of reclaimed water because they could subject the Districts or other entities wishing to purvey reclaimed water to litigation for damages from the local potable water retailer. Instead of taking the lead role in distribution of reclaimed water, the Districts continue to encourage and work with local water districts and retailers to develop water reuse programs that work cooperatively within the limits of existing statutes. The Districts also have an ongoing monitoring program to identify the need for modifications or improvements to JOS wastewater collection facilities. No change to the EIR is required.

12-2. The Districts would coordinate with the City of Compton regarding any potential subsequent sewer projects or other Districts-sponsored projects requiring work within city limits. However, because the Districts cannot take the lead on reclaimed water distribution projects for reasons described above, other agencies would sponsor these projects. No change to the draft EIR is required.

Letter 13

MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Office of the General Manager

January 27, 1995

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts
of Los Angeles County
1955 Workman Mill Road
Whittier, California 90601-1400

Dear Mr. Carry:

Draft Joint Outfall System
2010 Master Facilities Plan and
<u>Draft Program Environmental Impact Report</u>

We have received the Draft Joint Outfall System (JOS) 2010 Master Facilities Plan (Plan) and Draft Program Environmental Impact Report (Program EIR). The County Sanitation Districts of Los Angeles County (Districts) are proposing to upgrade the Districts' Joint Water Pollution Control Plant (JWPCP) to full secondary treatment and expand the JOS wastewater treatment plants to accommodate projected growth through 2010. The comments herein represent the Metropolitan Water District's (Metropolitan) response as a potentially affected public agency.

Metropolitan requests that you make the following changes and corrections to the Program EIR:

Page 3-10, third paragraph, last sentence should read: 13-1
The Replenishment District purchases reclaimed water from the Districts and purchases imported water supplies from the Central Basin Municipal Water District, which are then mixed and spread by the DPW (Los Angeles Department of Public Works) in the Rio Hondo and San Gabriel River percolation basins.

Page 14-1, fourth paragraph, second sentence should read: 13-2
The Metropolitan Water District of Southern California (MWD) provides imported water supplies to supplement the local supplies of the more than 15 million residents in its 5,154 square-mile service area. This service area covers approximately 5% of the total land area of California and has a $400 billion economy.

Page 14-1, last paragraph, first sentence should read: 13-3
MWD is composed of member cities, municipal water districts and a county water authority.

Page 14-1, last sentence: 13-4
In order to be consistent with page 2-58 of the Plan, please delete the City of Los Angeles and add the City of San Marino to the list of cities within the JOS service area.

Page 14-2, second paragraph, fourth sentence: 13-5
Please add Raymond Basin to the list of adjudicated groundwater basins within the JOS service area.

Page 14-2, fifth paragraph should be replaced with:
MWD has water delivery contracts for Colorado River water with the U.S. Department of the Interior for 1.212 million acre-feet per year (MAFY) and an additional 180,000 acre-feet per year (AFY) of surplus water. The capacity of MWD's Colorado River Aqueduct is 1,800 cubic feet per second or 1.3 million AFY. However, as a result of the 1964 U.S. Supreme Court decree in <u>Arizona</u> v. <u>California</u>, MWD's dependable supply of Colorado River water was reduced to less than 550,000 AFY. This reduction in dependable supply occurred with the commencement of Colorado River deliveries by the Central Arizona Project (CAP).

MWD has a priority to divert 550,000 AFY of California's 4.4 MAFY basic apportionment under its water delivery contract with the Secretary of the Interior. In addition, MWD has entered into agreements with water agencies serving Colorado River water for agricultural purposes in the California desert to increase its dependable supplies. Water use by holders of present perfected rights (Indian reservations, towns, and other individuals along the Colorado River that predate MWD's rights) is estimated to reduce dependable diversions by about 30,000 AFY. Conveyance losses along the Colorado River Aqueduct of 10,000 AFY further reduce the amount of Colorado River water received in the coastal plain. 13-6

Based on an annual determination, the Secretary of the Interior has allowed MWD in recent years to divert Colorado River water apportioned to, but unused, by Arizona and Nevada. Arizona and Nevada are not expected to use their full apportionments until the years 2036 and 2005, respectively.

Page 14-2, last paragraph and page 14-3, first two paragraphs should be replaced with: 13-7
MWD first received deliveries of State Water Project (SWP) supplies in 1972. MWD has contracted for the delivery of approximately 2.01 MAFY of SWP water, or about 48% of the total contracted entitlement. Contractor requests for SWP entitlement have been increasing, and in 1994, they reached 3.85 million

acre-feet (MAF). While this level of request significantly exceeds the dependable yield from existing SWP facilities, the SWP has been able to meet all contractors' requests for entitlement water except during the drought periods in 1977, 1990 through 1992, and 1994. In addition, surplus water has been delivered to contractors in many years. SWP deliveries to MWD reached a high in 1990 of 1.4 MAF. The only years when MWD received less SWP water than it needed were 1991 and 1992, with a SWP delivery in 1991 of 381,000 acre-feet (AF).

13-7

The quantity of SWP water available for delivery is controlled both by hydrology and operational considerations. In the past, SWP operations in the Sacramento-San Joaquin Delta (Delta) were governed by standards established under the State Water Resources Control Board's 1978 Water Rights Decision 1485 (D-1485). D-1485 required compliance with water quality standards and flow requirements for the Delta and assigned responsibility to meet these standards exclusively to the SWP and Central Valley Project.

Currently, the SWP is being operated in accordance with the December 1994 consensus agreement on Bay/Delta standards. This agreement has resulted in a reduction in SWP supplies in order to provide added environmental protections for the Delta.

Page 14-3, third paragraph, first sentence should read:
Projected Water Supply: Several programs have been proposed to increase future supply reliability in the MWD service area. 13-8

Page 14-3, first bullet, last sentence should read:
This program is expected to recover 200,000 AFY of contaminated groundwater. Approximately 100,000 AFY of the annual groundwater production will be untapped local yield or new supplies, while the remaining amount will require replenishment by imported water supplies or reclaimed water to prevent groundwater basin overdraft. 13-9

Page 14-3, second bullet should be replaced with:
Local Projects Program: MWD has determined that providing financial assistance toward the implementation of reclamation projects would be a regional benefit to its entire service area as reclaimed water could augment local water supplies and increase reliability. In 1982, MWD instituted the Local Projects Program (LPP) as a means by which it could participate with local agencies in expanding local water supplies through reclamation. The LPP provides a contribution of $154 per 13-10

AF to qualifying projects based on the amount of reclaimed water delivered and used by a project in a particular year. The LPP is expected to yield an additional 200,000 AFY of water by the year 2000. 13-10

Page 14-3, third bullet should be replaced with:
Colorado River Programs:

<u>All American and Coachella Canal Lining Projects</u>
Title II of Public Law 100-675 authorized the Secretary of the Interior to line 65 miles of the All American Canal and the Coachella Canal. The projects are to be constructed with 100 percent non-federal funding. Constructing a 23-mile concrete-lined canal parallel to the existing earthen All American Canal could conserve 67,700 AF of Colorado River water annually. Constructing a 33-mile concrete-lined canal in the existing cross section of the Coachella Canal could conserve 25,700 AF of Colorado River water annually. MWD is proposing to provide the funding for implementation of the All American Canal Lining Project in exchange for use of the conserved water. MWD would be reimbursed if another entity with a higher-priority right were to use the conserved water.

<u>Interstate Underground Storage of Unused Colorado River Water</u> 13-11
MWD and the Central Arizona Water Conservation District (CAWCD) executed an Agreement for a Demonstration Project on Underground Storage of Colorado River Water (Agreement) in October 1992. Under the Agreement, 100,000 AF of Colorado River water has been released from Lake Mead, conveyed through the Central Arizona Project's Hayden-Rhodes Aqueduct, and stored underground in Central Arizona. MWD and the Southern Nevada Water Authority (SNWA) paid the costs of storing the water, while CAWCD is responsible for costs of recovery of the water. There are two potential uses of the stored water. CAWCD could use the water during shortages declared by the Secretary of the Interior. Alternatively, MWD and SNWA could exchange this water for CAWCD's Colorado River water subsequent to a surplus occurring or a release for flood control purposes from Lake Mead. MWD and CAWCD have executed an Amendatory Agreement to the Agreement that increases the total amount of water which may be stored from 100,000 AF to 300,000 AF and extends the time for storage activities from December 31, 1996 to December 31, 2000. MWD and CAWCD are seeking the approval of the Amendatory Agreement from a number of agencies, including the States of Arizona and Nevada, and the Bureau of Reclamation, by May 1995.

Colorado River Basin Regional Water Supply Solution

Representatives of water agencies, the Colorado River Basin States, and the Bureau of Reclamation are working to reach consensus on a number of components which would improve water management in the Colorado River Basin. A major element of this effort is to ensure adequate dependable supplies, in particular for urban users of Colorado River water in Arizona, California, and Nevada. The consensus, which could take the form of regulations for administering entitlements, may include provisions for banking conserved and non-Colorado River system water, interstate water leases, guidelines for surplus and shortage declarations, and wheeling non-Colorado River system water. 13-11

Page 14-4, first bullet should be replaced with:

State Water Project Programs: Due to many complex issues, the facilities needed to increase the yield of the SWP have not been constructed. MWD's Integrated Resources Planning (IRP) process identifies interim South Delta facilities, acoustic fish barriers, and a Delta water transfer facility as additional SWP facilities to be included in the Preferred Resource Mix. In addition, the California Department of Water Resources (DWR) is working on developing other water management programs which will increase the SWP yield. The following describes these facilities and programs which are needed to increase SWP water supplies:

Acoustic Fish Barriers

Acoustic fish barriers have been installed on a trial basis along the Sacramento River at the Delta Cross Channel and at Georgianna Slough. If proven to be effective, acoustic barriers will reduce SWP impacts to certain fish species and improve SWP operation and flexibility. 13-12

Bulletin-160-93, Level 1 Options

In 1994, DWR issued the update to the California Water Plan, Bulletin 160-93. This bulletin listed several SWP programs, referred to as Level 1 options, that have undergone extensive investigation and environmental analysis and are judged to have a higher likelihood of being implemented by 2020. The following potential SWP programs were listed as Level 1 options:

- Interim South Delta Water Management Program:
  The preferred alternative for the Interim South Delta Program consists of an additional SWP intake structure at Clifton Court Forebay, limited dredging in South Delta channels, and four South Delta channel flow-control structures. These

facilities are intended to allow the SWP to increase its export pumping capacity, provide increased operational flexibility, reduce fishery impacts and improve water levels and circulation for local agricultural diverters.

- Long-term Delta Solution:
  In 1992, Governor Wilson delivered a water policy statement that established a Bay Delta Oversight Council to guide the planning and environmental documentation process for implementation of a long-term Delta solution. In 1994, federal regulatory agencies joined the State of California in this effort by forming a coalition, known as "CalFed." Members of CalFed signed a Framework Agreement that outlined a joint state/federal process to develop a long-term solution. It is anticipated that this process will take three to four years to identify solutions and carry out the California Environmental Quality Act/National Environmental Policy Act process. 13-12

- Kern Water Bank:
  The Kern Water Bank consists of local and State-owned groundwater storage programs in Kern County. DWR has estimated that, in total, approximately 2 million AF could be stored in these programs. Planning for Kern Water Bank has slowed to accommodate the long-term Delta solution process.

- Los Banos Grandes Reservoir:
  This proposed 1.75 million AF surface reservoir, located near and functioning similarly to San Luis Reservoir, would provide additional SWP storage and yield south of the Delta. The schedule for this project has also slowed to accommodate the long-term Delta solution process.

Proposed SWP Water Supply Planning Strategy

In late 1994, DWR began a scoping process to develop a SWP Future Water Supply Program. This process is focusing on identifying new strategies to develop SWP water supplies during the next 30 years through interim, short-term (next 10 years) and long-term measures. The strategies will include both traditional and "non-traditional" options to develop the necessary supplies in a timely manner. DWR has indicated that they intend to gain broad-based support for this program through public and regulatory agency participation programs. DWR plans to have a report outlining details for implementing the SWP Future Water Supply Planning Strategy by Spring 1996.

Metropolitan also requests that you make the following changes and corrections to the Plan:

Page 2-57, first paragraph, first three sentences should read:
Water has played a central role in accommodating development in the Los Angeles metropolitan area including the JOS service area. Throughout the history of the region, major efforts have been made to supply a growing population and industrial base with adequate amounts of water. Early in the twentieth century, when it became apparent that local water supplies were not sufficient to support continued development of the Los Angeles region, the City of Los Angeles began to import water from the Owens Valley in Northern California. Later, MWD diverted water from the Colorado River. More recently, the State of California began delivering water from the Sacramento-San Joaquin Delta in Northern California. 13-13

Page 2-57, second paragraph, last two sentences should read:
Imported water from the Colorado River was intended to supplement local water supplies in the original 13 MWD member cities. The 242-mile Colorado River Aqueduct was completed in 1941, and deliveries of Colorado River water to Southern California began that year. 13-14

Page 2-57, third paragraph, last sentence should read:
In 1972, the MWD began distributing water supplies provided by the SWP to meet supplemental demands for water in its service area. 13-15

Page 2-57, last paragraph, first sentence should be replaced with:
MWD provides imported water to supplement local water supplies to more than 15 million residents on the coastal plain of Southern California. Southern California has a highly diversified economy with a value of goods and services produced of approximately 400 billion dollars per year. This economy is dependent on MWD's ability to supply over 55 percent of the water used in Southern California. MWD's 5,154 square-mile service area extends from Ventura to the international boundary with Mexico and includes portions of the six counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura. MWD's mission is to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way. 13-16

Page 2-58, first paragraph, third sentence should read: 13-17
The MWD supplies approximately two-thirds of the water used within its service area, but the JOS municipalities rely even more heavily on MWD.

Page 2-58, first paragraph, last two sentences should be replaced with:
Since the JOS service area is almost entirely within MWD's service area and MWD incorporates both local and imported water into its water resources planning, an analysis of MWD water resources would be representative of water resources available to the JOS service area. 13-18

2-64, second paragraph should read:

<u>Colorado River Aqueduct</u>
The Colorado River originates in the Rocky Mountains and flows through five states and the Republic of Mexico to the Gulf of California. Rights to use Colorado River water are divided amongst the states in the upper and lower Colorado River Basin and the Republic of Mexico. Colorado River water is used for agricultural, municipal, and industrial purposes. California first began using water from the Colorado River in 1855 and deliveries of Colorado River water to the Southern California coastal plain began in the early 1940's following the completion of the Colorado River Aqueduct. MWD has delivery contracts with the U.S. Department of the Interior for 1.212 MAFY of Colorado River water, and for an additional 180,000 AFY of surplus water. The capacity of MWD's Colorado River Aqueduct is 1,800 cubic feet per second or 1.3 MAFY. In 1964, however, a U.S. Supreme Court decree handed down in <u>Arizona</u> v. <u>California</u> which would significantly reduce California's dependable supply of Colorado River water. MWD's dependable supply was subsequently reduced to less than 550,000 AFY with the commencement of Colorado River water deliveries by the CAP. The volume of MWD's dependable supplies of Colorado River water are affected by use of water by holders of present perfected rights to Colorado River water such as Indian reservations and towns located along the Colorado River, estimated to be 30,000 AFY, and by conveyance losses along the Colorado River Aqueduct, which are estimated to be 10,000 AFY. In April 1994, the U.S. Fish and Wildlife Service (Service) designated approximately two thousand overlapping miles of critical habitat along the Colorado River and certain of its tributaries, in an effort to permit four endangered fish species native to the rivers to survive and recover. While the Service has stated that it did not foresee changes in current hydrologic operations of the Lower Colorado River, it remains to be 13-19

determined whether efforts to recover these species could impact MWD's Colorado River supplies. In 1994, MWD diverted approximately 1.3 MAF of Colorado River water. Since the CAP began operations in 1985, MWD has been able to continue diverting Colorado River water as needed to meet a portion of its service area's demands and storage objectives. This has been accomplished through the use of surplus and unused water and the execution of agreements to:

- Deliver Colorado River water in advance to Coachella Valley Water District and Desert Water Agency 13-19
- Implement a water conservation program with Imperial Irrigation District
- Implement a test land-fallowing program with Palo Verde Irrigation District
- Implement a demonstration program to store unused Colorado River water in central Arizona with the CAWCD.

However, deliveries of Colorado River water by the United States Bureau of Reclamation to MWD could be reduced in the future.

Page 2-64, last paragraph, last sentence should read:
MWD may be able to import additional water from the Colorado River during any given year but such diversions are subject to hydrological conditions in the Colorado River Basin 13-20
and demands for Colorado River water by other users. MWD is negotiating arrangements with other water agencies and the U.S. Department of the Interior to increase its dependable supplies of Colorado River water.

Page 2-65, first and second paragraphs should be replaced with the same language used in Metropolitan's corrections to page 14-2, last paragraph and page 14-3, first two paragraphs of the Program EIR. 13-21

Page 2-65, last sentence should read the same as Metropolitan's corrections to page 14-3, first bullet, last sentence of the Program EIR. 13-22

Page 2-66, first paragraph should read the same as Metropolitan's corrections to page 14-3, second bullet of the Program EIR. 13-23

Page 2-66, second paragraph. Please replace the last sentence with the following:

Surplus and Unused Water
Studies by the Bureau of Reclamation indicate that, over a period of time, surplus Colorado River water could be made available to MWD in the future in certain years. MWD has diverted available surplus water, water apportioned to but unused by Arizona and Nevada, and unused Colorado River water apportioned to California for use by other agencies for agricultural purposes. 13-24
Currently, the availability of surplus water and water apportioned to but unused by Arizona and Nevada is determined on a year-to-year basis by the Secretary of the Interior based on a recommendation by the Commissioner of Reclamation. The amount of unused agricultural priority water available to MWD varies from year to year and is dependent upon agricultural economics, type of crops grown and acreage irrigated. Therefore, surplus and unused water are considered to be intermittent supplies due to the uncertainties associated with the determination of their availability to MWD.

Page 2-66, third and fourth paragraphs should be replaced with the same language used in Metropolitan's inserts to page 14-3, third bullet, entitled "All American Canal and Coachella Canal Lining Projects" and "Interstate Underground Storage of Unused Colorado River Water" in the Program EIR. 13-25

Page 2-67, paragraph two should be replaced with:

Land-Fallowing Programs 13-26
Under these programs, MWD would pay lessees/landowners in the Palo Verde and/or Imperial Valleys who irrigate crops with Colorado River water to leave land fallow in exchange for use of the water saved.

Page 2-67, paragraph three should be replaced with the same language used in Metropolitan's insert to page 14-3, third bullet, entitled "Colorado River Basin Regional Water Supply Solution" of the Program EIR. 13-27

Page 2-67, fourth paragraph should be replaced with the same language used in Metropolitan's corrections to page 14-4, first bullet of the Program EIR. 13-28

2-42

Page 2-68, Table 2.5-3 should be corrected as follows: 13-29

Table 2.5-3
Existing and Potential Water Supply for the MWD Service Area for the Year 2010 (MAFY)[1]

	Average Year Supply	Dry Year Supply
Existing Supplies		
Local Production	1.05	1.05
Reclaimed Water	0.40	0.40
Los Angeles Aqueducts	0.37	0.12
Colorado River	0.62	0.62
State Water Project[2]	1.54	1.14
Total	3.98	3.33
Potential Supplies		
Additional Colorado River	0.45	0.45
Additional State Water Project[2]	0.40	0.40
Reclaimed Water	0.27	0.27
Groundwater Recovery	0.11	0.20
Total	1.23	1.32
Total Supplies	5.21	4.65

[1]Metropolitan is currently engaged in the IRP process and all supplies and programs are being re-evaluated.
[2]These supply estimates were developed based on D-1485 operating constraints. SWP supplies will be reduced as a result of the December 1994 consensus agreement on Bay/Delta standards.

Page 2-69, second paragraph:
We request that the term "dry year conditions" be further qualified as "critically dry year conditions." The same change applies to Figure 2.5-7. 13-30

Page 2-69, last paragraph, first sentence should read:
In summary, given implementation of demand management programs identified in the BMP's (Best Management Practices) and supply augmentation programs and projects identified above, water resources will be sufficient to accommodate anticipated growth during the planning period. 13-31

Additionally, Metropolitan requests that you add a section to Chapter 2. The section should read as follows: 13-32

<u>2.5-8 MWD Water Resource Planning</u>

MWD and its member agencies are currently engaged in an Integrated Resources Planning (IRP) process. The primary objective of the IRP process is to develop efficient and reliable water supply plans utilizing mixes of local and imported resources as well as demand management options. Water demand projections used in the IRP analyses are consistent with SCAG's (Southern California Association of Governments) 1994 Regional Comprehensive Plan. One of the most important strengths of the IRP process is that it is an open, participatory decision-making process. Participants in the IRP process include Metropolitan, its member agencies, other water supply agencies, water resources agencies, local government, and representatives from the business, agricultural, and environmental communities. All water resources programs are being evaluated in the IRP process. One of the key products of the IRP process is a regional resource management plan that will include specific goals and implementation strategies for each water supply resource and demand management option. The resource management plan is scheduled for completion in mid-1995. 13-32

We appreciate the opportunity to provide input to your planning process. If we can be of further assistance, please contact me at (213) 217-7261.

Very truly yours,

Dale C. Mann

for Brian G. Thomas
Assistant Chief
Planning and Resources Division

MME

cc: Mr. Richard W. Atwater
General Manager
Central Basin Municipal Water District
17140 S. Avalon Boulevard
Suite 210
Carson, California 90746-1218

Response to Comments on the Draft EIR

13-1. The draft EIR is hereby changed to state that the Replenishment District purchases reclaimed water from the Districts and purchases imported water supplies from the Central Basin Municipal Water District, which are then mixed and spread by the Los Angeles County Department of Public Works (DPW) in the Rio Hondo and San Gabriel River Coastal Basin Spreading Grounds. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-2. The draft EIR is hereby changed to state that Metropolitan Water District (MWD) provides imported water to supplement local water supplies to more than 15 million residents and the $400 billion economy in its 5,154-square-mile service area, which is approximately 5% of the total land area of California. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-3. The draft EIR is hereby changed to state that MWD is a consortium of member cities, municipal water districts, and a county water authority. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-4. The draft EIR is hereby changed to reflect this correction. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-5. The draft EIR is hereby changed to reflect this correction. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-6. The draft EIR is hereby changed to reflect details regarding the amount of Colorado River water currently extracted by MWD. See Chapter 3 of the final EIR, "Changes and Errata in the Draft EIR."

13-7. The draft EIR is hereby changed to reflect details regarding the amount of State Water Project water currently received by MWD. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-8. The draft EIR is hereby changed to reflect that several programs have been proposed to increase future water supply reliability in the MWD service area. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-9. The draft EIR is hereby changed to reflect that the Groundwater Recovery Program is expected to recover 200,000 AFY of contaminated groundwater. Approximately 100,000 AFY of the annual groundwater production will be untapped local yield or new supplies, while the remaining amount will require replenishment by imported water supplies or reclaimed water to prevent groundwater basin overdraft. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-10. The draft EIR is hereby changed to include a description of the MWD Local Projects Program. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-11. The draft EIR is hereby changed to reflect this correction. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

13-12. The draft EIR is hereby changed to reflect this correction. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR."

Response to Comments on the Draft 2010 Plan

13-13. Changes made to Section 2.5, page 2-57, first paragraph, lines 1-8.

13-14. Changes made to Section 2.5.1, page 2-57, second paragraph, lines 5-8.

13-15. Changes made to Section 2.5.1, page 2-57, third paragraph, lines 4 and 5.

13-16. Changes made to Section 2.5.1, page 2-57, fifth paragraph, continued on page 2-58, lines 1-9.

13-17. Changes made to Section 2.5.2, page 2-58, first complete paragraph, lines 4 and 5.

13-18. Changes made to Section 2.5.2, page 2-58, first complete paragraph, lines 15-18.

13-19. Changes made to Section 2.5.4, pages 2-65 and 2-66, Imported Water Supplies subsection, under Colorado River Aqueduct subheading.

13-20. Changes made to Section 2.5.4, page 2-66, Imported Water Supplies subsection, lines 2 through 7 of last paragraph under Colorado River Aqueduct subheading.

13-21. Changes made to Section 2.5.4, page 2-66, Imported Water Supplies subsection, under State Water Project subheading.

13-22. Changes made to Section 2.5.5, page 2-67, Groundwater Recovery Program subsection.

13-23. Changes made to Section 2.5.5, page 2-67, Wastewater Reclamation subsection.

13-24. Changes made to Section 2.5.5, pages 2-67 and 2-68, Colorado River Programs subsection, under Surplus and Unused Water subheading.

13-25. Changes made to Section 2.5.5, page 2-68, Colorado River Programs subsection, under All American Canal and Coachella Canal Lining subheading and Interstate Underground Storage of Unused Colorado River Water subheading.

13-26. Changes made to Section 2.5.5, page 2-69, Colorado River Programs subsection, under Land Fallowing Programs subheading.

13-27. Changes made to Section 2.5.5, page 2-69, Colorado River Programs subsection, under Colorado River Basin Regional Water Supply Solution subheading.

13-28. Changes made to Section 2.5.5, pages 2-69 through 2-71, State Water Project Programs subsection.

13-29. Changes made to Section 2.5.6, Table 2.5-3, and to Section 2.5.7, page 2-72, first and second paragraphs and Figures 2.5-6 and 2.5-7.

13-30. Changes made to Section 2.5.7, page 2-72, paragraph 2, line 1, and to Figure 2.5-7.

13-31. Changes made to Section 2.5.7, page 2-73, first paragraph.

13-32. Section 2.5.8 has been added to the final 2010 Plan.

Letter 14

SCAG
SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

818 West Seventh Street, 12th Floor • Los Angeles, California 90017-3435 ☐ (213) 236-1800 • FAX (213) 236-1825

January 17, 1994

Mr. Charles W. Carry, Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400
Attention: Mr. Gary Yoshida

RE: SCAG COMMENTS ON THE JOINT OUTFALL SYSTEM 2010 MASTER FACILITIES PLAN AND ASSOCIATED DRAFT PROGRAM EIR
SCAG No. I 9400560

Dear Mr. Yoshida:

Thank you for submitting the Joint Outfall System 2010 Master Facilities Plan and associated Draft Program EIR to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG assists cities, counties and other agencies in reviewing projects and plans for consistency with regional plans. The attached comments are based in part upon state and federal mandates, as noted herein. If you have any questions about these comments, please contact Glenn Blossom (213) 236-1876.

2-46

Sincerely,

Eric H. Roth

ERIC H. ROTH
Manager, Intergovernmental Review

SCAG Comments on the Joint Outfall System
2010 Master Facilities Plan and
Associated Draft Program EIR

PROJECT DESCRIPTION

The Master Facilities Plan has been prepared to continue to guide the orderly development of the Joint Outfall System (JOS) into the next millennium . The JOS is operated under a joint powers agreement between 15 individual sanitation districts. The JOS facilities include the Joint Water Pollution Control Plant (JWPCP), five water reclamation plants (WRPs), and an interconnected network of sewers and pumping plants.

The five WRPs are: the Long Beach (LBWRP), the Los Coyotes (LCWRP), the Pomona, The San Jose Creek (SJCWRP), and the Whittier Narrows.

The JWPCP provides advanced primary treatment to all influent wastewater plus secondary treatment to approximately 60 percent of the flow, followed by ocean disposal. The WRPs provide tertiary treatment and the reclaimed water is reused or discharged to inland waters. The JOS serves 72 cities and unincorporated areas and currently treats approximately 470 million gallons per day (mgd) of wastewater.

The Master Facilities Plan uses a forecast of the future population growth and changes in land use within the Districts' service area based on the proposed Growth Management Chapter of SCAG's 1993 Draft Regional Comprehensive Plan (RCP). Based on the projections available at that time, the JOS service population was expected to increase from approximately 4.4 million to 5.2 million between 1990 and 2010.

The preferred project alternative calls for 400 mgd of secondary treatment capacity at the JWPCP, a 25 mgd expansion of the SJCWRP, and a 12.5 mgd expansion of the LCWRP. No expansion of the LBWRP would be required under any of the alternatives that have been analyzed for this project.

THE OBJECTIVES OF THE JOS 2010 MASTER FACILITIES PLAN

The planning objectives of the Master Facilities Plan are to:

- Provide full secondary treatment for all JOS wastewater flows by December 31, 2002, as required by a Consent Decree between the Districts, the United States, the State of California, the Natural Resources Defense Council, and Heal the Bay; and

SCAG

- Provide wastewater conveyance, treatment, and reclamation/disposal facilities to meet service area needs through the year 2010 in a cost-effective and environmentally sound manner.

CONSISTENCY WITH REGIONAL COMPREHENSIVE PLAN AND GUIDE POLICIES

The Growth Management Chapter (GMC) of the 1994 Regional Comprehensive Plan and Guide contains a number of policies that are particularly applicable to this program[1]. The following are selected growth management policies of the GMC in italics and SCAG staff comments regarding the consistency of the program with those policies:

o *The population, housing, and jobs forecasts, which are adopted by SCAG's Regional Council and that reflect local plans and policies, shall be used by SCAG in all phases of implementation and review.*

SCAG Staff Comments: Chapter 5 of the Draft EIR addresses the existing and projected water and wastewater characteristics pertaining to the program. It indicates that the demographic data that were used as the basis for sizing and timing the expansion of the wastewater treatment facilities were obtained from SCAG. Our staff review of that demographic data presented in the Draft EIR indicates that it differs slightly from the forecasts that were subsequently adopted by the SCAG Regional Council in June, 1994. The same conclusion holds true for the 1990 and 2010 population and employment data 14-1 disaggregated by census tracts found in Appendix A-5.2-1. Pursuant to telephone conversations that were recently held between SCAG staff and County Sanitation Districts staff, SCAG will supply the updated demographic data to the Districts for inclusion in the Final EIR. Because of the relatively minor differences in these data sets, it is unlikely that this will necessitate any changes in the sizing or timing of the facility expansion program. All other aspects of the calculations and methodology for sizing and timing the wastewater treatment facilities contemplated by this program appear to be fully consistent with this regional policy.

o *The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.*

SCAG Staff Comments: The timing and location of these proposed wastewater treatment facility improvements appear to be consistent with the growth management policies for 14-2 this service area which is slated to have a 17 percent increase in population between 1990 and 2010.

[1] See Endnote.

o *To support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services .....*

SCAG Staff Comments: Wastewater treatment is a public service that is essential to a well-functioning, sustainable community or region. The proposed wastewater treatment 14-3 facilities would be part of a complex system that will provide this much-needed public service.

o *To encourage mitigation measures aimed at preservation of biological and ecological resources.....*

SCAG Staff Comments: The environmental documentation for the project contains thorough analyses of the impact of the project on biological and ecological resources and 14-4 presents a full slate of mitigation measures which appear to be adequate to protect these resources, provided such measures are adopted as conditions of project approval.

CONCLUSIONS

This project appears to be one that (1) would be generally consistent with the Growth Management Chapter of the Regional Comprehensive Plan, and (2) would provide cities in the service area with sufficient wastewater treatment facility capacity to accommodate anticipated 14-5 growth through the year 2010 and provide full secondary treatment to all JOS wastewater flows by December 31, 2002, as required by the Consent Decree.

- - -

ENDNOTE

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

Roles and Authorities

SCAG is a ***Joint Powers Agency*** established under California Government Code Section 6502 et seq. Under federal and state law, SCAG is designated as a Council of Governments (COG), a Regional Transportation Planning Agency (RTPA), and a Metropolitan Planning Organization (MPO). SCAG's mandated roles and responsibilities include the following:

SCAG is designated by the federal government as the Region's ***Metropolitan Planning Organization*** and mandated to maintain a continuing, cooperative, and comprehensive transportation planning process resulting in a Regional Transportation Plan and a Regional Transportation Improvement Program pursuant to 23 U.S.C. §134(g)-(h), 49 U.S.C. §1607(f)-(g) et seq., 23 C.F.R. §450, and 49 C.F.R. §613. SCAG is also the designated ***Regional Transportation Planning Agency***, and as such is responsible for both preparation of the Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) under California Government Code Section 65080.

SCAG is responsible for developing the demographic projections and the integrated land use, housing, employment, and transportation programs, measures, and strategies portions of the ***South Coast Air Quality Management Plan***, pursuant to California Health and Safety Code Section 40460(b)-(c). SCAG is also designated under 42 U.S.C. §7504(a) as a ***Co-Lead Agency*** for air quality planning for the Central Coast and Southeast Desert Air Basin District.

SCAG is responsible under the Federal Clean Air Act for determining ***Conformity*** of Projects, Plans and Programs to the Air Plan, pursuant to 42 U.S.C. §7506.

Pursuant to California Government Code Section 65089.2, SCAG is responsible for ***reviewing all Congestion Management Plans (CMPs) for consistency with regional transportation plans*** required by Section 65080 of the Government Code. SCAG must also evaluate the consistency and compatibility of such programs within the region.

SCAG is the authorized regional agency for ***Inter-Governmental Review*** of Programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12,372 (replacing A-95 Review).

SCAG reviews, pursuant to Public Resources Code Sections 21083 and 21087, ***Environmental Impact Reports*** of projects of regional significance for consistency with regional plans [California Environmental Quality Act Guidelines Sections 15206 and 15125(b)].

Pursuant to 33 U.S.C. §1288(a)(2) (Section 208 of the Federal Water Pollution Control Act), SCAG is the authorized ***Areawide Waste Treatment Management Planning Agency***.

SCAG is responsible for preparation of the ***Regional Housing Needs Assessment***, pursuant to California Government Code Section 65584(a).

SCAG is responsible (with the San Diego Association of Governments and the Santa Barbara County/Cities Area Planning Council) for preparing the ***Southern California Hazardous Waste Management Plan*** pursuant to California Health and Safety Code Section 25135.3.

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Response to Comments on the Draft 2010 Plan

14-1. Responses are as follows:

- Population and employment figures by subregions are updated in Section 5.2.2, page 5-7, Table 5.2-2.
- The percentage of all expected JOS growth is updated in Section 5.2.2, page 5-8, third paragraph, line 6.
- 2010 population figures by treatment plant drainage areas are updated in Section 5.2.3, page 5-9, Table 5.2-3.
- 2010 population figures by treatment plant drainage areas are updated in Section 5.2.4, page 5-15, Table 5.2-8.
- The projected population and 2010 flow figures shown in the formula in Section 5.2.4, page 5-13, are updated.
- The footnote in Section 5.2.4, page 5-13, is added.
- 2010 population and employment figures are updated in Appendix A-5.2-1, Table 1.

Response to Comments on the Draft EIR

14-1. The draft EIR is hereby changed to reflect this updated demographic data. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

14-2. Consistency of the proposed project with SCAG growth management policies for the JOS service area is hereby noted.

14-3. General support for the purpose of the proposed project is hereby noted.

14-4. Support for the assessment of project impacts on biological and ecological resources, as well as the associated mitigation measures included in the draft EIR, is hereby noted.

14-5. Consistency of the proposed project with the Growth Management chapter of the Regional Comprehensive Plan is hereby noted. The statement that the proposed project would provide sufficient wastewater treatment facility capacity to accommodate anticipated growth in the JOS service area through 2010 is also noted.

Letter 15

January 17, 1995

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400 via FAX : 310-695-6139

Attention : Mr. Gary Yoshida

Dear Mr. Yoshida :

The Advisory Board of Ken Malloy Harbor Regional Park in Wilmington, California would like to provide the County Sanitation Districts of Los Angeles County the following comments on the Draft Program Environmental Impact Report for the Joint Outfall System 2010 Master Facilities Plan.

Our comments are summarized below; detail is provided on the attached.

1. **PHASE I DIGESTERS.** The Phase I Digesters at the Joint Water Pollution Control Plant [JWPCP-Carson], currently proposed for the upland adjacent to the JWPCP marsh, should be relocated. The upland habitat should be restored and the marsh itself expanded. **15-1**

   Rationale : The potential negative impacts associated with locating the digesters on this site will be entirely eliminated. Beneficial uses of the upland and wetland will be substantially improved.

2. **TERTIARY LEVEL RECLAIMED WATER.** The JWPCP upgrade should include provision for generation of approximately 8.0 millions of gallons per day (mgd) of tertiary level reclaimed water. This water must be suitable for use at the adjacent JWPCP marsh, Wilmington Drain and Machado (Harbor) Lake (1.0 mgd) and other appropriate local uses such as refinery processing (+5.0 md). **15-2**

   Rationale : Providing tertiary level capacity at JWPCP is consistent with overall policy objectives of the Districts' Master Facility Plan and will provide significant enhancement to the marsh and lake, improving both its natural resource values and quality of recreation uses.

3. **OTHER CONCERNS.** In addition to the above, the Advisory Board would like the Districts to consider the following items in the EIR.

   a. Inconsistencies between the proposed project and applicable general plans and regional plans. The EIR should provide greater detail in its discussion of the relationship between the project and the Los Angeles Region (4) Basin Plan of the Regional Water Quality Control Board. **15-3**

   b. Cumulative, growth-inducing, and growth-related impacts. The Draft Program EIR indicates that these projects impacts may be substantial but that the responsibly for implementing possible mitigation measures are the responsibility of other agencies or jurisdictions. [17-1]. **15-4**

   c. Land Use. As part of a Program EIR it would be useful for the District to provide information regarding plans for the vacant land on the south of the JWPCP site. **15-5**

Much of the response provided is background information. The specific issues to which we hope the Districts will respond are indicated in the text.

A re-circulation of the project-specific portions the EIR, may be appropriate if, in response to comments received, details of mitigation measures related to impacts of the JWPCP upgrade are substantially different than those provided in this Draft. If some other mutually agreeable method of resolving any issues raised herein exists consistent with CEQA such re-circulation may not be necessary.

We appreciate the opportunity to provide these comments and looks forward to the successful implementation of the Final Joint Outfall System 2010 Master Facilities Plan.

Sincerely Yours,

Frank O'Brien
Advisory Board
Ken Malloy Harbor Regional Park
Wilmington, CA

BACKGROUND

Ken Malloy Harbor Regional Park [KMHRP] is a City of Los Angeles facility containing active recreation areas, riparian woodland, freshwater wetland and Machado [Harbor] Lake. The park is located approximately 1/4 mile southwest of the Districts' Joint Water Pollution Control Plant. KMHRP's surface waters and wetlands receive urban runoff from the surrounding 20 square mile area via County of Los Angeles flood control channels.

About 70% of this urban runoff enters the park from the County's Wilmington Drain. The Drain runs directly east of JWPCP and into the park's northern wetland. [No treated wastewater from JWPCP is known to enter the flood control system]. Water flows from the park via an underground culvert into Los Angeles Harbor's West Basin.

The park is heavily used by residents from the surrounding areas of Carson, Wilmington and Harbor City, however water quality in lake and wetland is very poor. Extensive trash enters the system from flood control channels. The beneficial uses identified by the Regional Water Quality Control Board for Bixby Slough and Machado Lake are severely impaired.

Harbor Park and Wilmington Drain contain the last fragments of a wetland and riparian woodland once extensive in Wilmington and generally known as the Bixby Slough. The Districts' JWPCP was constructed on the northern portion of the Slough's wetland and the marsh under the Districts' jurisdiction at JWPCP is part of the historical Slough. 15-6

Wetlands and riparian woodlands are "special status biological communities of high value to wildlife" as the Draft Program EIR indicates [11-4]. The County of Los Angeles has designated the Slough a Significant Ecological Area [SEA].

The Advisory Board's comments principally focus on these special status biological communities : the potential negative environmental impacts which the project may create and opportunities for mitigation measures and enhancement programs for these areas.

RECOMMENDATIONS

We recommend relocating the Phase I Digesters and improving the marsh and surrounding area. We believe this is a feasible measure which will entirely eliminate possible negative environmental impacts associated with this project element. 15-7

We also recommend making provision for approximately 8.0 mgd tertiary level reclaimed water at JWPCP. The Advisory Board recognizes that this proposal is a significant modification to the JWPCP upgrade as proposed in the Draft Program EIR.

The benefits which JWPCP tertiary capacity would provide are, we believe, substantial enough to warrant serious consideration for inclusion in the overall Master Facilities Plan. 15-8

Tertiary water could be used onsite and at area industries. Unocal's Wilmington refinery has an 5.0 mgd requirement, for example.

In addition, reclaimed water at JWPCP Carson could be used for enhancement of the Bixby Slough wetlands, both on-site and down-line at Wilmington Drain and Harbor Park.

POLICY CONTEXT & CONSISTENCY WITH EXISTING PLANS

The recommendations are intended to be consistent with the goals of the Districts' Master Facilities Plan. Based on projected regional growth the Districts need to expand and upgrade their wastewater treatment plants. Relocating the Phase I digesters at JWPCP will eliminate direct potential negative environmental impacts associated with this expansion and upgrade at JWPCP and also mitigate negative impacts associated with growth within the JOS service area. 15-9

Provision for generation of tertiary water at JWPCP will provide the Districts an opportunity for reclaimed water reuse. 15-10

The proposals have also been developed consistent with the objectives set forth in the following :

Current federal wetlands policy. USEPA and others. August 1993.

State of California policy guidelines for wetlands conservation. Executive Order W-59-93. August 1993.

State of California Water Resources Control Board "Policy with Respect to Water Reclamation in California". 77-1.

State of California Regional Water Quality Control Board, Region 4 Basin Plan. April 28, 1994.

Los Angeles County Guidelines for Management of Significant Ecological Areas. August 1975.

A Consent Decree Negotiated Between the Districts, the United States, the State of California, the Natural Resources Defense Council and Heal the Bay. June 6, 1994.

City of Los Angeles General Plan, Wilmington-Harbor City District Plan. June 15, 1989.

Ken Malloy Harbor Regional Park Advisory Board, Master Plan. March 17, 1994.

The federal Clean Water Act and the California Porter-Cologne Water Quality Act provide the statutory basis for majority of the objectives detailed in the above. These laws, among others, are implemented in the Regional Water Quality Board's April 1994 Basin Plan.

Beneficial Uses and Water Quality Objectives identified in the Basin Plan for waters constitute the policy and statutory basis for the recommendation that JWPCP tertiary water be used for improving Bixby Slough/Machado [Harbor] Lake.

Technical elements of this proposal were first discussed in the "Machado Lake Reclaimed Water Issue Paper" developed by the City of Los Angeles Department of Environmental Affairs in the fall of 1991, and in the Port of Los Angeles' February 1992 "Machado Lake Restoration and Enhancement Plan".

The Advisory Board of Ken Malloy Harbor Regional Park consists of area residents, staff of City of Los Angeles Departments and of other agencies, and City, County, State and federal elected officials. Board recommendations are strictly those of resident Board members and are intended to result in the improvement of the park.

1. RELOCATE PHASE I DIGESTERS.

The proposed expansion of JWPCP [all alternatives] includes Phase I construction of seven digesters and a gallery on land immediately east of the JWPCP marsh. [Fig 11-2]. This project element would require replacing a number of greenhouses with industrial-type structures of unspecified height and appearance. [12-17], and directing an unspecified number of stormdrains into the marsh [11-19]. 15-11

The Draft EIR identifies a number of potentially significant environmental impacts from construction and operation of the Phase I Digesters. Mitigation measures are then proposed which would reduce these impacts to less-than-significant levels.

The Advisory Board recommends that the Phase I Digesters be relocated to another area of the facility, and that the entire land area north of the railroad tracks and west of Figueroa under the jurisdiction of the Districts be maintained as marshland and upland openspace. This would entirely eliminate the possibility of negative environmental impacts and provide a significant benefit. 15-12

The Draft Program EIR provides in Chapter 17 [Cumulative, Growth-Inducing, and Growth-Related Impacts] useful data on the importance of incorporating this proposed modification into the final project design. Chapter 17 states [17-12] :

> According to the SCAG RCP EIR, growth in the JOS service area could result in the substantial loss of the extent and quality of plan and wildlife habitat and sensitive biological communities. Dune, scrub, chaparral, herbaceous, marsh, riparian, woodland and forest communities would especially be affected. This impact is considered significant because the extent of sensitive biological communities in the JOS service area has been decreased substantially. (Southern California Association of Governments 1994a.)

And also [17-13] :

> Project-induced growth could contribute to the loss of substantial portions of special-status species habitat and 18 biological communities. Figure 11-1 shows areas supporting natural habitats in the JOS service area and outlying areas.

The Districts have jurisdiction over the JWPCP marsh and adjacent upland and therefore the ability to provide direct mitigation for both direct and indirect project impacts through a relatively minor modification in project design.

The Advisory Board defers to the judgement of District staff as to specific alternate locations for the Phase I Digesters.

Although this alternative seems feasible, and we strongly recommend it, a number of concerns exist about the mitigation measures for this project element.

The Draft does not provide enough information to evaluate the adequacy of the measures proposed to mitigate the impacts of locating the Phase I digesters directly adjacent to the wetland. In addition, some of the mitigation measures are planned to be developed at a future date after approval of the project.

We believe CEQA requires a Draft EIR discuss mitigation measures with a level of detail sufficient to permit meaningful evaluation of their adequacy. Further, development of mitigation measures may not generally be deferred until after certification of an EIR.

Areas of specific concern are provided below:

Mitigation Measure 3-1. Prepare and Implement a Stormwater Pollution Prevention Plan. [SWPPP]. The DEIR states "The contents of the SWPPP and details of the required BMPs [Best Management Practices] would be prepared by the Districts before they obtain the general construction activity stormwater permit from the RWQCB." and "The key to the SWPPP would be establishment of sediment and erosion control practices recommended by a qualified specialist."

Compliance by the Districts with the permit requirements of the RWQCB may constitute adequate mitigation for this potential impact. Detailing the provisions of the Stormwater Pollution Prevention Plan, and providing in the Draft the recommendations of a qualified specialist, might elicit suggestions which improve these measures. 15-13

Mitigation Measure 11-1. Install Energy Dissipaters in Drainages into the Marsh. This mitigation measure will be installed "prior to completion of stormdrains into the marsh." 15-14

In order to evaluate the adequacy of this mitigation measure, additional information is required on these drains, such as their number and anticipated size and the quality of stormwater which they will discharge into the marsh. 15-14

Mitigation Measure 11-2. Prepare and Implement a Marshland Management Plan. "In cooperation with the Los Angeles County Department of Public Works, the Districts propose to prepare a marshland management plan to improve irrigation to the marsh and maintain the marsh."

This marsh is a "special status biological community of high value to wildlife" and is part of a Los Angeles County "Significant Ecological Area". 15-15

Additional information is required to evaluate the adequacy of this proposed mitigation measure. Details of the measure should not be deferred until after approval of the project.

As proposed the plan might consist a few guys from the County's Imperial Maintenance Yard driving by twice a month to look out the window of their pick-up truck or construction of a lined trapezoidal low-flow channel. The specific elements the mash management plan might contain should be spelled out and an opportunity provided for public and agency evaluation and comment.

Other Potentially Significant Impacts of the Phase I Digesters Not Discussed by the Draft.

Land Use. Section 12 indicates that converting open space to developed use would constitute a significant impact. This potential impact from constructing the Phase I Digesters directly adjacent to the marsh on land now occupied by greenhouses is not adequately discussed. 15-16

Aesthetics. Section 15 indicates that screening would be used between the complex of proposed digesters and Figueroa Street. This measure would "effectively screen 30% of the views within 10 years." 15-17

From the information provided it is not clear if the screening proposed would be an adequate mitigation measure.

RELOCATE PHASE I DIGESTERS : Response requested

1. Please provide a revised project description which makes provision for relocation of the Phase I Digesters and *complete restoration and enhancement* of the JWPCP marsh and surrounding upland. **15-18**

The below only apply if the Phase I Digesters will not be relocated :

2. Should such a revision not be considered feasible, please provide a quantitative and technically detailed discussion of this determination. **15-19**

3. Please provide additional details about the Stormwater Pollution Prevention Plan. **15-20**

4. Please provide additional details about the stormwater and associated stormdrains which will be directed into the Marsh. **15-21**

5. Please provide a additional information on the Marshland Management Plan sufficient to evaluate its adequacy as a mitigation measure. **15-22**

6. Please explain how conversion of greenhouses, planting beds and open area adjacent to a sensitive biological resource does not constitute a significant land use impact. **15-23**

7. Please provide additional specific detail about the Phase I Digesters and the plantings which are intended to mitigate the potential negative impacts on the aesthetic qualities of the project site. **15-24**

2. TERTIARY LEVEL RECLAIMED WASTEWATER [8 mgd]

The Advisory Board recommends that provision be made within the Master Facilities Plan for the capacity for processing approximately 8 mgd of tertiary water at the Joint Water Pollution Control Plant. **15-25**

The Joint Outfall 2010 Master Facilities Plan has among its chief objectives an increase in the Beneficial reuses of reclaimed wastewater. **15-26**

As part of the Consent Decree, the Districts have agreed to prepare by December 31, 1995 a plan for reclaimed wastewater, and to use best efforts to attain and maintain within 7 years a goal of 150 mgd level of the Beneficial reuse of reclaimed wastewater.

Currently the District processes approximately 482 mgd of wastewater, 85% of capacity. Of this 482 mgd throughput, 330 mgd, or 68% is processed by JWPCP Carson, the remainder by the 5 Water Reclamation facilities.

Of the 152 mgd processed by the Water Reclamation facilities, 70 mgd, or 46%, is reused. None of Carson's wastewater is reused. As a result of this allocation of volume, currently 15% of total system wastewater throughput is reused.

Under Alternative 1 recommended in the Draft Program EIR, full system capacity in 2010 will be 628 mgd. Of that total, JWPCP represents 64%. **15-27**

However, no beneficial reuse of wastewater is projected under Alternative 1 [as well as the other project options]. Even should the 150 mgd target established by the decree be achieved by 2010, 75% of all wastewater processed by the Joint Outfall System will not be reused. See Table I.

This allocation is not hard to understand.

The Draft Program EIR refers briefly to some of the technical issues involved : the Water *Reclamation Plants* convey their solid residuals to JWPCP, wastewater with high dissolved solids are routed around the Reclamation Plants to JWPCP, and the JWPCP service area has a higher concentration of industrial discharges than the WRs.

The Draft summarizes this simply : JWPCP processes "high strength" wastewater.

Costs and site configuration are also a factor. Upgrading JWPCP to provide tertiary water is probably not the most cost-effective way to achieve the 150 mgd beneficial reuse target.

Nevertheless we believe providing a modest 8 mgd tertiary processing capacity at JWPCP has merit.

Such a plan would allow for immediate realization of local beneficial uses within the JWPCP service area which will meet clearly identified local needs.

As proposed in the Master Facilities Plan, JWPCP will process about 60% of the system's wastewater but its service area will have access to none of the system's reclaimed water and the beneficial reclaimed water will provide. 15-27

This project design meets certain engineering and cost/benefits constraints, but there is a lack of proportion between the proposed project's potential negative impacts and the measures proposed to mitigate these impacts.

The existing Machado Lake enhancement plans developed by the Port of Los Angeles and City of Los Angeles Environmental Affairs Department proposed use of reclaimed wastewater for improving Bixby Slough and Harbor Lake.

The State Water Resources Control Board "Policy with Respect to Water Reclamation in California" identifies enhancement of wetlands as a priority use for reclaimed water.

TERTIARY LEVEL RECLAIMED WATER [8 mgd] : Response Requested

1. Please provide a brief but detailed evaluation of the feasibility of providing 8.0 mgd tertiary level reclaimed water at JWPCP as part of the Master Facility Plan.

   Please include in this evaluation an estimate of: 15-28

   1. Capital and on-going costs.
   2. Sales price of water produced per mgd
   3. Possible on-site and local beneficial uses for such water.
   4. Suitability of such water for wetland enhancement.
   5. Alternative projects [eg 2.5 mgd] which might achieve project objectives at ower cost.

3. **OTHER CONCERNS.** Please respond to the items indicated below :

a. Inconsistencies between the proposed project and applicable general plans and regional plans.

The JOS project goals include both expansion of capacity and increased beneficial use of reclaimed water. The Regional Water Quality Control Board's Basin Plan provides detailed discussion of Beneficial Uses and Water Quality Objectives for regional waters. Additional information on the consistencies or inconsistencies between the JOS Master Facilities Plan and the RWQCB Basin Plan should be provided. 15-29

b. Cumulative, growth-inducing, and growth-related impacts. The Draft Program EIR indicates that these projects impacts may be substantial but that the responsibly for implementing possible mitigation measures are the responsibility of other agencies or jurisdictions [17-1] and cites CEQA Guidelines Section 15130(c) as follows: "..for some projects, the only feasible mitigation for cumulative impacts involves adopting ordinances or regulations rather than imposing project-specific conditions." 15-30

Is it the case that responsibility for mitigating the significant growth-inducing environmental impacts from the project are reste entirely with other agencies and jurisdictions?

Is it the case that implementation of the mitigation measures identified in section 17 may not be implemented in whole or in part?

c. Land Use. Please provide information regarding plans for the vacant land on the south of the JWPCP site. 15-31

I

JOINT OUTFALL SYSTEM
FACILITY CAPACITY and UTILIZATION (in MGD)

FACILITY	CURRENT CAPACITY	CURRENT VOLUME	% CAPACITY	RECLAIMED WATER USED	% USED	A[illegible] UPGRADE INCR	CAPAC[illegible]
JWPCP	385.0	330.0	85.7%	0.0	0.0%	[illegible]	[illegible]
SAN JOSE	100.0	75.[illegible]	75.0%	67.0	53.7%	[illegible]	[illegible]
LOS COYOTES	37.5	33.0	[illegible]	3.0	9.1%	[illegible]	[illegible]
WHITTIER	15.0	12.[illegible]	80.0%	12.8	[illegible]	[illegible]	[illegible]
LONG BEACH	25.0	18.0	[illegible]	3.0	16.7%	[illegible]	[illegible]
POMONA	13.0	10.0	76.9%	[illegible]	[illegible]	[illegible]	[illegible]
SUBTOTAL	190.5	[illegible]	79.8%	70.0	[illegible]	[illegible]	[illegible]
TOTAL	575.5	482.0	83.8%	70.0	14.5%	52.5	678.0

Please Provide a correct version of this Table I in the Final EIR. 15-32

15-1. The Phase I digesters are needed to accommodate the increase in solids generated from the full secondary treatment upgrade proposed for the JWPCP and from increased flows at the upstream WRPs. The location of the Phase I digesters was determined to be the most optimum site based on review of costs, safety, and environmental impacts of other sites at the JWPCP. The Districts must meet several criteria in considering the design, construction, and operation of the proposed Phase I digesters, including the need to:

- provide required capacity;
- allow continued operation of the existing facility during construction;
- provide for future expansion of the facility beyond the existing 2010 planning horizon;
- complete design and construction to enable operation of the full secondary treatment at the JWPCP by December 31, 2002 (as required by the Consent Decree);
- minimize nuisance impacts on the surrounding community;
- provide for efficient, long-term operation of the facility;
- minimize risks to employee health and safety; and
- minimize overall cost of the facility.

The site chosen by the Districts for the Phase I digesters best meets these criteria.

Adequate capacity is necessary to maintain solids detention times that are sufficient to ensure reliability and pathogen reduction. Seven digesters are needed to accommodate the increased generation of solids from full secondary treatment. These digesters will process the projected increase in solids flows through 2007. The possible locations for these digesters are restricted by the size of the required facility. The alternative locations at the JWPCP site considered for siting digesters include the following areas:

- Site 1: between Lomita Boulevard and the existing rectangular digesters north of Lomita Boulevard and west of Figueroa Street;

- Site 2: north of the existing chlorination and solids processing facilities south of Sepulveda Boulevard;

- Site 3: east of the proposed secondary treatment reactors and clarifiers, south of the AT-SF Railroad, east of Figueroa Street; and

- Site 4: south of Lomita Boulevard and west of Figueroa Street.

Site 1 has been reserved for construction of six Phase II digesters (see Figure 2-7 in the draft EIR). Of these six digesters, only two will provide additional capacity; the remaining four will replace the existing rectangular digesters, which perform less efficiently than circular digesters. In addition, construction of the Phase I digesters on Site 1 would require demolition of existing rectangular digesters. This would result in insufficient digester capacity during construction.

The distance of Site 2 from needed support facilities make locating Phase I digesters at this site cost-prohibitive. Digesters require steam for heating; locating the digesters at Site 2 would require either routing a major steam line across Figueroa Street or constructing a boiler house adjacent to the site.

Additionally, a flaring station located adjacent to the digesters, a gas pipeline from Site 2 across Figueroa Street, and additional or modified raw sludge pump stations would have to be constructed. Currently, the hazards associated with digester gas are confined to the primary treatment area of the JWPCP. Introducing these hazards to Site 2, which is near the existing chlorination facilities, would complicate safety procedures for workers in that area.

Site 3 also is too far from needed support facilities, including steam for digester heating. In addition, the alignment of sludge feed, sludge drawoff, and steam heat piping to this location would be highly constrained and cost-prohibitive. Additionally, this area has been reserved for future expansion of secondary treatment facilities.

Site 4 was considered unsuitable because of cost and aesthetic reasons. A portion of the property south of and fronting Lomita Boulevard is owned by Margate Construction, Inc. Locating the digesters at this site would require relocating the Margate Construction office and equipment yard or moving the digesters further south on the Districts' property. A gallery connecting the digesters south of Lomita Boulevard with the existing digester system would be at least 700 feet longer than that required for the proposed Phase I digester site, which would add several million dollars to the project cost. Additionally, the depth of the gallery and distance to supporting facilities gallery would make location of the digesters at this site too costly.

In addition to cost considerations, other reasons for not locating digesters at this site include access and land use issues. Constructing digesters at Site 4 would require Districts vehicles to cross Lomita Boulevard from the main plant site north of Lomita Boulevard for maintenance and operations. Furthermore, because the existing land uses at Site 4 include parkland; public buildings; active oil wells, pipelines, and oil leases; and open space, locating the digesters at this site would be inconsistent with the City of Los Angeles general plan land use designation as an open space/public/quasi-public area. Unlike the rest of the JWPCP site, this parcel of land is not designated for industrial use but rather functions as a buffer between the industrial uses of the JWPCP site and the adjacent community.

Because of the constraints of locating the Phase I digesters at Sites 1 through 4 listed above, the Districts did not consider these sites further. Because alternative sites are not considered feasible for reasons described above, the Districts chose the location identified in the draft EIR for the Phase I digesters and proposed mitigation measures that would reduce the impacts on the adjacent JWPCP marsh habitat and wildlife to less-than-significant levels. No change to the draft EIR is required.

15-2. The Districts' existing JOS WRPs provide tertiary treatment to all influent wastewater to produce reclaimed water. Treatment at the WRPs consists of the following unit processes: primary treatment via gravity settling, secondary treatment via conventional air activated sludge process, conventional tertiary treatment via filtration, and disinfection (see Figure 4.1-3 in the 2010 Plan). Reclaimed water produced at the inland WRPs is suitable for a large variety of reuse applications including groundwater recharge, industrial process water, and landscape irrigation.

The suitability of treated effluent for any given reuse application depends on two factors: the level of treatment provided and the quality or strength of the influent wastewater. The ability of the inland WRPs to produce high-quality reclaimed water that is suitable for a wide range of reuse applications is a direct result of the level of treatment provided and the Districts' ability to selectively route lower strength residential wastewater to the WRPs while routing higher strength industrial wastewater around the WRPs to the JWPCP for treatment. The strength of wastewater is reflected by the concentrations of total suspended solids (TSS), total dissolved solids (TDS), and chemical oxygen demand (COD) in the wastewater. Because high-strength industrial wastewaters are diverted to the JWPCP as described above, and because the JWPCP service area includes the largest concentration of industrial dischargers in Southern California, influent wastewater at the JWPCP is of very high strength, exhibiting high levels of TSS, TDS, and COD. The practice of returning sewage solids removed at the WRPs to the sewer system for conveyance to the JWPCP for treatment and processing also tends to increase the strength of influent wastewater at the JWPCP. The relative strength of influent wastewater at the WRPs and the JWPCP is shown in Table 3-3, page 3-17, of the draft EIR.

The quality and/or suitability of treated effluent (or reclaimed water) for reuse is largely a function of the level of TDS and other constituents in the reclaimed water. Conventional wastewater treatment processes such as those employed at the JOS WRPs effectively remove TSS and COD and effectively kill and/or remove bacteria and/or viruses in wastewater. However, they are not efficient in removing TDS. Tertiary treatment/filtration removes TSS but not TDS (dissolved solids are by definition less than one one-thousandth of 1 micron in diameter). Reclaimed water produced at the JWPCP via tertiary treatment would, therefore, have high TDS levels and would be of relatively low quality and suitable for only a very limited range of reuse applications. It could not, for example, be used for landscape irrigation because elevated TDS levels would kill many types of plants, nor could it be used for groundwater recharge as the Water Replenishment District of Southern California has set an upper limit of 700 milligrams per liter for TDS (tertiary effluent from the JWPCP would contain approximately 1,200-1,400 mg/l TDS), nor could it be used for many industrial processes that require high-quality water (low TDS and especially low hardness) to avoid problems such as boiler scale and corrosion. The suitability of such water for freshwater wetland enhancement may also be doubtful because of high TDS and ammonia concentrations.

15-3. Chapter 3 of the draft EIR, "Hydrology and Water Quality", states on page 3-2 that the water quality control plan most applicable to the Districts' facilities is the RWQCB Water Quality Control Plan for the Los Angeles Region (Basin Plan) and on page 3-3 references Appendix B of the draft EIR (which is bound together with the draft EIR) as having detailed relevant numeric surface water and groundwater quality objectives from the Basin Plan, as well as other objectives for surface waters and groundwater designated as municipal water supply. No change to the draft EIR is required.

15-4. Page 17-1 of the draft EIR states that it is acknowledged in the State CEQA Guidelines that for some projects the only feasible mitigation for cumulative impacts involves adopting ordinances or regulations rather than imposing project-specific conditions. Furthermore, page 17-5 of the draft EIR states that the Districts have little authority or ability to mitigate the significant adverse impacts associated with growth, other than the authority and responsibility to provide wastewater and solid waste services. The State CEQA Guidelines (Section 15091[2]) allow the Districts to find that mitigation for growth-related impacts is the responsibility of other public agencies that have adopted or should adopt such mitigation. In this case, the Districts propose the implementation of local and SCAG RCP policies and programs adopted by agencies with the authority to enforce the policies the agencies adopted. No change to the draft EIR is required.

15-5. The parcel of Districts-owned land on the southwest corner of Lomita Boulevard and Figueroa Street is designated open space/public/quasi-public by the City of Los Angeles. The Districts' short-term plans for this site are to reserve the area for possible construction staging and storage. Long-term plans are to maintain the site as open space buffer property. Also, see Comment 10-1 in Letter 10 of the final EIR for the City of Los Angeles' concurrence with the Districts' use.

15-6. The Districts recognize that the JWPCP marsh is a remnant of a once larger area of wetland and have reserved the marsh site. No change to the draft EIR is required.

15-7. See response to Comment 15-1.

15-8. The production of reclaimed water at the JWPCP was considered as a conceptual project alternative during the facility planning process and is discussed in Section 6.5.2, JWPCP Water Reclamation subsection, page 6-13, of the 2010 Plan. Changes have been made to this subsection (in lines 11 through 13 of the second paragraph on page 6-13) to reflect the estimated cost of producing reclaimed water at the JWPCP.

15-9. See response to Comment 15-1.

15-10. See response to Comment 15-2.

15-11a. Figure 12-2 in the draft EIR shows that the site proposed for Phase I digesters is designated as industrial. The proposed digesters will be between 12 and 15 feet above adjacent grade and approximately 125 feet in diameter and will be painted in shades of brown earth tones identical to the existing digesters. A 3-foot-high painted metal screen wall also will be placed on top of each digester (for a total height of 15-18 feet), which will shield piping and equipment on top of the digesters from the view of motorists on Figueroa Street. A wall will also be constructed between the proposed digesters and Figueroa Street. The Districts will plant trees along Figueroa Street to further shield the proposed facilities. No change to the draft EIR is required.

15-11b. The Districts have modified the design of the storm drains so that no discharge of stormflow into the JWPCP marsh will occur from around the Phase I digesters. Stormwater runoff from the proposed Phase I digester area will be collected through drainage catch basins and associated storm drains at a stormwater pump station to be located adjacent to the existing developed area south of the AT-SF railroad tracks. Collected stormwater will be diverted into the plant for treatment during the initial phase of a storm in compliance with the existing storm water pollution prevention plan (SWPPP) for the JWPCP. After a predetermined time, continued stormflow will be discharged directly to the Wilmington Drain from the pump station (as is currently practiced). As a result of this modification to the project design, Mitigation

Measure 11-1, "Install Energy Dissipaters in Drainages into the Marsh", is no longer needed and has been deleted from the draft EIR. See Chapter 3 of the final EIR, "Changes and Modifications to the Draft EIR".

15-12. See response to Comment 15-1. Also, the "upland area" adjacent to the JWPCP marsh is neither zoned nor maintained as open space. It is currently leased from the Districts for a commercial nursery for growing bedding plants. No change to the draft EIR is required.

15-13. As stated on page 3-33 of the draft EIR, the Districts are required under the Clean Water Act to obtain a general construction activity stormwater permit before construction, which requires preparation of an SWPPP. The SWPPP will be implemented in accordance with the requirements of the SWRCB General Permit Number CAS000002, which is administered by the Los Angeles RWQCB. All prevention measures and monitoring frequencies will be specified to be in compliance with RWQCB requirements. Development of an SWPPP is an ongoing process at the construction site.

Because of the nature of construction projects, the required mitigation measures will continually vary as the construction progresses. Development of an initial plan for each individual construction contract will be required, and the individual plans will be maintained in conjunction with the construction contractors involved in each project. As a standard practice, the Districts use the Construction Handbook of Best Management Practices (BMPs), which was developed in conjunction with the SWRCB to define the BMPs required for construction contractors. Contractor compliance and the development of the SWPPP are made standard provisions of the plans and specifications. No change to the draft EIR is required.

15-14. See response to Comment 15-11b.

15-15. In response to this comment, Mitigation Measure 11-2, "Prepare and Implement a Marshland Management Plan", is hereby revised to identify the specific elements of the plan. The expanded description of the plan emphasizes the importance of enhancing the wildlife value of the marsh, assigns responsibilities for review and implementation, and establishes timing for implementation. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

15-16. Page 12-19 of the draft EIR describes a significant impact related to the conversion of an open space zoning and significant ecological area designation at the Whittier Narrows WRP. However, open space would not be converted at the JWPCP (specifically, the area proposed for the Phase I digesters). Figure 12-2 of the draft EIR shows that the designated land use for the proposed Phase I digester site is industrial, not open space. Figure 12-3 of the draft EIR shows that the zoning designation for this site is heavy manufacturing. Furthermore, the existing site is not used as open space or recreation, but rather for a commercial nursery. No change to the draft EIR is required.

15-17. The proposed Phase I digesters are relatively low structures (a maximum of 18 feet high), which are approximately the same height as the existing greenhouse structures. As part of Mitigation Measure 15-5, the Districts plan to screen the proposed Phase I digesters from the public view by using fencing and landscaping, which would include planting trees along the west side of Figueroa Street north of the AT-SF railroad. The current view of the site from Figueroa Street has no trees and would be improved by the proposed mitigation. No change to the draft EIR is required.

15-18. See responses to Comments 15-1 and 15-15.

15-19. See response to Comment 15-1.

15-20. See response to Comment 15-13.

15-21. See response to Comment 15-11b.

15-22. See response to Comment 15-15.

15-23. See response to Comment 15-16.

15-24. See response to Comment 15-17.

15-25. See response to Comment 15-2.

15-26. Page 2-3 of the draft EIR states that the objectives of the 2010 Plan are "to provide wastewater conveyance, . . . and reclamation/disposal facilities. . . .", not to increase the "beneficial reuses of reclaimed wastewater". No change to the draft EIR is required.

15-27. The JOS service area has access to reclaimed water from JOS water reclamation facilities as well as from other water reclamation facilities. The foundation of the regional water reclamation and reuse strategy is the construction and operation of reclaimed water distribution systems that convey reclaimed water from its point of origin to users within the area that the system serves. These distribution systems are generally constructed, owned, operated, and maintained by water supply agencies. A number of reclaimed water distribution systems currently serve or will soon serve much of the JWPCP service area. These include (but are not limited to) the following systems: City of Long Beach, City of Cerritos, City of Lakewood, City of Bellflower, Central Basin Municipal Water Districts' Century Project, and West Basin Municipal Water Districts' Water Recycling Program. Reclaimed water for enhancement of habitat at Harbor Lake and/or Bixby Slough could be acquired from one or more of these distribution systems. In addition, reclaimed water produced at the San Jose Creek and Whittier Narrows WRPs is used to recharge the Central Basin Aquifer. Much of this water is later withdrawn and used within the JWPCP service area. No change to the draft EIR is required.

15-28. To produce reclaimed water at the JWPCP that is suitable for reuse, TDS levels in the secondary effluent must be significantly lowered via an advanced treatment process. The conventional tertiary treatment process employed at the inland WRPs would have to be supplemented by a reverse osmosis process to remove dissolved solids from tertiary effluent. JWPCP effluent also exhibits relatively high concentrations of ammonia, which could preclude some types of reuse applications.

The preferred method to remove ammonia from JWPCP effluent would require nitrification and denitrification facilities consisting of conventional air-activated sludge facilities operated to achieve nitrification and denitrifying filters consisting of attached-growth biological columns. Unit treatment processes required to produce usable reclaimed water at the JWPCP would include: preliminary treatment, advanced primary treatment, secondary treatment via a pure-oxygen activated sludge process, nitrification via conventional air activated sludge facilities, denitrification via denitrifying filters, demineralization via reverse osmosis, and disinfection. The following additional facilities would have to be constructed at the JWPCP: conventional air activated sludge facilities operated to achieve nitrification, clarifiers, denitrifying filters, and reverse osmosis facilities.

Capital and operation and maintenance costs for facilities necessary to produce reclaimed water at the JWPCP are given in the table below.

Table 2-3. Cost of Reclaimed Water Production at the JWPCP

Facility	Capital Cost ($ million)	Annual Operation and Maintenance Cost ($ million/yr)	Equivalent Annual Cost[a] ($ million/yr)
Nitrification system	5.78	0.24	0.83
Final clarifier system	2.0	0.12	0.32
Denitrification system	2.30	0.42	0.65
Reverse osmosis facilities	35.39	2.03	5.64
TOTAL	45.47	2.81	**7.44**

[a] Assumes 20-year amortization of capital costs at 8% interest rate.

Based on the above figures, the capital cost of additional facilities necessary to produce 8 mgd or approximately 24.5 AF/day of reclaimed water at the JWPCP would be approximately $45.5 million. Annual operation and maintenance costs for these facilities would be approximately $2.8 million. The equivalent annual cost for these facilities is approximately $7.4 million, and the unit cost of reclaimed water produced at the JWPCP would be approximately $830/AF.

To reuse reclaimed water produced at the JWPCP, distribution facilities consisting of pipelines and pumping stations would also have to be constructed in order to deliver reclaimed water to users. The capital cost of distribution pipelines alone ranges from approximately $30 to $200 per linear foot and operation costs for such facilities vary directly with pipeline length and required pumping lift. Capital and operation and maintenance costs for necessary distribution facilities would further increase the cost of reclaimed water.

Simple alterations of the proposed size of water reclamation facilities at the JWPCP would not significantly alter the cost to produce and deliver reclaimed water. It would be more costly to produce and deliver smaller quantities of reclaimed water because certain fixed capital costs for production and distribution facilities would have to be repaid by a smaller number of users and because larger facilities operate more efficiently due to economies of scale. On the other hand, while unit costs of reclaimed water would be slightly lower for a larger facility, absolute costs would be larger and unused reclaimed water, which is produced at a high cost, would have to be disposed of to the Pacific Ocean through the existing ocean outfalls in accordance with the Districts' National Pollutant Discharge Elimination System (NPDES) permit for operation of the JWPCP.

The Districts typically do not sell reclaimed water produced in the JOS directly to reclaimed water users. Rather, the Districts sell reclaimed water produced at the JOS WRPs to water purveyors and/or other agencies who supply water either directly or indirectly to water consumers. The Districts currently employ a flexible pricing scheme for sale of reclaimed water. Reclaimed water produced at JOS WRPs is generally sold at the higher of either one-half of the savings that the buyer realizes by using reclaimed water (calculated by subtracting capital and operation and maintenance costs for distribution facilities from the price of the alternative water supply) or one-fifth of the Districts' operation and maintenance costs to produce reclaimed water at the inland WRPs.

The pricing scheme described above would not, however, be applicable for reclaimed water produced at the JWPCP via the advanced treatment process previously described. At the inland WRPs this pricing scheme allows the Districts to recoup a portion of the costs to operate and maintain wastewater treatment facilities that are mandated by existing water quality laws and associated receiving water standards. Thus, reuse of reclaimed water provides a dual benefit of providing a low-cost source of water and reducing what may be regarded as operation and maintenance costs for the inland WRPs. In addition, the ability of the Districts to produce and provide high-quality reclaimed water at the inland WRPs is largely a function of the Districts' ability to isolate the WRPs from the industrial wastewater discharges that are routed to the JWPCP for treatment.

According to the Consent Decree, the Districts must provide secondary treatment to all wastewater treated at the JWPCP. As described previously, significant additional treatment processes would be required to produce marketable reclaimed water at the JWPCP involving significant additional cost (capital and operation and maintenance costs) that would be paid by all users of the JOS. If the pricing scheme used for reclaimed water produced at the JOS WRPs were adopted for reclaimed water produced at the JWPCP, this water would be sold at a cost significantly below its production cost. Because these costs may not be regarded as sunk costs (advanced treatment has not been mandated at the JWPCP), the sale of reclaimed water produced at the JWPCP at a price less than the additional cost required to produce it would, in effect, directly subsidize those who purchase and use this water. The Districts would, therefore, need to price reclaimed water produced at the JWPCP so as to recover the additional cost required to produce it.

Based on the costs given in Table 2-3, the price of reclaimed water produced at the JWPCP would be approximately $830/AF. By comparison, the cost of reclaimed water provided by the West Basin Municipal Water District's (WBMWD) reclaimed water distribution system, which will serve the area around the JWPCP, ranges between $200 and $250/AF and the Metropolitan Water District (MWD) sells untreated and treated potable water for $335/AF and $412/AF respectively. Based on the availability of substitutes for reclaimed water produced at the JWPCP at much lower prices, it is reasonable to assume that, given its required price, the demand for reclaimed water produced at the JWPCP would be almost nonexistent.

No change to 2010 Plan is required.

15-29. See response to Comment 15-3.

15-30. See response to Comment 15-4.

15-31. The referenced parcel of Districts' property is not considered "vacant land". Page 12-5 of the draft EIR indicates that the designated land use is open space/public/quasi-public. Also, see response to Comment 15-5 for a description of the Districts' plans for this parcel of land. No change to the draft EIR is required.

15-32. Table ES-1 of the draft EIR identifies the existing and proposed capacities of the JOS wastewater treatment plants, and Chapter 2 of the draft EIR, "Plan Description and Alternatives", identifies the high- and low-reuse scenarios for the inland WRPs under each of the 2010 Plan Alternatives. No change to the draft EIR is required.

Letter 16

10 YEARS
Heal the Bay

1640 FIFTH STREET, SUITE 204
SANTA MONICA, CA 90401
310-394-4552 (fax) 310-395-6878
e-mail heal_the_bay@earthsprint.org

January 17, 1995

Mr. Charles Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601-1400
Attention: Mr. Gary Yoshida

Dear Mr. Carry,

The following comments on the draft Joint Outfall System (JOS) 2010 Master Facilities Plan and the draft Program EIR for that plan were prepared on behalf of Heal the Bay, a local environmental group with over 10,000 members dedicated to making Santa Monica Bay and Southern California's coastal waters safe and healthy again for people and marine life. In addition, Heal the Bay is a signatory to the 1994 Consent Decree requiring full secondary treatment for all flows from the Joint Water Pollution Control Plant (JWPCP).

The primary concerns with any Masters Facilities Plan (MFP) and Programmatic EIR are the alternatives analysis and the subsequent conclusion based on the analysis: a preferred alternative. The MFP was quite thorough in the analysis of a wide array of alternatives for the JOS. The screening criteria for eliminating possible alternatives were clearly stated and they were applied consistently across all alternatives. However, Heal the Bay has a number of questions about the preferred alternative and the third and fourth alternative.

#1 - Does the final preferred alternative include a reclaimed water pumpback facility for Los Coyotes WRP? Los Coyotes has little potential for water reuse within areas tributary to the facility. As you know, water reuse is one of our organization's highest priorities (as demonstrated by our support of water reuse and groundwater recharge projects throughout the region) and we know that the Districts have been a leader in this field for 30 years. The MFP states that a pumpback facility is needed at Los Coyotes in order to meet the demands characterized in the Regional Wastewater Reclamation and Reuse Operation and Coordination Study (6-104). However, we could not find another section in the MFP or d-EIR that stated that the Districts plan to build the facility as part of the Los Coyotes expansion. 16-1

#3 - If the pumpback facility does not get built at Los Coyotes, this alternative is environmentally superior to the first alternative because of the increased potential for water reuse. Did you determine that Alternative 1 was superior to #3 because of lower cost, higher peak storm capacity, and the potential of flooding at Whittier Narrows? Does Whittier Narrows expansion pose an additional operations problem other than flood risk? If not, in light of the storm patterns over the last three years, Los Angeles' Tillman WRF has provided a great deal of information on protecting facilities within flood control basins. Three years ago, without much flood control protection in place, inundation led to a record 65 million gallon spill. Since then, the City has demonstrated that it is feasible and reasonably cost effective to expand an upstream WRF and provide mitigation for loss of facility flood control capacity. 16-2

#4 - For Heal the Bay's concerns, this is probably the environmentally superior alternative because implementation of the alternative would result in decreased ocean discharge and increased production of reclaimed water. Was the alternative inferior to #1 because of increased cost alone? Alternative 4 scored quite high in all categories except for cost, design construction and scheduling (related to cost and limited staff resources), and system operation (the same Whittier Narrows problem). 16-3

As the Districts learned first hand in the early eighties, SCAG population projections have been known to be inaccurate. Is the Districts' projected capacity need of at least 628 MGD an absolute requirement for the 2010 JOS plan? Is an alternative of 350 MGD at JWPCP, 125 MGD at San Jose Creek, 50 MGD at Los Coyotes, and 52.5 MGD at Whittier Narrow (plus existing capacity at Pomona and Long Beach) completely out of the question as a viable alternative (615.5)? 16-4

Biosolids - Heal the Bay's remaining comments are predominantly limited to the category of Biosolids management. Heal the Bay and the Districts have long disagreed about the definition of biosolid beneficial reuse. We have used the EPA definition which includes land application, composting, chemical stabilization, and energy recovery while the Districts have added landfill disposal as a beneficial use. Regardless of our differences, there is no disagreement over the fact that the Districts will be producing significantly more biosolids after full secondary at the JWPCP goes on-line.

Considering the fact that the Districts spent tens of millions of dollars on a biosolids energy recovery system, why wasn't energy recovery included as a biosolids management option? The Carver-Greenfield sludge drying process has proved unreliable and cost-ineffective, but sludge drying through ultra-efficient centrifugation has shown a great deal of promise. Considering that the Districts is already planning to upgrade their dewatering processes over the next ten years, does this mean that energy recovery will be considered a more viable option at that point? 16-5

At one point over the last few years, the Districts had expressed interest in an in-vessel compost system. Does the Districts still consider this sort of system as a viable biosolids management option? Did the in-vessel compost experience at the Las Virgenes Municipal Water District provide information that led the Districts to eliminate this option? 16-6

As we've all seen over the last six months, even the best biosolids management programs on paper can turn into Quality Control problems (the sludge mountain on Native American Reservation land). What additional precautions will the Districts take to ensure that 16-7 contractor biosolids management programs will meet the same high standards of the rest of the Districts' operations? If those standards are not met, what will the Districts do to mitigate the actions of the irresponsible contractor? 16-7

Miscellaneous d-EIR comments - On page 5-33 - the d-EIR states that the LA-2 dredge spoil dumpsite is 1.5 miles from the Palos Verdes peninsula. We were under the impression that the dumpsite was approximately 5 miles SW of the peninsula. 16-8

In relation to estimates of pollutant loadings from each of the four alternatives, what assumptions were used for pollutant removal efficiencies to derive the estimates in Tables 5-2 and 5-3? Were they based on the historic removal efficiencies for those constituents at those facilities? 16-9

Chapter 5 did not adequately assess the possible benefits to marine life of going to full secondary treatment at the JWPCP. This seemed inconsistent with the analysis in the rest of the document (for example - the risk of human illness and degradation to groundwater supplies of water reuse was discussed throughout the document, yet where are the data to substantiate such a statement). However, there have been numerous studies that have demonstrated improvements in marine biological communities following significant reductions in loadings of suspended solids and BOD or TOC. 16-10

The No Project alternative did not have a negative impact to marine life. This is contrary to the conclusions reached by the EPA in their assessment of the Districts last 301(h) waiver application. Heal the Bay believes that the No Project alternative would result in an unavoidable significant impact to marine life. 16-11

Conclusions - Heal the Bay agreed with the Districts conclusions that the four favored alternatives posed no significant, unmitigatable impacts to water quality and natural resources. Also, although we disagree on the merits of full secondary treatment, we support the Districts' basic proposal for completion of the full secondary facilities at the JWPCP and expansion of their upstream water reclamation facilities. Heal the Bay appreciated the opportunity to participate in the preliminary scoping meeting for the MFP and EIR. Congratulations for completing the necessary draft-planning and environmental review documents in a timely manner. If you have any questions about our comments, please give me a call at (310)394-3552 x119.

Sincerely,

Mark Gold

Mark Gold, D.Env.
Executive Director

16-1. The Districts would have a limited role in the construction of the pumpback facility, which was identified for the Los Coyotes WRP in the 2010 Plan alternatives. The Central Basin Municipal Water District most likely would be the lead agency for implementing this facility. To some degree, the ability to pump reclaimed water from the Los Coyotes WRP to the north already exists. The City of Cerritos owns an existing pump station at the Los Coyotes WRP that provides reclaimed water to its customers and to the Central Basin Municipal Water District for the Century project. The Central Basin Municipal Water District also operates its own pump station, which supplies effluent from the San Jose Creek WRP to the Rio Hondo project. Because the Rio Hondo and Century project systems are interconnected, it is possible to provide reclaimed water from either WRP to both systems. As the demand for the two systems increases, the capacity of the existing pump station at the Los Coyotes WRP would have to be increased to meet the flow requirements identified in the 2010 Plan. No change to the draft EIR is required.

16-2. Alternative 1 was chosen over Alternative 3 by the Districts based on a combination of considerations, including cost, design and operational constraints, and environmental impacts. Of the four alternatives analyzed in detail, Alternative 3 is the second most costly. Also, as described on page 1-3 of the draft EIR, the Districts considered the impacts on 14 different resource areas. Of those 14 areas, the potential for increased availability of reclaimed water for reuse was a beneficial impact identified for hydrology and water quality and public services and facilities. It was not the Districts' intent to base the determination of the environmentally superior alternative solely on the amount of reclaimed water made available for reuse.

The draft EIR identifies flooding and flood storage capacity loss as significant impacts associated with the Whittier Narrows WRP under Alternative 3. Other significant impacts addressed in the draft EIR that would occur only at the Whittier Narrows WRP pertain to geologic and soil hazards, botanical and wildlife resources, land use, and cultural resources.

Page 11-21 of the draft EIR identified the loss of riparian scrub habitat from construction at the Whittier Narrows WRP under Alternative 3, which is an issue of major concern to the USFWS because of the possible effects on the least Bell's vireo, a state- and federally listed endangered species (see Comment Letter 1). Under Alternative 1, special-status species would not be affected. Page 3-38 of the draft EIR states that the Districts are working with the U.S. Army Corps of Engineers to identify regulatory requirements and design measures that would avoid inundation at the proposed facility, and Mitigation Measure 3-2 in the draft EIR proposes to replace the approximate 230,000 cubic yards of lost flood storage capacity. No change to the draft EIR is required.

16-3. Similar to Alternative 3, Alternative 4 was not chosen as the recommended alternative for several reasons. Alternative 4 is the most costly; would involve modifications to the Los Coyotes, San Jose Creek, and Whittier Narrows WRPs; and would cause more significant impacts than any of the other alternatives. No change to the draft EIR is required.

16-4. Population projections are by their nature less than exact. SCAG population projections generated during the late 1970s and 1980s, for example, substantially underestimated the actual rate of population growth experienced in Southern California during the last two decades. Despite the inherent uncertainty associated with projection modeling, it is a necessary tool in estimating future needs for housing, employment, infrastructure, and services. The Districts base their wastewater flow projections on population projections.

Because the Districts are pursuing federal financial assistance (direct grants and/or State Revolving Fund loans) for the upgrade portion of this project and for future inland WRP expansions, the 2010 Plan must conform to SCAG's population projections. Section 176(c)(1)(B)(iii) of the federal Clean Air Act requires conformity with an implementation plan when federal support or financial assistance is granted by a department or agency of the federal government. The Section states that "The determination of conformity shall be based on the most recent estimates of emissions, and such estimates shall be determined from the most recent population, employment, travel, and congestion estimates as determined by the metropolitan planning organization . . .", which in this case is SCAG.

Because past population projections have been inaccurate, the Districts will monitor the actual needs for wastewater services, as stated in the draft project report. If flows develop more quickly than the flow projections indicate, implementation of the inland WRP expansions would be accelerated. On the other hand, if wastewater flows develop more slowly than the proposed flow projections indicate, implementation of the proposed inland WRP expansions would be delayed.

The suggested alternative of 350 mgd at the JWPCP, 125 mgd at the San Jose Creek WRP, 50 mgd at the Los Coyotes WRP, and 52.5 mgd at Whittier Narrows WRP would not be a feasible alternative because:

- it would not conform with Section 176(c) of the Clean Air Act;
- there is no basis for the Districts to assume the SCAG population projections are inaccurate; and

- it would have the same disadvantages as Alternative 4, which is analyzed in the 2010 Plan and draft EIR.

No change to the draft EIR is required.

16-5. The Carver-Greenfield dehydration system followed by fluidized bed combustion with energy recovery was built under the innovative/alternative technology portion of the Clean Water Act Grant Program to treat approximately 50% of the JWPCP solids. The Districts declared the system a failed technology as defined by the federal grant program regulations.

As described on page 6-42 of the draft 2010 Plan, dewatering of biosolids using the most advanced centrifuge technology is under consideration. Dewatering using the most current, cost-effective centrifuge technology would be expected to achieve 29-31% total solids (i.e., 69-71% moisture content). Combustion with energy recovery requires a much higher total solids content to support combustion without auxiliary fuel. An intermediate step, "drying", must be provided by equipment such as multiple-effect evaporation, indirect steam dryers, or direct dryers. These drying processes can produce a biosolids fuel at 85-95% total solids. Indirect steam dryers have been operated at the City of Los Angeles' Hyperion plant and were also tested at the JWPCP. Drying and energy recovery was determined to be high in cost, energy demand, and maintenance. Improvements to centrifuge technology will not produce a sludge cake by centrifugation alone that is sufficiently dry for energy recovery. No change to the draft EIR is required.

16-6. The Districts constructed an in-vessel composter demonstration pilot plant at JWPCP with a capacity of about 10 wet tons per day and have conducted research on the process since July 1992. Representatives of the Districts have visited the Las Virgenes Municipal Water District site; however, the process has been evaluated based mainly on extensive research conducted at the Districts' demonstration facility. Based on this research, the cost of in-vessel composting currently appears to be at least twice that of offsite windrow composting and other reuse options. In addition, the process creates substantial energy demands. In-vessel composting is therefore not considered a feasible option at this time.

In the future, the Districts will continue to refine and reassess the feasibility of in-vessel composting. For example, Districts staff have developed and patented an air management/odor control system, which demonstrated that a pilot plant such as the one at JWPCP can be operated with no net increase in emissions. No change to the draft EIR is required.

16-7. Page 2-37 of the draft EIR identifies the Districts' quality control measures for biosolids contract management. A key element of the quality control effort is the inspection program. The Districts have conducted site inspections in the past and are continually assessing their program so that a more thorough and standardized inspection protocol will always be in place. The inspection program will be aimed at detecting problems before they become a concern.

For example, one objective will be to more readily inventory a site to ensure that only reasonable amounts are being stored. Site conditions can be enforced because Districts' contracts contain provisions to allow cessation of hauling to a site if conditions are found unacceptable. By maintaining multiple contracts with flexible capacity as well as the Districts-operated landfill as a back-up site, the Districts can avoid the need to rely on any single contractor and can require strict compliance with contract and permit conditions. No change to the draft EIR is required.

16-8. The draft EIR is hereby changed to state that the dredge spoil site is approximately 1.5 miles in diameter and is located between 4.5 and 6.0 miles southeast of the Palos Verdes Peninsula. See Chapter 3 of the final EIR, "Changes and Errata to the Draft EIR".

16-9. The projected concentrations of and mass emissions in the JWPCP discharge for 2010 are based on the following assumptions: the JWPCP will run at full capacity in 2010, the influent concentrations for the contaminants identified will be similar to the levels that were received by the JWPCP in 1993, and the effluent concentrations for the contaminants identified will be similar to the concentrations measured in the secondary effluent in 1993. No change to the draft EIR is required.

16-10. Pages 5-40 through 5-43 discuss the potential for improved conditions for marine biota resulting from disposal of secondary-level treated effluent. Specifically, the proposed project's effects on plankton; kelp beds; benthic invertebrates; demersal fish; pelagic fish; coastal and pelagic birds; marine mammals; rare, threatened, and endangered species; and beneficial uses are discussed. No change to the draft EIR is required.

16-11. Page 5-44 of the draft EIR states that the concentrations and mass emissions projected for 2010 under the No-Project Alternative would meet marine water quality, current NPDES standards, and the California Ocean Plan limitations. These results support the Districts' conclusion that the No-Project Alternative would have a less-than-significant impact on marine life. No change to the draft EIR is required.

Letter 17

Surfrider Foundation

Sanitation Districts of
Los Angeles County
1955 Workman Mill Road
Whittier, CA 90621

January 18, 1995

Dear Sirs/Madams,

Thank you for the opportunity to comment on the draft environmental impact report (d.e.i.r.) for the Joint Outfall System 2010 Master Facilities Plan. The d.e.i.r. seems to have adequately outlined the various impacts of this project. We have no problem with the chosen alternative.

An increase in water recycling and an upgrade of water treatment will greatly benefit our environment. **17-1**

Thank You,

Gordon LaBedz MD

Gordon LaBedz, M.D.

122 SOUTH EL CAMINO REAL, SUITE #67 • SAN CLEMENTE, CALIFORNIA 92672 • (714) 492-8170 • FAX (714) 492-8142

Response to Comments from the Surfrider Foundation

17-1. Support for the draft EIR is hereby noted.

Chapter 3
Changes and Errata to the Draft Environmental Impact Report

Chapter 3. Changes and Errata to the Draft Environmental Impact Report

This chapter describes corrections that have been made to the draft EIR either as corrections or updates or as a result of comments received by the Districts. Underlining indicates where additions were made to the original text. Strikeout indicates where the original text was deleted. Tables modified substantially from the draft EIR are located at the end of this chapter.

- Revise page ES-8, column 2, third bullet, to read: degradation of riparian . . . an SWPPP~~, installing energy dissipaters in drainages into the marsh,~~ and preparing . . .plan.

- Revise page ES-17, Table ES-3, page 3 of 5, to delete: **Mitigation Measure 11-1. Install energy dissipaters in drainages into the marsh.**

- Revise page 3-4, third paragraph, to read:

The Rio Hondo flows southwest from its origin at the ~~Saw Pit Dam~~ spillway of Peck Road Water Conservation Park . . . Ocean. ~~No flow data are available for the Rio Hondo and Los Angeles Rivers.~~ Flow data for the Rio Hondo are available from Gaging Stations Nos. F192-B-R, F64-R, and F45B-R. Gaging Station F45B-R is the last station on the Rio Hondo before the confluence with the Los Angeles River. Flow data for the Los Angeles River are available from Gaging Station Nos. F300-R, F285-R, F57C-R, F34D-R, and F319-R. Station F319-R is the last gaging station on the Los Angeles River before it discharges to the Pacific Ocean.

- Revise page 3-10, second paragraph, sentences 3 and 4, to read:

The Rio Hondo Coastal Basin Spreading Grounds is . . . with a total of ~~423~~ 430 acres available ~~(County Sanitation Districts of Los Angeles City, 1992b)~~.

San Gabriel River Coastal Basin Spreading Grounds have a total of 252 acres of wetted area, 96 acres in the grounds, and 156 acres in the river.

- Revise page 3-10, third paragraph, to read:

Reclaimed Water Production and Use. The recharge program involves the Districts, the DPW, and the Water Replenishment District. The DPW owns and operates the recharge facilities, commonly referred to as the spreading grounds. <u>It should be noted that the San Gabriel Coastal Basin Spreading Grounds are only partially owned by the DPW, which has a long-term lease for the grounds. The operation and maintenance of the river was transferred to DPW on April 29, 1969.</u> The DPW operates both spreading grounds on a ~~21-day~~ <u>battery</u> cycle~~, with an individual basin flooded for 7 days, allowed to drain the next 7 days, and then allowed to dry for 7 days to prevent mosquitos and other vectors from thriving and to restore percolation rates in basins.~~ <u>The time it takes to fill a battery depends on the inflow, size of the battery, and the percolation rate. The water is switched to another battery to disrupt the breeding cycle of the vectors and to allow the battery to rejuvenate. San Gabriel Coastal Basin Spreading Grounds has an inflow capacity of 350 cfs (226 mgd) and Rio Hondo Coastal Basin Spreading Grounds has an inflow capacity of 2,000 cfs (1,293 mgd)</u>. The Replenishment District purchases reclaimed water from the Districts ~~and imports water supplies from the MWD~~ <u>and purchases imported water supplies from the Central Basin Municipal Water District,</u> which are then mixed and spread by the DPW in the Rio Hondo and San Gabriel River percolation basins.

- Revise page 3-24, first paragraph, sentence 1: replace "DPW Flood Control Division" with "Los Angeles County Department of Public Works".

- Revise page 5-33, first full paragraph, as follows:

  The only permitted . . . is ~~1.5~~ <u>4.5 to 6.0</u> miles . . . Peninsula. It is a site ~~1.1~~ <u>1.5</u> miles in diameter . . . Harbors."

- Revise page 7-15, Table 7-5, to change "Avelon" to "Avalon".

- Revise page 7-16, paragraph 2, last sentence, to read: The Los Angeles County guidelines . . . deficient facility by 2% <u>or more</u> . . .

- Revise page 7-16, paragraph 1, under "Construction Impacts", to add:

  <u>**Impact: Increase in Volume-to-Capacity Ratio (V/C) at the Intersection of SR 1/Figueroa Street**</u>

By 2002, construction-related traffic would increase the morning and evening peak-hour V/C at the SR 1/Figueroa Street intersection by 0.01. This intersection would be operating at LOS F in 2002 with or without the project construction-related traffic.

The Congestion Management Program for Los Angeles County (Los Angeles County Metropolitan Transportation Authority 1993) indicates that a project will have a significant impact when it increases traffic demand on an already deficient facility by 2% of capacity (V/C > 0.02), causing or worsening LOS F.

This impact is considered less than significant because the construction-related traffic does not increase the V/C at the SR 1/Figueroa Street intersection by 0.02.

Mitigation. No mitigation is required.

- Revise page 7-17, **Mitigation Measure 7-1. Develop and Implement a Traffic Control Plan for the Construction Site,** last dash mark, to read:

  - maintain safe access to and minimize conflicts with commercial parking lots, private driveways, sidewalks, and bikeways to the greatest extent feasible.

- Revise page 8-49, first paragraph, to add:

  A recent refinement of the full secondary upgrade project physical design configuration resulted in the deletion of two point emission sources (scrubbers) from the design analyzed in the draft EIR. One of the scrubbers vented the E4 skimmings channel and the other vented the mixed liquor conveyance channels. The cancer risk was recalculated accordingly to reflect these design changes pursuant to SCAQMD's current Rule 1401. The revised incremental cancer risk for the project at the location of the MEI is 0.72 per million, which is still below the acceptable risk level of 1.0 per million pursuant to Rule 1401. The corresponding chronic and acute health hazard index values were not revised because these values were originally reported in the draft EIR at a level substantially below the significance threshold and no appreciable change is expected as a result of the design changes.

- Table 11-1, add the following special-status plant species: Smooth spikewood (*Hemizonia punens* ssp. *laevis*); C2/--/1B; Saltbrush scrub, meadows, grassland, riparian woodland (alkali).

- Table 11-2, add the following special-status wildlife species:

  - Southwestern willow flycatcher (*Empidonax trailii extimus*); PE/E; Riparian habitat.

  - Burrowing owl (*Athene cunicularia*); C2/SSC; Grasslands, agricultural fields.

  - Two-striped garter snake (*Thamnophis hammondii*); C2/--; Wetland with dense riparian thicket.

  - San Diego horned lizard (*Phrynosoma coronatum blainvillei*); C2/SSC; Open scrub and grassland.

- Revise page 11-19, to delete:

  Mitigation Measure 11-1. Install Energy Dissipaters in Drainages into the Marsh.

- Revise page 11-19, to replace Mitigation Measure 11-2 with the following:

  - **Mitigation Measure 11-2. Prepare and Implement a Marshland Management Plan**

  In cooperation with the Los Angeles County Department of Public Works, the Districts propose to prepare and implement a marshland management plan (MMP) for habitat at the Districts' marsh site. The purpose of the MMP would be to maintain and enhance the wildlife habitat value of the Districts' marsh site. The site supports freshwater marsh, riparian forest and scrub, annual grassland, and ruderal habitats. As part of the MMP, the Districts would:

  - Establish a cooperative agreement with Los Angeles County Flood Control District for access to water from and disposal of marsh water to the Wilmington Drain;

  - Maintain or enhance the habitat quality of the freshwater marsh by managing the flow to and water quality of the marsh site;

  - Enhance riparian forest by gradual replacement of non-native trees (e.g., eucalyptus and Peruvian peppertree) with native trees (e.g. Goodding's willow, arroyo willow, red willow, yellow willow, and coast live oak) and native shrubs (e.g., mule fat, coyote brush, Mexican elderberry, and California rose);

- Convert ruderal habitat to native riparian forest and scrub habitat through weed management (e.g., poison hemlock, fennel, and horehound) and the installation of native riparian trees and shrubs; and

- Prepare and implement short-term and long-term monitoring programs that include specific success criteria; methods for measuring success of native vegetation establishment and levels of wildlife use; and provisions for remedial actions.

The draft MMP would be completed within 6 months of certification of the final program EIR. The draft MMP would be provided to DFG, USFWS, the U.S. Army Corps of Engineers and Ken Malloy Harbor Regional Park Advisory Board for review. Following consideration of DFG, USFWS, U.S. Army Corps of Engineers, and Park Advisory Board comments, the Districts would develop a final MMP. The Districts would be responsible for commencing the implementation of the MMP within a year of construction of the Phase I digesters at the currently proposed location.

■ Revise page 11-21, **Mitigation Measure 11-3,** to add text after second dash mark:

- implementing necessary irrigation <u>(and identifying groundwater levels in proposed irrigation areas)</u>, <u>exotic plant and</u> weed control, herbivore control, . . .shrub plantings.

■ Revise page 11-21, **Mitigation Measure 11-3,** to add following text after the last dash mark:

<u>The mitigation plan will include a planting plan showing the location of the mitigation site; the number, size, and species of plants proposed for the mitigation plan; the layout of the proposed compensation area; the seasonal timeframe for planting; and analysis of soil conditions at the site. The Districts would be responsible for implementing the mitigation plan and would provide a draft mitigation plan to USFWS and the U.S. Army Corps of Engineers for review before implementation of the mitigation plan.</u>

■ Revise page 11-22, paragraph 2, to read: Alternative 4: Upgrade <u>JWPCP/Expand</u> Los Coyotes WRP/San Jose Creek WRP/Whittier Narrows WRP.

- Revise Table 11-3, page 2 of 2, to delete: **Mitigation Measure 11-1. Install energy dissipaters in drainages into the marsh.**

- Revise page 12-6, Figure 12-3, to show: the area north of Lomita Boulevard and west of Main Street as MH, not ~~R2~~ to the area east of Main Street between Lomita Boulevard and Sepulveda Boulevard to add ML-D (light manufacturing development overlay); and the area north of Sepulveda Boulevard between Figueroa Street and Main Street as RA (residential-agricultural), not ~~R~~.

- Revise page 14-1, paragraph 4, line 2, to read:

MWD ~~distributes water to a service area encompassing 5,139 square miles~~ provides imported water to supplement local water supplies to more than 15 million residents and the $400 billion economy in its 5,145-square-mile service area, which is approximately 5% of the total land area of California.

- Revise page 14-1, last paragraph, line 1, to read:

MWD is a consortium of member cities ~~and~~, municipal water districts, and a county water authority.

- Revise page 14-1, last paragraph, line 3, to read:

Cities with their own water agencies in the JOS service area are Torrance, Pasadena, ~~Los Angeles~~ San Marino, Compton, and Long Beach.

- Revise page 14-2, paragraph 3, line 4, to read:

The major groundwater basins serving the JOS service area (the Raymond Basin, the Central Basin, the West Coast Basin, and the main San Gabriel Basin) are adjudicated or managed by special districts or agencies.

- Revise page 14-2, to replace paragraph 5 with:

MWD has water delivery contracts for Colorado River water with the U.S. Department of the Interior for 1.212 million acre-feet per year (MAFY) and an additional 180,000 acre-feet per year (AFY) of surplus water. The capacity of MWD's Colorado River Aqueduct is 1,800 cubic feet per second, or 1.3 million AFY. However, as a result of the

1994 U.S. Supreme Court decree in *Arizona vs. California*, MWD's dependable supply of Colorado River water was reduced to less than 550,000 AFY. This reduction in dependable supply occurred with the commencement of Colorado River deliveries by the Central Arizona Project (CAP).

MWD has a priority to divert 55,000 AFY of California's 4.4 MAFY basic apportionment under its water delivery contract with the Secretary of the Interior. In addition, MWD has entered into agreements with water agencies providing Colorado River water for agricultural purposes in the California desert to increase its dependable supplies. Water use by holders of present perfected rights (such as Indian reservations, towns, and individuals along the Colorado River whose rights predate MWD's rights) is estimated to reduce dependable diversions by about 30,000 AFY. Conveyance losses along the Colorado River Aqueduct of 10,000 AFY further reduce the amount of Colorado River water received in the coastal plain.

Based on an annual determination, the Secretary of the Interior has allowed MWD in recent years to divert Colorado River water apportioned to, but unused by, Arizona and Nevada. Arizona and Nevada are not expected to use their full apportionments until the years 2036 and 2005, respectively.

- Revise page 14-2, to delete last paragraph, and page 14-3, to delete first two paragraphs and replace with:

MWD first received deliveries of State Water Project (SWP) supplies in 1972. MWD has contracted for the delivery of approximately 2.01 MAFY of SWP water, or about 48% of the total contracted entitlement. Contractor requests for SWP entitlement have been increasing, and in 1994 they reached 3.85 million acre-feet (MAF). While this level of request significantly exceeds the dependable yield from existing SWP facilities, SWP has been able to meet all contractors' requests for entitlement water except during the drought periods in 1977, 1990 through 1992, and 1994. In addition, surplus water has been delivered to contractors in many years. SWP deliveries to MWD reached a high in 1990 of 1.4 MAF. The only years when MWD received less SWP water than it needed were 1991 and 1992, with an SWP delivery in 1991 of 381,000 acre-feet (AF).

The quantity of SWP water available for delivery is affected both by hydrology and operational considerations. SWP operations in the Sacramento-San Joaquin Delta (Delta) are governed by standards established under the State Water Resources Control Board (SWRCB) 1978 Water Rights Decision 1485. This decision requires compliance with water quality standards and flow requirements for the Delta and assigns responsibility to meet these standards exclusively to SWP and the Central Valley Project (CVP).

Currently, the SWP is being operated in accordance with the December 1994 consensus agreement on Bay/Delta standards. This agreement has resulted in a reduction in SWP supplies in order to provide added environmental protection for the Delta.

- Revise page 14-3, paragraph 3, first sentence, to read:

Projected Water Supply: Several programs have been proposed to increase future supply reliability in the MWD service area.

- Revise page 14-3, first bullet, last sentence, to read:

This program is expected to recover 200,000 AFY of contaminated groundwater. Approximately 100,000 AFY of the annual groundwater production will be untapped local yield or new supplies, while the remaining amount will require replenishment by imported water supplies or reclaimed water to prevent groundwater basin overdraft.

- Revise page 14-3, to replace second bullet with:

Local Projects Program: MWD has determined that providing financial assistance toward the implementation of reclamation projects would be a regional benefit to its entire service area as reclaimed water could augment local water supplies and increase reliability. In 1982, MWD instituted the Local Projects Program (LPP) as a means by which it could participate with local agencies in expanding local water supplies through reclamation. The LPP provides a contribution of $154 per acre-foot to qualifying projects based on the amount of reclaimed water delivered and used by a project in a particular year. The LPP is expected to yield an additional 200,000 AFY of water by 2000.

- Revise page 14-3, to replace third bullet with:

Colorado River Programs

<u>All American and Coachella Canal-Lining Projects</u>

Title II of Public Law 100-675 authorized the Secretary of the Interior to approve the lining of 65 miles of the All American Canal and the Coachella Canal. The projects are to be constructed with 100% nonfederal funding. Constructing a 23-mile concrete-lined canal parallel to the existing earthen All American Canal could conserve 67,700 AF of Colorado River water annually. Constructing a 33-mile concrete-lined canal in the existing cross section of the Coachella Canal could conserve 25,700 AF of Colorado water annually. MWD is proposing to provide the funding for implementation of the All

American Canal-Lining Project in exchange for use of the conserved water. MWD would be reimbursed if another entity with a higher priority right were to use the conserved water.

Interstate Underground Storage of Unused Colorado River Water

MWD and the Central Arizona Water Conservation District (CAWCD) executed an Agreement for a Demonstration Project on Underground Storage of Colorado River Water (Agreement) in October 1992. Under the Agreement, 100,000 AF of Colorado River water has been released from Lake Mead, conveyed through the Central Arizona Project's Hayden-Rhodes Aqueduct, and stored underground in central Arizona. MWD and the Southern Nevada Water Authority (SNWA) paid the costs of storing the water, while CAWCD is responsible for costs of recovery of the water. There are two potential uses of the stored water. CAWCD could use the water during shortages declared by the Secretary of the Interior. Alternatively, MWD and SNWA could exchange this water for CAWCD's Colorado River water subsequent to a surplus occurring or a release for flood control purposes from Lake Mead. MWD and CAWCD have executed an Amendatory Agreement to the Agreement that increases the amount of water that may be stored from 100,000 AF to 300,000 AF and extends the time for storage activities from December 31, 1996 to December 31, 2000. MWD and CAWCD are seeking the approval of the Amendatory Agreement from a number of agencies, including the States of Arizona and Nevada and the U.S. Bureau of Reclamation, by May 1995.

Colorado River Basin Regional Water Supply Solution

Representatives of water agencies, the Colorado River Basin States, and the U.S. Bureau of Reclamation are working to reach consensus on a number of components that would improve water management in the Colorado River Basin. A major element of this effort is to ensure adequate dependable supplies, in particular for urban users of Colorado River water in Arizona, California, and Nevada. The consensus, which could take the form of regulations for administering entitlements, may include provisions for banking conserved and non-Colorado River system water, interstate water leases, guidelines for surplus and shortage declarations, and wheeling non-Colorado River system water.

- Revise page 14-4, to replace first bullet with:

State Water Project Programs: Due to many complex issues, the facilities needed to increase the SWP yield have not been constructed. MWD's Integrated Resources Planning (IRP) process identifies interim South Delta facilities, acoustic fish barriers, and a Delta water transfer facility as additional SWP facilities to be included in the Preferred Resource Mix. In addition, the California Department of Water Resources (DWR) is working on developing other water management programs that will increase the SWP yield. The facilities and programs that are needed to increase SWP water supplies are:

Acoustic Fish Barriers

Acoustic fish barriers have been installed on a trial basis along the Sacramento River at the Delta Cross Channel and at Georgianna Slough. If proven to be effective, acoustic barriers will reduce SWP impacts on certain fish species and improve SWP operation and flexibility.

Bulletin-160-93, Level 1 Options

In 1994, DWR issued the update to the California Water Plan, Bulletin 160-93. This bulletin listed several SWP programs, referred to as Level 1 options, that have undergone extensive investigation and environmental analysis and are judged to have a higher likelihood of being implemented by 2020. The following potential SWP programs were listed as Level 1 options:

- Interim South Delta Water Management Program: The preferred alternative for the Interim South Delta Program consists of an additional SWP intake structure at Clifton Court Forebay, limited dredging in South Delta channels, and four South Delta channel flow-control structures. These facilities are intended to allow SWP to increase its export pumping capacity, provide increased operational flexibility, reduce fishery impacts, and improve water levels and circulation for local agricultural diverters.

- Long-Term Delta Solution: In 1992, Governor Wilson delivered a water policy statement that established a Bay-Delta Oversight Council to guide the planning and environmental documentation process for implementation of a long-term Delta solution. In 1994, federal regulatory agencies joined the State of California in this effort by forming a coalition, known as "CalFed." Members of CalFed signed a Framework Agreement that outlined a joint state/federal process to develop a long-term solution. This process is expected to take 3 to 4 years to identify solutions and carry out the CEQA/National Environmental Policy Act process.

- Kern Water Bank: The Kern Water Bank consists of local and State-owned groundwater storage programs in Kern County. DWR has estimated that, in total, approximately 2 million AF could be stored under these programs. Planning for Kern Water Bank has slowed to accommodate the long-term Delta solution process.

- Los Banos Grandes Reservoir: This proposed 1.75-million-AF surface reservoir, located near and functioning similarly to San Luis Reservoir, would provide additional SWP storage and yield south of the Delta. The schedule for this project has also slowed to accommodate the long-term Delta solution process.

Proposed SWP Water Supply Planning Strategy

In late 1994, DWR began a scoping process to develop an SWP Future Water Supply Program. This process is focusing on identifying new strategies to develop SWP water supplies during the next 30 years through interim, short-term (over the next 10 years), and long-term measures. The strategies will include both traditional and "nontraditional" options to develop the necessary supplies in a timely manner. DWR has indicated that it intends to gain broad-based support for this program through public and regulatory agency participation programs. DWR plans to have a report outlining details for implementing the SWP Future Water Supply Planning Strategy by spring 1996.

- Revise page 14-7, paragraph 2, line 5, to read:

  Initial response to San Jose Creek WRP is provided by ~~3 engines~~ one engine each out of Stations 87 and 90, which are approximately 4.7 and 4.2 minutes away from the plant, respectively.

- Revise page 14-11, "Impacts of Biosolids Disposal and Reuse", line 6, to read: However, the amount of biosolids disposed of is expected to be less than 2% of total landfill space, which would not substantially reduce landfill life.

- Revise page 15-13, under Mitigation Measure 15.8, first paragraph, last sentence, to read: The Districts would also provide water (or reimbursement for the cost of water) in an amount reasonably necessary to irrigate the athletic field (see Figure 15-1).

- Revise Table 18-1, page 3 of 4, to delete: Mitigation Measure 11-1. Install energy dissipaters in drainages into the marsh, and change: Mitigation Measure ~~11-2~~ 11-1. Prepare and implement a marshland management plan.

- Revise page C-2, first bullet, to read: a schedule showing when . . . each of ~~18~~ 8 JWPCP construction contracts.

- Revise page C-7, sixth bullet, to read: a maximum distance of ~~198~~ 253.5 miles . . . assumed.

- Revise page C-19, Table C-14, first column, under "2010 with Project Scenario" and "2010 Baseline Scenario" to read: SCAB/SEDAB to remote ~~landfill~~ disposal or reuse sites.

Table 2-1 (Revised from Draft EIR). JOS Population Forecast by Treatment Plant Drainage Areas, 1990-2010

Tributary Treatment Plant	Drainage Area	Number of Residents			Percentage Growth	Percentage of Total JOS Growth
		1990	2010	Growth		
Pomona WRP	1	172,657	214,577	41,920	24.3	5.7
San Jose Creek WRP	2	667,154	813,284	146,130	21.9	19.8
San Jose Creek or Whittier Narrows WRPs	3	327,836	398,255	70,419	21.4	9.6
Whittier Narrows or Los Coyotes WRPs	5	387,638	447,903	60,265	15.5	8.2
JWPCP	6	4,244	7,182	2,938	69.2	0.4
Los Coyotes WRP	7	247,818	286,309	38,491	15.5	5.2
Los Coyotes WRP or JWPCP	8	192,139	210,913	18,774	9.8	2.5
Long Beach WRP	9	54,948	61,923	6,975	12.7	0.9
Long Beach WRP or JWPCP	10	165,990	206,013	40,023	24.1	5.4
JWPCP	11	2,230,737	2,540,411	309,674	13.9	42.1
JWPCP	12	4,397	4,996	599	13.6	0.1
JWPCP	13	693	795	102	14.7	0.0
JOS service area (total)	all	4,456,251	5,192,561	736,310	16.5	100.0
Los Angeles County	---	8,860,000	11,286,000	2,426,000	27.4	---

Sources: Southern California Association of Governments 1994c.

Table 2-2 (Revised from Draft EIR).
JOS Treatment Capacity Needs for 2010

Drainage Area	Residential/ Commercial Flow (mgd)	Industrial Flow (mgd)	Total Flow (mgd)
1	21.7	0.72	22
2	82.3	3.75	86
3	40.3	1.59	42
5	46.1	2.40	49
6	0.7	0.29	1
7	29.0	2.16	31
8	21.3	1.06	22
9	6.3	0.13	6
10	20.8	0.29	21
11	257.1	81.05	338
12	0.5	0.00	1
13	0.1	0.72	1
Chino Basin[a]	N/A	7.6	7.6
TOTAL	526.3	101.77	628[b]

Note: N/A = not applicable (industrial flows only).
[a] Flows from Chino Basin are part of a contract entitlement.
[b] Columns and rows may not total exactly because of rounding.

Table 2-4 (Revised from Draft EIR). Comparison of Project Costs for Alternatives

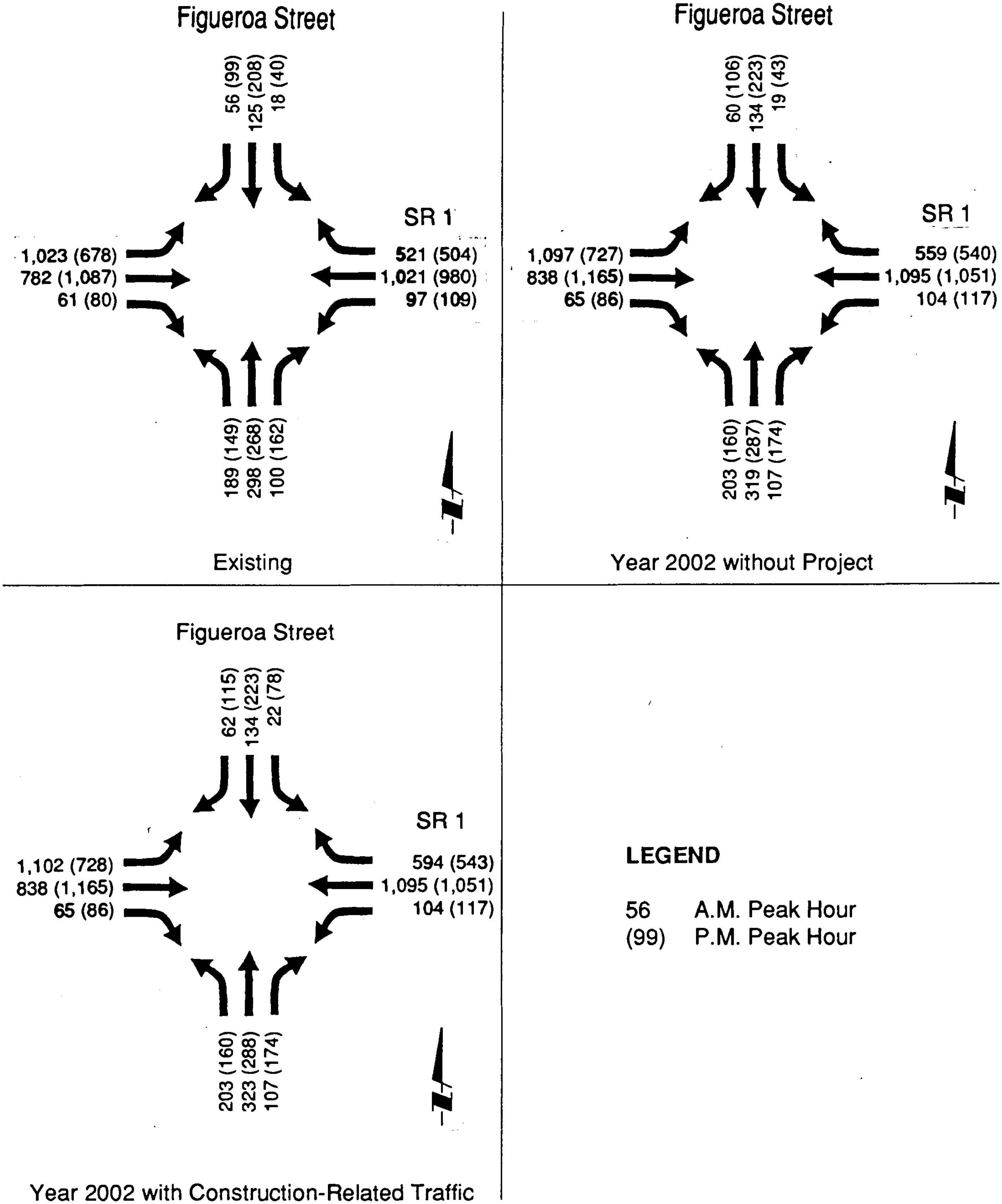
Alternative	Capital Cost	Annual O&M 2010	Equivalent Annual Costs
Alternative 1	$259,800,000	$13,800,000	$40,300,000
Alternative 2	278,800,000	14,200,000	42,600,000
Alternative 3	279,000,000	14,400,000	42,800,000
Alternative 4	323,800,000	16,400,000	49,400,000
JWPCP solids processing (common element)	196,800,000	14,800,000	34,800,000

Notes: All costs are in 1994 dollars. Equivalent annual costs based on 20-year amortization.

O&M = operations and maintenance.

Table 7-4a (New Table Added to Final EIR). Summary of Capacity Analysis during Construction: Intersection of State Route 1 and Figueroa Street

	Morning Peak Hour		Evening Peak Hour	
	V/C	LOS	V/C	LOS
Existing conditions	1.09	F	0.96	E
2002 without project	1.17	F	1.03	F
2002 with project construction-related traffic	1.18	F	1.04	F



COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

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Figure 7-6
Peak-Hour Turning Movements at the Intersection of SR 1 and Figueroa Street

Chapter 4

References

Chapter 4. References

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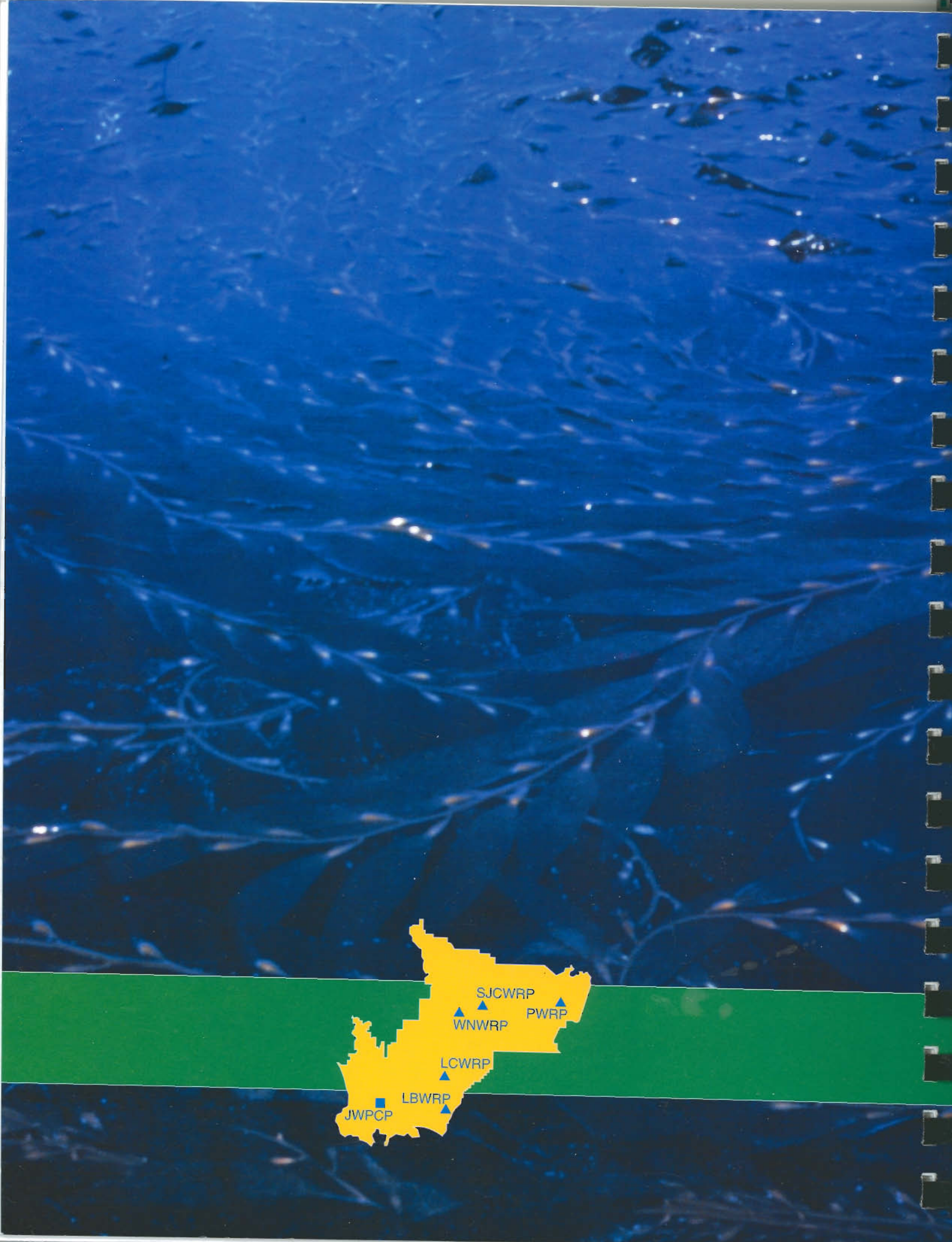
U.S. Fish and Wildlife Service. 1995. Letter from Gail C. Kobetich, field supervisor, to the SWRCB. March 1. Carlsbad, CA.

PERSONAL COMMUNICATIONS

Nelson, Marjorie. U.S. Fish and Wildlife Service, Carlsbad, CA. January 3, and February 8, 1995 - telephone conversations.


SJCWRP
WNWRP
PWRP
LCWRP
LBWRP
JWPCP

Marshland Management Plan
Joint Water Pollution Control Plant
Carson, California

Prepared for:

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

Prepared by:

Jones & Stokes Associates, Inc.

April 3, 1996

Marshland Management Plan

Prepared for:

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April 3, 1996

This document should be cited as:

Jones & Stokes Associates, Inc. 1996. Marshland management plan. April 3, 1996. (JSA 95-108.) Sacramento, CA. Prepared for County Sanitation Districts of Los Angeles County, Whittier, CA.

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Section 1. Introduction

SETTING

The marshland being managed is located at the Joint Water Pollution Control Plant (JWPCP) in Carson, California (Figures 1 and 2). The JWPCP, including the marshland, is owned and managed by the County Sanitation Districts of Los Angeles County (Districts). Situated at the northwestern corner of the JWPCP, the marshland consists of approximately 17.5 acres of natural and disturbed habitats surrounded by urban land uses (Figure 3). Immediately adjacent to the marshland are a flood control channel (the Wilmington Drain) and the Harbor Freeway to the west, a commercial nursery and Sepulveda Boulevard to the north, a commercial nursery and Figueroa Street to the east, and the Atchison Topeka & Santa Fe (AT & SF) Railroad line and the JWPCP to the south.

The marshland is a remnant of a much larger and more diverse system of freshwater marsh, riparian, and upland habitats. Although the marshland contains diverse habitats, its habitat value is greatly limited by its small size and its isolation from other areas of similar habitats by the surrounding urban development and lack of any obvious connecting wildlife movement corridors to other natural habitats.

PURPOSE OF THE MARSHLAND MANAGEMENT PLAN

This management plan has been developed to fulfill Mitigation Measure 11-2 of the Districts' final program environmental impact report (EIR) for the Joint Outfall System 2010 Master Facilities Plan (Jones & Stokes Associates 1995). The purpose of the management plan is to maintain and enhance the vegetation and wildlife habitat value of the marshland. Actions are identified in the management plan to mitigate potentially adverse impacts on vegetation or wildlife resulting from human activities associated with planned modifications at the JWPCP.

Compliance with Mitigation Measure 11-2

The marshland management plan has been developed in cooperation with the Los Angeles County Department of Public Works (Public Works) and addresses the following requirements of Mitigation Measure 11-2 in the EIR (Jones & Stokes Associates 1995):

- establish a new cooperative agreement with Public Works for access to water from and disposal of marsh water to the Wilmington Drain;

- maintain or enhance the habitat quality of the freshwater marsh by managing the flow to and water quality of the marsh site;

- enhance riparian forest by gradual replacement of non-native trees (e.g., eucalyptus and Peruvian peppertree) with native trees (e.g., Goodding's willow, arroyo willow, red willow, yellow willow, and coast live oak) and native shrubs (e.g., mule fat, coyote brush, Mexican elderberry, California rose);

- convert ruderal habitat to native riparian forest and scrub habitat through weed management (e.g., poison hemlock, fennel, and horehound) and the installation of native riparian trees and shrubs; and

- prepare and implement short-term and long-term monitoring programs that include specific success criteria, measurements of the success of native vegetation establishment and levels of wildlife use, and provisions for remedial actions.

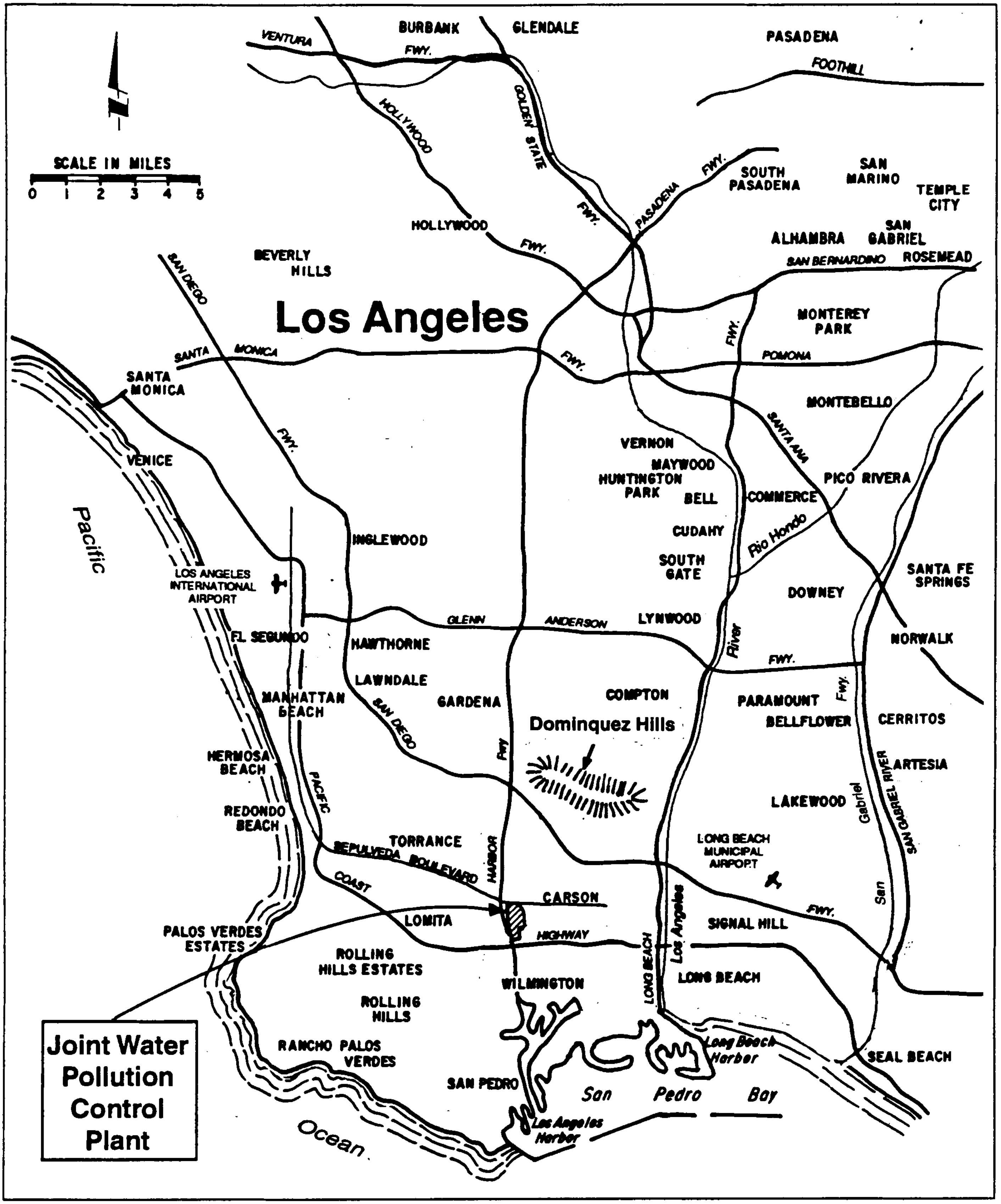
Additional requirements of the mitigation measure include completing the draft marshland management plan within six months of certification of the final program EIR; providing the draft plan to the California Department of Fish and Game, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and Ken Malloy Harbor Regional Park Advisory Board for review; developing a final management plan based on consideration of comments received on the draft plan; and commencing implementation of the marshland management plan within one year of construction of the Phase 1 digesters on the terrace at the eastern edge of the marshland. Construction of the Phase 1 digesters is anticipated to be complete in 2002.

In compliance with the requirements of the mitigation measure, the draft marshland management plan was provided to the agencies identified above for review. Comments were received from Ken Malloy Harbor Regional Park Advisory Board and Public Works. The comments and the Districts' responses on the draft management plan appear in Appendix A.

BACKGROUND

The marshland is a remnant of a formerly extensive, natural freshwater wetland complex known as Bixby Slough. As urban development increased near the slough in the early 1970s, the frequent flooding of these lowlands was viewed as a hardship to the local landowners, although it was essential to the existence of the wetlands. The Los Angeles County Flood Control District (LACFCD) proposed construction of a storm drain, the Wilmington Drain, through the marsh to provide protection from stormflows resulting from rainfall having a frequency of recurrence of once in 50 years.

The Wilmington Drain provided the necessary flood protection and ensured maintenance of the marshland by means of low-flow diversion. It was constructed in the mid-1970s by LACFCD



COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

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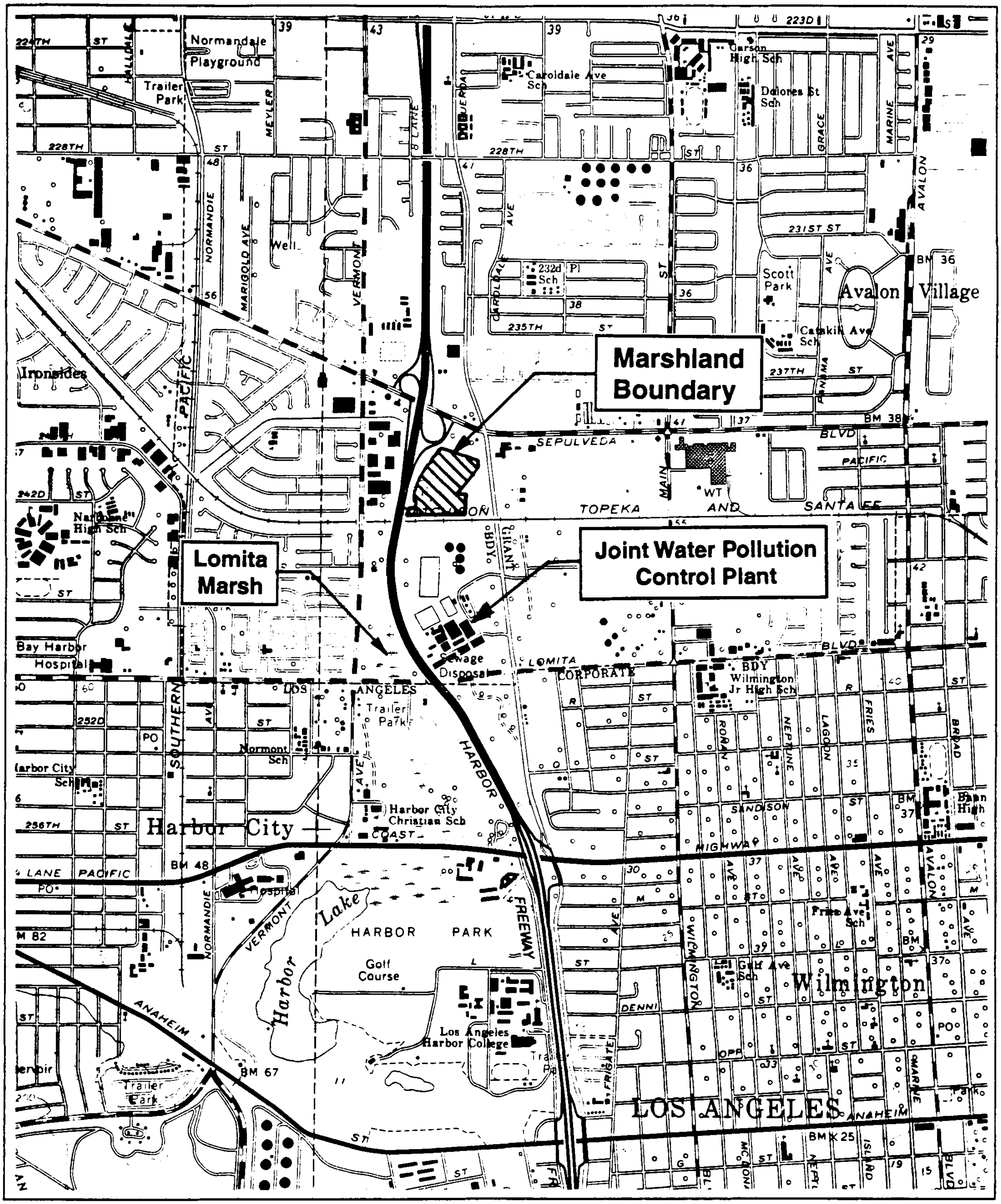
Figure 1
Regional Location of the Joint Water Pollution Control Plant



Source: USGS Torrance, California 7.5' Quadrangle, 1964, photorevised 1972.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

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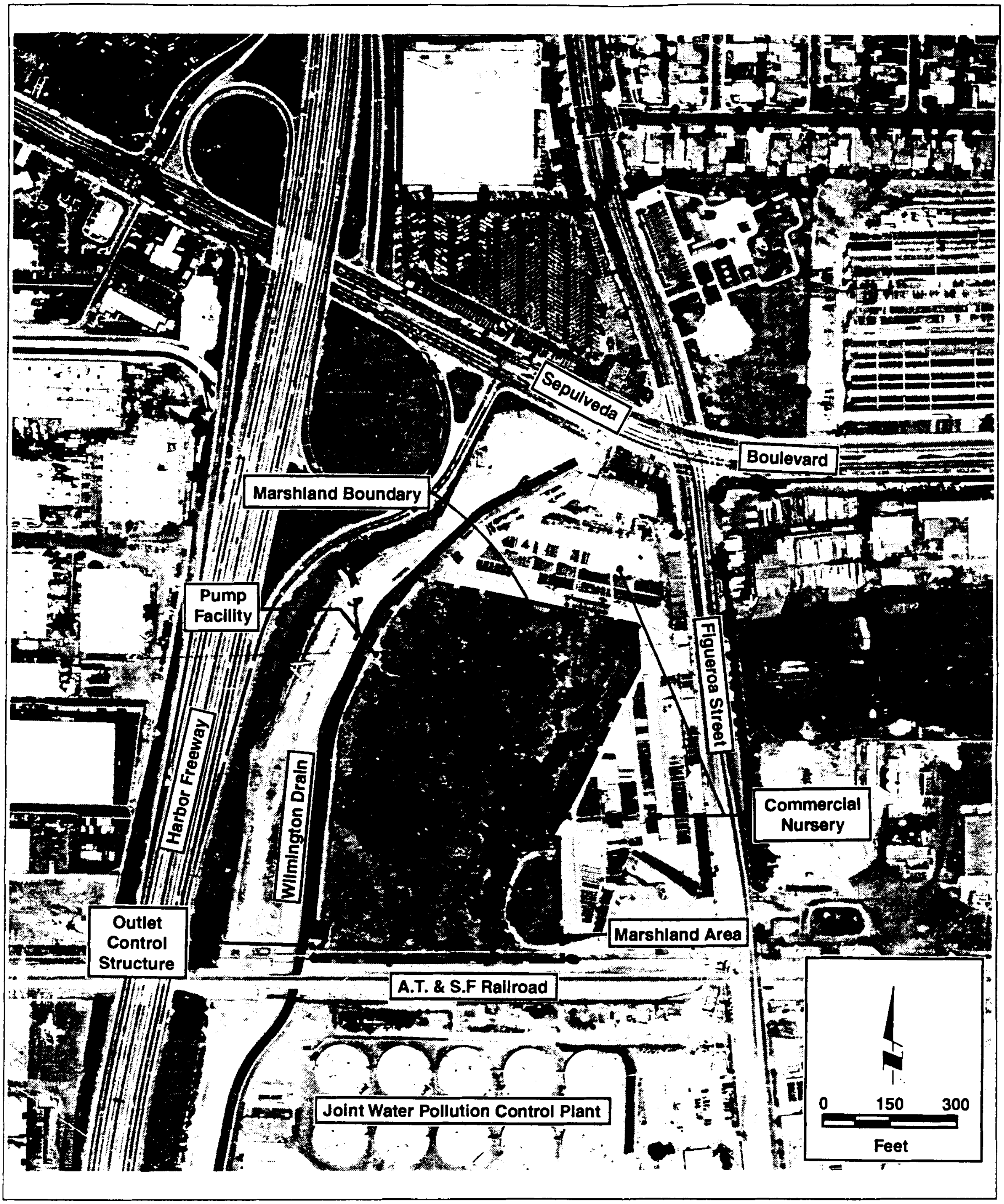
Figure 2
Vicinity of the Marshland at the Joint Water Pollution Control Plant



Source: County Sanitation Districts of Los Angeles County. 1992 aerial photograph.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

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Figure 3
Marshland Context

to convey stormwater from the approximately 14 square miles of mostly urban lands upstream of the JWPCP to the Lomita Marsh west of the Harbor Freeway and to Harbor Lake south of Lomita Boulevard (Figure 2). To avoid hydraulically isolating the JWPCP marshland area, a pump/gravity-flow facility was constructed as part of the Wilmington Drain project to provide water to the marshland.

The natural hydrology and drainage patterns within the marshland and its watershed have changed significantly as development has occurred in the region. The most significant changes are the channelization of Bixby Slough and the ongoing conversion of land from open space to urban uses.

A cooperative agreement adopted on April 23, 1975, between LACFCD and the Districts (Districts contract no. 2120A) states that, as part of constructing the Wilmington Drain, LACFCD would construct "facilities required for joint-use, open-space, and greenbelt areas along the project's alignment" and "assume responsibility for operation and maintenance" of those facilities (Los Angeles County Flood Control District and County Sanitation Districts of Los Angeles County 1975). Since Public Works absorbed the responsibilities of LACFCD for flood control maintenance associated with the Wilmington Drain, the pump facility has been maintained and operated by Public Works. Because the pump facility was constructed to maintain hydrologic flows to the marshland as part of the Wilmington Drain project, Public Works has continued to maintain and operate it under this cooperative agreement.

Section 2. Site Analysis

This section describes the existing and historical site conditions that may influence decisions for managing the marshland at the JWPCP. The factors described in this section are hydrology, soils, vegetation, wildlife, and public use and aesthetics. Analysis of these factors provides the context and rationale for the management goals, objectives, and actions described in Section 3.

The information contained in this section was gathered from existing reports, through discussions with knowledgeable individuals, and during a site visit by Jones & Stokes Associates scientists. The site visit, conducted on August 9, 1995, was a reconnaissance-level field survey by a landscape architect, a hydrology specialist, and two biologists.

HYDROLOGY

Water Supply and Drainage

The marshland was once part of a more extensive freshwater wetland complex. As described in Section 1, "Introduction", the marsh originally received natural stormwater runoff from the surrounding area. Today, runoff from the nursery operations also contributes some surface water flow (Figure 4). Regional groundwater maps indicate that a significant groundwater depression is located south of the Dominguez Hills (Figure 1) and that groundwater occurs at about -40 feet mean sea level (msl) at the project site (Los Angeles County Department of Public Works 1993). However, perched or shallow groundwater from surplus irrigation applied to landscaping or the nurseries in the natural watershed of the marsh may also contribute some water.

As development occurred in the area, the increased runoff was diverted to Bixby Slough because it was a naturally low-lying area. Construction of the Wilmington Drain hydraulically isolated the marsh from the contributing watershed. A pump/gravity-flow facility was constructed by LACFCD during the mid-1970s to provide water to ensure the viability of the marsh. The outlet control structure was added later when the JWPCP was expanded and the natural outlet of the marsh was blocked. The pump facility was constructed and maintained under a cooperative agreement between the Districts and LACFCD. The pump facility is now maintained by Public Works, which took over the functions of LACFCD.

Examination of historic aerial photographs on public display at the JWPCP indicates that native woody riparian and marsh vegetation has increased substantially in the marshland since operation of the pump facility began in the mid-1970s. It appears that the rapid increase in native vegetation is due almost entirely to the substantially increased quantity of water reaching the marsh. In the past, significant flows other than those caused by storms were rare. As urban development has occurred in the watershed, runoff has become more persistent and the volume has increased, probably because of the increased amount of impermeable surfaces in the area, overapplication of landscape irrigation, car washing, and other activities. Installation of the pump system further increased flows to the marsh in the summer. Since the early part of this century, the marsh has evolved from what was once an ephemeral drainage into a viable freshwater marsh, largely as a result of urban development and an increased year-round supply of water.

Pump Facility and Outlet Control Operation

The pump system operates when the water surface elevation in the Wilmington Drain, East Channel is less than 15.68 feet msl; the system is controlled by a series of water level sensors (Figure 5). When water in the stilling well exceeds 12.68 feet msl, the pump activates and operates until the water level in the stilling well decreases to 10.51 feet msl or the water in the marsh increases to an elevation of 19.34 feet msl. During high flows in the Wilmington Drain, East Channel, when the water surface elevation exceeds 17.68 feet msl, water enters the marsh by gravity flow through a flap gate.

An outlet control structure was also constructed near the southwestern corner of the marsh when the natural outlet was blocked by JWPCP expansion. The structure allows surplus water in the marsh to flow back to the drain and controls the water surface elevation in the marsh. The outlet structure has a weir-type overflow at 20.18 feet msl and a toggle gate with an invert elevation of 16.93 feet msl. The toggle gate is presently jammed in the open position. Although the purpose of the toggle gate is not known, it could be used to allow maintenance activities in the marsh or provide seasonal stormwater detention. The Wilmington Drain, East Channel does not have the capacity in this reach to accommodate a 50-year flood (1,300 cubic feet per second [cfs]); it does convey the 23-year flood flow (1,100 cfs). Although stormwater detention is the likely purpose of the gate, the area is not operated by Public Works as a detention basin.

Public Works operates and maintains the pump facility and inspects it once a month. The pump sump is cleaned as needed by Public Works (Yamahara pers. comm.). No information is available on how frequently the pump system operates or how often stormwater runoff flows by gravity to the marsh (Chebabi pers. comm.). An hour meter installed in the pump control facility indicated that, over the last 10 years, the pump had operated approximately 1,300 hours per year, or about 15% of the time. During a site visit conducted by the Jones & Stokes Associates project team on August 9, 1995, the pump did not appear to have run recently for more than a few minutes at a time. The outfall channel from the pump facility to the former natural drainage channel in the marsh (Figure 4) was clogged with sediments and vegetation, which would cause water to back up and the pump to shut off. Plastic bags and other trash were buried by as much as 12 inches of dry silt and other fine materials in the connecting channel. When the pump was operated manually, approximately 30 minutes of operation was required for water to flow over the obstruction.

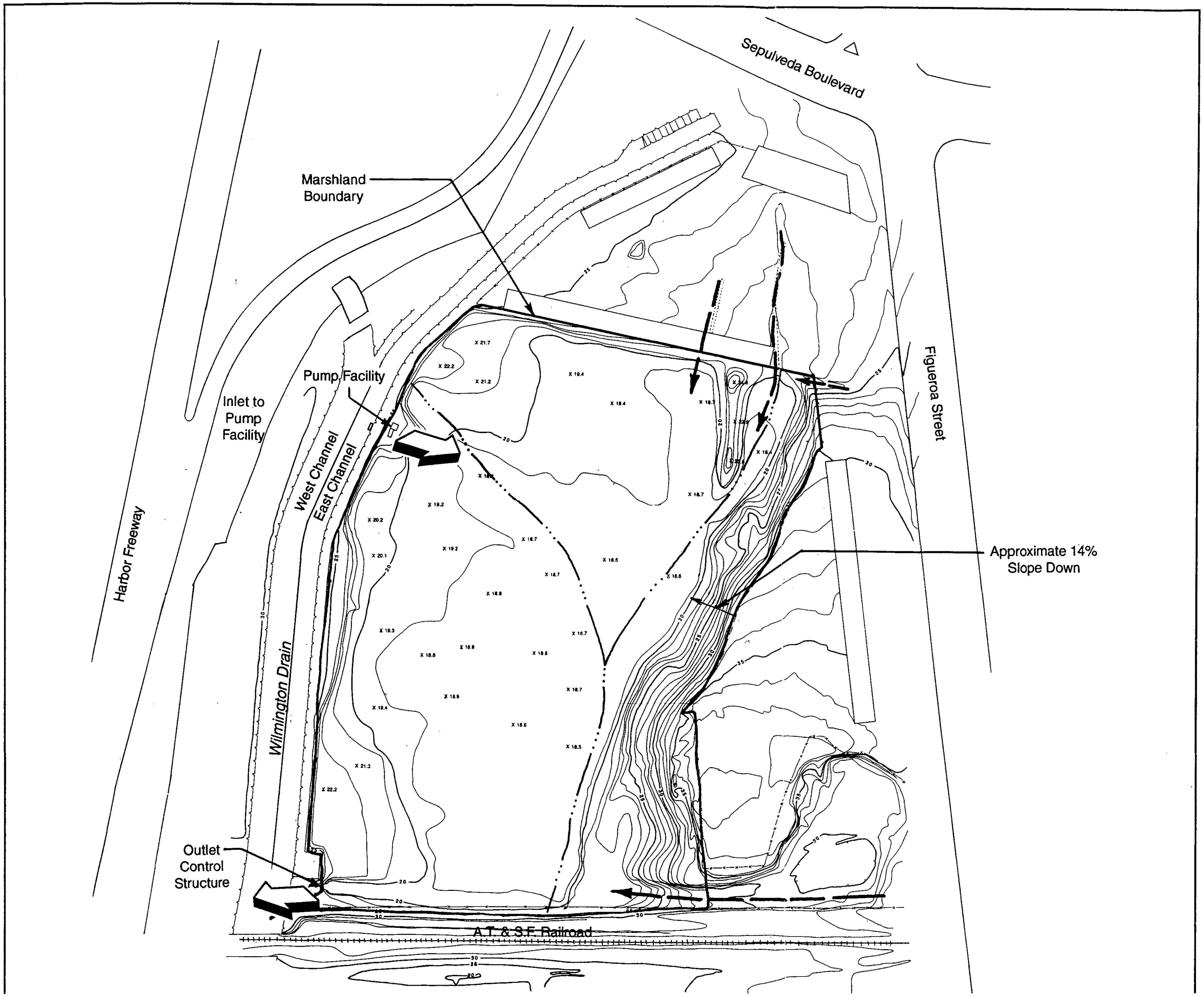

Figure 4
Topography and Drainage Features

LEGEND

Ephemeral Drainage into Marshland

Controlled Inflow and Outflow for Marshland

Approximate Location of Former Natural Drainage Channel

0 100 200
Scale in Feet

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Water Quality

Water quality is not monitored regularly in the drain or the marsh. The water quality is expected to be somewhat degraded, however, because its primary source is urban runoff, which is recognized as a major source of pollution that can adversely affect receiving waters. During dry periods, pollutants accumulate on the land surface. These pollutants, which are common household substances, include inorganic chemicals and minerals (e.g., metals and salts), oil and grease from parking areas and roads, synthetic organic chemicals (e.g., detergents), oxygen-demanding and disease-causing wastes (e.g., animal waste), fertilizers, and pesticides. These pollutants are typically conveyed directly to receiving waters through the storm drain infrastructure.

Los Angeles County and other local agencies have been issued a National Pollutant Discharge Elimination System (NPDES) permit (CA0061654) for municipal stormwater discharges (Yamahara pers. comm.). Permit conditions require implementation of best management practices (BMPs) to reduce the quantity of pollutants discharged to stormwater. These measures include separation of non-stormwater discharges from the storm drain system, street sweeping, and installation of oil and grease traps on road and parking area drains. Implementation of BMPs greatly reduces the potential for significant pollutant loading.

Little water quality information has been collected since the 1970s for the Wilmington Drain project. The concentration of total dissolved solids can range from 450 milligrams per liter (mg/l) during winter storms to more than 900 mg/l during the first storm of the season or summer low flows. The water quality of Harbor Lake, which receives inflow from the drain, does not appear to be adversely affected. (Los Angeles County Flood Control District 1975.)

Although supporting water quality data are not available for this site, implementation of BMPs has probably reduced pollutant loading from previous levels that were measured in the late 1960s and early 1970s, before implementation of the Clean Water Act and the NPDES program.

SOILS

The soils at the project site are probably altered from their original state. Aerial photographs show that, although the natural channels appear to be largely undisturbed, grading and other development activities have occurred in the adjacent uplands. According to geologic investigations of the JWPCP site completed for previous plant expansions, the site is located on Quaternary alluvium consisting of sand and thin clay interbeds; the recent alluvium overlies the Pico, Repetto, and Puente Formations, which consist of porous sand with sandstone and shale interbeds. Catalina schist, formed in the Jurassic period, composes the basement geologic materials. (Fugro Consulting Engineers and Geologists 1975.)

Boring logs for the JWPCP expansion south of the marshland indicate that surface soils are primarily silty clays, silty sands, and sandy silts. The surface materials are generally dense, stiff, silty clays, which extend to 10 feet below grade and overlie a layer of silty sand and sandy silt. Beneath this layer is another layer of silty clay underlain by sand. The boring logs show that these layers are not continuous and are not inclined or dipped toward or away from the natural lowlands of the marsh.

Based on these data, surface materials in the marsh, which is 10-15 feet below the elevation of the JWPCP, probably comprise silty sands and sandy silts overlaying a silty clay layer. This conclusion is supported by the vigor of the hydrophytic vegetation in the marsh in the absence of a significant surface water supply. Surplus irrigation water from the residential development in the natural watershed of the marsh probably flows through or is perched in the relatively porous silty sand and sandy silt that overlie the more impervious silty clay layer and supports the vegetation in the marsh. This conclusion is further supported by evidence collected during the field visit. In areas of the marsh dominated by tules, the accumulated detritus could be pushed aside to reveal moist, silty soils.

No recent soil survey that includes the project area is available. A historic soil survey (U.S. Department of Agriculture 1903) indicates that the salt content of the soil at the upper end of Bixby Slough near the marshland could restrict the growth of woody riparian vegetation. The present salt and sodium content of the soil are unknown; however, willows appear to be thriving and multiplying in the marshland. Information in the historic soil survey also indicates indirectly that the soil at higher elevations on the east side of the project area may be imported fill. During the site visit, some land surface characteristics indicated that fill materials may have been placed on the eastern slope of the marsh area. The suitability of the soil on the east slope to support the establishment of native oaks or other vegetation is unknown and would have to be determined through an onsite soil analysis.

VEGETATION

The area surrounding the JWPCP marshland consists primarily of developed land with little natural vegetation. The surrounding land uses include the AT & SF Railroad grade, the Harbor Freeway, the Wilmington Drain, Sepulveda Boulevard, commercial flower nurseries, and the JWPCP facility (Figure 3). The marshland supports riparian forest, annual grassland, freshwater marsh (seasonal and permanent), sagebrush scrub, and stands of poison hemlock (Figure 6). Many of the habitats in the area contain patches of interspersed ruderal vegetation. The marshland is essentially an isolated area of mostly natural habitat surrounded by extensive urban development. Although small, the area contains a diversity of habitats and exhibits a wide variety of vegetation structure, ranging from low-growing grassy areas to tall trees (Figure 7).

The vegetation in the marshland has changed substantially during this century, as shown in aerial photographs on public display at the JWPCP dating from 1928. During 1928-1976, the area

Figure 6
Vegetation Habitat

LEGEND

- Riparian Forest (RF) - dominated by willows with patches dominated by eucalyptus
- Annual Grassland (AG) - dominated by annual grasses with ruderal vegetation interspersed
- Freshwater Marsh (FM) - primarily tules with patches of cattails
  - Seasonal Marsh (SM)
  - Cattail Marsh (CM)
- Sage Scrub (SS) - dominated by California sagebrush
- Poison Hemlock (H) - ruderal vegetation dominated by poison hemlock

0 100 200
Scale in Feet

Sources: 1987 aerial photograph and field observation by Jones & Stokes Associates in August 1995.

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was dominated by herbaceous vegetation, such as grasses and forbs with some emergent vegetation. Riparian woody vegetation (e.g., willows and eucalyptus) began to develop during the late 1970s and early 1980s. The riparian forest has grown substantially during the late 1980s and early 1990s, as observed in the most recent aerial photograph of the area (Figure 3). Figure 8 shows the approximate elevation ranges of the vegetation habitats in the marshland.

No special-status plants are known to occur at the marshland site. The common and scientific names of plants mentioned in the text are listed in Appendix B.

Freshwater Marsh

Freshwater marsh habitat, comprising tule marsh with patches of cattails, seasonal marsh, and cattail marsh, occupies a total of 5.0 acres in the marshland and occurs in the northeastern and south-central portions of the area (Figure 6). Most of the freshwater marsh habitat (3.7 acres) is dominated by tules with small patches of cattails. Seasonal marsh occupies 1.1 acres of the freshwater marsh and is dominated by cocklebur and curly dock. A small area (0.2 acre) of the freshwater marsh is dominated by cattails. Other common species in the freshwater marsh are mulefat, cocklebur, yellow nut-sedge, alkali heath, and arroyo willow.

Riparian Forest

Riparian forest occupies approximately 7.0 acres and is found throughout much of the marshland (Figure 6). The riparian forest habitat consists primarily of native riparian trees and scrub, including arroyo willow, Goodding's willow, red willow, and yellow willow. Many non-native trees, including Peruvian peppertree and red gum, are also present. Native willows in the marshland often grow in dense thickets and as understory in the riparian forest. Also, dense thickets of mulefat dominate some portions of the riparian forest understory. The riparian forest provides most of the tall and medium-height vegetative structure for the area. Tall riparian trees help screen views by motorists traveling on the Harbor Freeway of the nurseries on the terraces east and north of the marshland.

Annual Grassland

Annual grassland encompasses 4.1 acres and is generally located along the eastern, western, and southern edges of the marshland (Figure 6). The grassland vegetation is dominated by annual grasses (e.g., ripgut brome and soft chess) with ruderal species interspersed (e.g., wild radish, wild mustard, and cheeseweed). Non-native castor bean and fan palm also are present along the embankment of the AT & SF Railroad tracks.

Sagebrush Scrub

Sagebrush scrub occupies 0.4 acre in the southeastern portion of the marshland on the west-facing slope (Figure 6). The sagebrush scrub habitat is dominated by California sagebrush. Other plants occurring in the sagebrush scrub include coyote brush, horehound, fennel, ripgut brome, soft chess, and wild mustard. The area of sagebrush scrub habitat is small and limited in plant diversity. Many species of plants typical of coastal scrub habitats in southern California are lacking at this site, such as California buckwheat, California encilia, purple sage, black sage, white sage, toyon, lemonadeberry, redberry, and laurel sumac (Paysen et al. 1980, Conrad 1987).

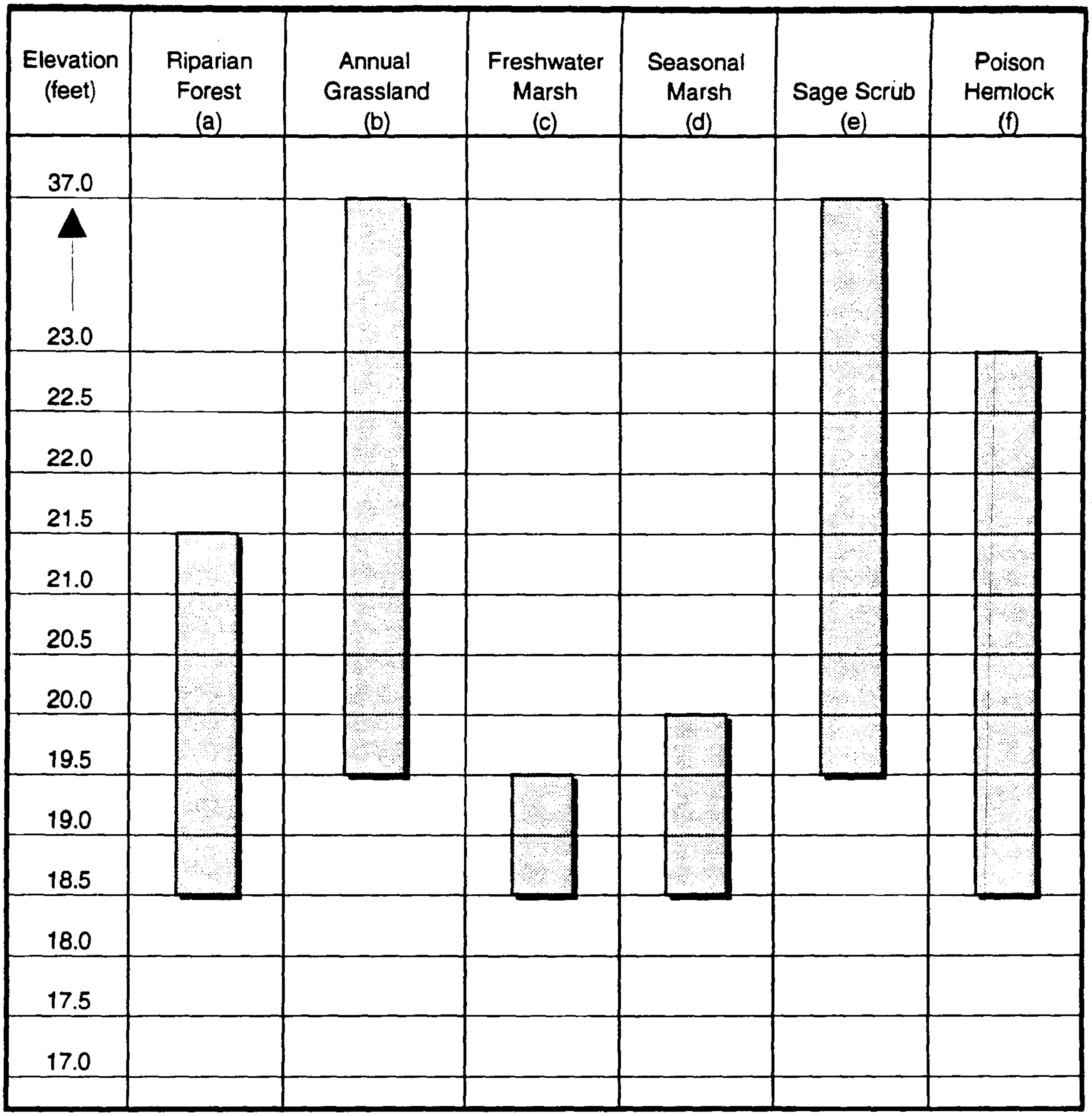
Poison Hemlock

A sparse cover of ruderal vegetation dominated by poison hemlock is found in three areas in the northern and northwestern portions of the marshland area, adjacent to riparian forest habitats (Figure 6). Poison hemlock is an introduced plant that has naturalized throughout large areas of California and is considered a noxious weed. It is highly toxic if eaten. Other plants found in the poison hemlock habitat are wild mustard, fennel, and cheeseweed. Approximately 1.0 acre of poison hemlock vegetation is located in the marshland.

WILDLIFE

The marshland probably has an unstable wildlife population. Wildlife populations are considered stable when the annual rate of increase is approximately equal to the rate of decrease (Adams 1994). Three factors generally affect animal population stability: reproduction, mortality, and movement (emigration and immigration) (Adams 1994). The marshland area is small (17.5 acres) and isolated from other natural habitats (i.e., no wildlife movement corridors connect it to other natural areas). The nearest important natural habitat area is about 0.5 mile south of the marshland at Lomita Marsh (Figure 2), with the Harbor Freeway creating a barrier to movement. Because of these limitations, many terrestrial and wetland wildlife species populations are isolated in the marshland. Wildlife species that are usually found in wetland and riparian habitats do not occur in the marshland, or occur only during migration, because access to the site is limited and the site is too small to sustain populations of species that require a larger habitat area.

Despite these limitations, the marshland supports many wildlife species that migrate through the area (birds and bats), have small home ranges (small rodents, reptiles, and amphibians), or can use both urban and natural areas (some birds, raccoons, and skunks). During site visits by Jones & Stokes Associates biologists, a small number of species were observed to be using the marshland (Appendix C).



(a) Dominated by willows with patches of eucalyptus.
(b) Dominated by annual grasses with ruderal vegetation interspersed.
(c) Primarily tules with patches of cattails.
(d) Dominated by cocklebur and curly dock.
(e) Dominated by California sagebrush.
(f) Ruderal vegetation dominated by poison hemlock.

<u>Note:</u>
Elevation ranges are based on 1987 topographic data and field observations and are approximate.

Figure 8
Approximate Elevation Ranges of Marshland Habitats

Although it is small, the marshland has a substantial amount of habitat diversity (i.e., varied structure and composition of vegetation in a given area). This habitat diversity increases the habitat value for many wildlife species, especially those that use more than one habitat (e.g., American kestrels, song sparrows, bushtits, and bats) or prefer the edges between two or more habitat types (e.g., wetland snakes, Pacific chorus frogs, flycatchers, kestrels, skunks, and raccoons).

Because birds are not dependent on terrestrial corridors for their movement and migration, they are not restricted to the marshland and move into and out of the area as needed. Many birds that use riparian and other woodland or forest habitats are cavity nesters. These birds (usually woodpeckers) construct holes in mature trees, snags, or trees with broken tops or branches for nesting or roosting. The marshland provides low-quality habitat for most cavity-nesting birds because the trees in the area are fairly young and most are non-native species that generally do not form cavities.

Bats also may use the marshland and adjacent areas. Bats are beneficial to humans because they consume large quantities of insects, many of which are pests (e.g., mosquitos, flies, gnats, and moths). Many bats use roosts or hibernate in bat houses, caves, mines, and buildings. Bats are often found in urban natural areas, parks, and residential areas. The marshland is suitable foraging habitat for bats, but few suitable cavities for roosting or hibernating are available.

As described above with regard to vegetation, the wildlife habitats and plant communities in the marshland have changed dramatically in this century. The rapid and continual changes to vegetation and urban land uses have led to unstable wildlife populations in the marshland and adjacent areas. Also, the wildlife species composition has changed along with the vegetation and dominant land uses. The wildlife species composition has shifted from a predominance of grassland and swale wildlife (e.g., western meadowlarks, horned larks, American pipits, and gopher snakes) early in this century to consisting primarily of riparian and wetland wildlife (e.g., black phoebes, marsh wrens, song sparrows, scrub jays, and Pacific chorus frogs) in the 1980s and 1990s.

Human intrusion on and disturbance of wildlife appear to be minimal, although homeless people appear to use the marshland as a campsite. They apparently enter the marshland along the AT & SF Railroad grade where the fence has been pushed down. Because the marshland is small, use of the area as a transient camp could substantially disturb wildlife. Noise, light, and glare from surrounding land uses, especially traffic on the elevated Harbor Freeway just west of the marshland, may have some negative effects on wildlife in the area; however, wildlife species using the area are probably accustomed to these disturbances and have acclimated to them (Jones & Stokes Associates 1995).

No special-status wildlife are known to occur in the marshland. The common and scientific names of wildlife species observed in the marshland and mentioned in the text are listed in Appendix B.

The marshland contains five wildlife habitat types: freshwater marsh, riparian forest, annual grassland, sagebrush scrub, and poison hemlock. In addition, a sixth habitat, the Wilmington Drain, runs along the western edge of the marshland. These wildlife habitat types and their values are described below.

Freshwater Marsh

The freshwater marsh provides moderate-quality foraging, breeding, and roosting habitat for many wildlife species that have adapted to living in urban wetlands. These species include the black phoebe, barn swallow, cliff swallow, marsh wren, song sparrow, and Pacific chorus frog.

Riparian Forest

The riparian forest habitat provides moderate-quality foraging, breeding, and roosting habitat for many wildlife species adapted to urban riparian habitats. Dense willows provide cover, roosting, perching, and nesting habitat and attract insects that serve as a food source for many species of birds. The vertical structure of the riparian vegetation is important for canopy-dependent wildlife, including warblers, vireos, bushtits, and bats. Wildlife species observed during field surveys include raccoons, striped skunks, American kestrels, song sparrows, bushtits, house finches, mourning doves, northern mockingbirds, scrub jays, and Pacific chorus frogs. Also, two species of bats (long-eared myotis and California myotis) may feed on insects in the tree canopy. Suitable roosting cavities for bats are lacking in the marshland, although roosting habitat may exist nearby. American kestrels perch and forage in the marshland, but suitable nesting cavities in trees are lacking.

Annual Grassland

Annual grassland provides foraging habitat and cover for California ground squirrels, raccoons, striped skunks, American kestrels, house finches, mourning doves, northern mockingbirds, scrub jays, and Pacific chorus frogs. Big brown bats and Mexican free-tailed bats may also forage for insects in the grassland area.

Sagebrush Scrub

The sagebrush scrub habitat in the marshland does not support the typical wildlife species found in sagebrush scrub (i.e., California gnatcatchers, cactus wrens, and orange-throated whiptails) because the area of this habitat is small, many plants typical of sagebrush scrub (such as berry-producing shrubs) are absent, and the sagebrush scrub has only recently become established in the area. The sagebrush scrub provides habitat for wildlife species that also occur in the grassland and poison hemlock habitats, but the habitat quality of sagebrush scrub is higher.

Poison Hemlock

The wildlife use and wildlife species composition of the poison hemlock habitat is similar to those of annual grassland. Poison hemlock has lower wildlife value than annual grassland because non-native vegetation dominate and food sources are limited.

Wilmington Drain

The Wilmington Drain is a concrete-lined channel that runs along the western edge of the marshland (Figure 3). The drain contains open water and floating aquatic habitat (i.e., thick mats of water primrose floating in the drain). Although it contains water year round, the drain has low wildlife value because it supports only small amounts of the vegetation needed by most animals. The drain does support small numbers of mosquitofish, which are fed on by belted kingfishers. During field surveys, cliff and barn swallows were observed feeding on insects flying over the drain. The drain's vertical concrete walls and the adjacent Harbor Freeway probably serve as barriers to migration for most terrestrial and wetland wildlife species. Bats may forage for insects along the Wilmington Drain, but no suitable roosting habitat occurs there.

PUBLIC USE AND AESTHETICS

The Districts do not allow public access to the marshland. Authorized personnel from the Districts and Public Works are permitted to enter the marshland to perform maintenance or inspect the area. Other people are permitted by the Districts to enter the area on official business and with prior authorization. The perimeter of the area is fenced. The fence along the southern edge of the marshland, which separates it from the AT & SF Railroad line, has been bent over in at least two locations to gain access to the area. An abandoned camp was observed in the marshland during a Jones & Stokes Associates site visit on August 9, 1995. Trash, paths worn through parts of the area, remnants of small campfires, and other evidence suggested that more than one camp may have been in use in the marshland or that the area is used by homeless people on a regular basis. Unauthorized public use reduces the quality of the vegetation and wildlife habitat of the marshland and could affect the habitat value because of the potential for vegetation damage and fires.

The marshland provides a small but visually interesting area for travelers to view from the elevated Harbor Freeway. Motorists traveling north have excellent views of the marshland and the diverse vegetation growing there. The area is not as easily visible for southbound motorists. The marshland is aesthetically important and vivid in the context of the heavily urbanized surrounding area because it contrasts strongly as an area of natural visual character and relief. The year-round and seasonal variety of colors and forms of the diverse vegetation creates a small area of strong visual attraction and interest.

Section 3. Management Plan

This section describes the elements of the marshland management plan. For each management element, a goal, objectives, actions designed to accomplish the objectives, and the rationale for the actions are described. Because the management elements are interrelated, some management actions are described only briefly and cross-referenced to similar actions described in another element. Management actions will be implemented by the Districts unless identified otherwise. Where a management action will be implemented by an entity other than the Districts, that entity is identified in parentheses following the action. Figure 9 shows the important features of the marshland management plan.

Management of the marshland area at the JWPCP is intended to maintain and enhance the habitat value of the area. Goals have been identified to support this overall purpose in the management of hydrology, vegetation, wildlife, and public use and aesthetics. The goals for these management elements are identified below and are summarized as follows:

- Hydrology Management: Sustain the hydrologic conditions necessary to maintain and enhance the freshwater marsh and riparian forest habitats in the marshland.
- Vegetation Management: Maintain vegetation health and enhance the diversity and amount of native vegetation habitats in the marshland.
- Wildlife Management: Maintain and enhance wildlife habitat values in the marshland.
- Public Use and Aesthetics Management: Continue to control public access to the marshland and maintain its aesthetic function.

HYDROLOGY MANAGEMENT

Hydrology management activities will focus on maintaining the freshwater habitat that has become established in the marsh. Maintenance of the marsh was a condition of approval for the Wilmington Drain project. Based on the rapid increase in riparian vegetation that has occurred since construction of the drain, the hydrologic system for the marsh previously functioned differently than it does with the water management system operating today.

These changes from past operations have probably been caused by obstructions in the outfall channel that leads from the pump facility to the marsh, damage to outlet works, and accumulated sediments in the Wilmington Drain that block low flows to the inlet structure. The hydrology management objectives and actions are primarily directed toward maintaining the water management system and making minor corrections. The goal for managing hydrology in the marshland is to sustain the hydrologic conditions necessary to maintain and enhance the freshwater marsh and riparian forest habitats in the marshland.

During the Jones & Stokes Associates site visit, several areas appeared to require maintenance. The toggle gate at the outlet control structure has been damaged and is jammed in the open position. This prevents maintenance of open water habitats unless stormwater inflow is substantial. The toggle gate will be repaired and maintained to allow water management that will sustain the habitats in the marshland.

The outflow channel from the pump facility to the marsh is blocked by accumulated sediments and other debris, preventing the pump system from supplying the water necessary to maintain open water habitat in the marsh during low-flow conditions in the drain. The outflow channel from the pump facility to the marsh will be inspected regularly and maintained by the Districts at an elevation of 17.5 feet msl by removing debris, controlling vegetation, and grading as necessary to maintain the flow of water to the marsh and riparian areas.

During a site visit on August 9, 1995, the Wilmington Drain was observed to have accumulated a large amount of sediments near the pump inlet, and most of these sediments have been colonized by vegetation. This may lead to further entrainment of sediments and blockage unless the sediments and vegetation are removed. Public Works cleans the channel invert annually; this was last performed on November 28, 1995 (Yamahara pers. comm.). The inlet will continue to be inspected regularly and sediments, debris, vegetation, and other obstructions cleared from the inlet by Public Works as necessary to maintain flows through the inlet year round, especially during low-flow periods.

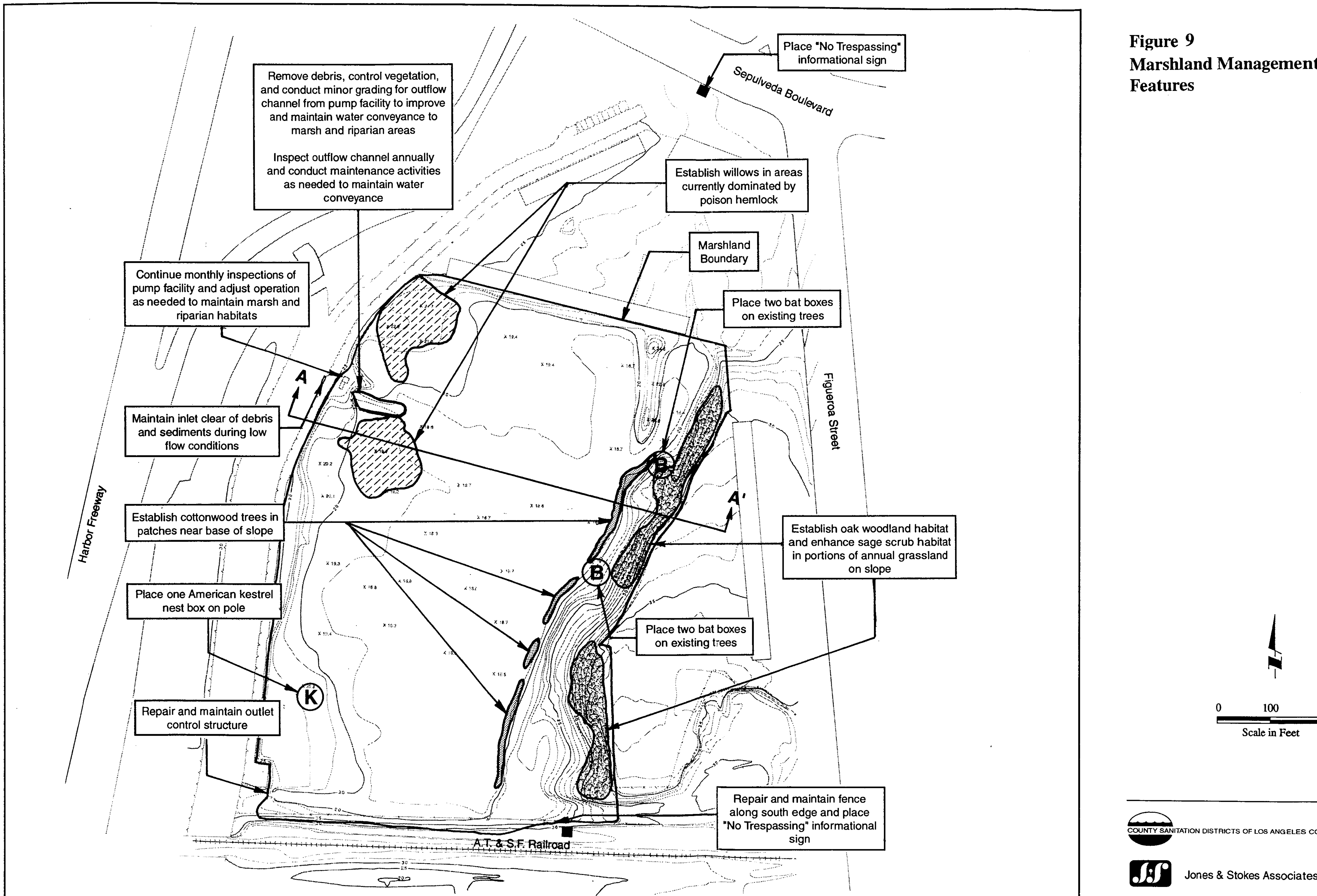
To maintain adequate water levels in the marsh, the outlet control structure will be operated by the Districts to provide stormwater detention during the rainy season (November through March) and to provide open water habitat throughout the rest of the year. Opening the toggle gate during the rainy season will allow the water level to fluctuate between 16.93 and 20.18 feet msl as a result of stormwater runoff. Rapid filling and draining of the marsh will help to scour sediments from the channels and flush accumulated debris. From April through October, the gate will be closed to pond water and maintain open water habitats. The water level during this period will fluctuate between 19.35 and 20.18 feet msl, assuming that the water in the drain is sufficient to offset losses from seepage and evapotranspiration.

Management Actions

Hydrology Management Goal: Sustain the hydrologic conditions necessary to maintain and enhance the freshwater marsh and riparian forest habitats in the marshland.

Objective H-1: Repair and maintain the water management facilities and system components that support the hydrologic system and habitats in the marshland.

Figure 9
Marshland Management Plan Features



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Action H-1.1: Repair and maintain the toggle gate at the outlet control structure.

Action H-1.2: Maintain the outflow channel from the pump facility to the marsh at or below an elevation of 17.5 feet msl by removing debris, controlling vegetation, and conducting minor grading as necessary to maintain water conveyance to the marsh and riparian areas.

Action H-1.3: Maintain the inlet to the pump facility from the Wilmington Drain to keep it clear of debris, sediments, and other obstructions (Public Works).

Action H-1.4: Adjust pump control system so that pump will operate until gravity flow occurs at an elevation of 17.68 feet msl (Public Works).

Objective H-2: Continue regular inspections of the water management system facilities and operate the system to ensure the continued existence of freshwater marsh and riparian forest habitat values.

Action H-2.1: Keep the toggle gate on the outlet control structure locked in the open position during the rainy season and in the closed position during the rest of the year, and adjust as necessary to maintain water levels in the marsh.

Action H-2.2: Inspect the outflow channel from the pump station to the marsh at least annually in the spring, following the rainy season, to assess the accumulation of debris and identify whether the invert of the channel is at or below an elevation of 17.5 feet msl.

Action H-2.3: Inspect the inlet to the pump facility annually in the spring, following the rainy season, and remove sediments or debris found to be blocking the inlet structure (Public Works).

Action H-2.4: Continue monthly monitoring of the pump facility to ensure that it is operating properly (Public Works).

VEGETATION MANAGEMENT

Vegetation management in the marshland is intended to maintain and improve vegetation habitat structure and diversity, improve the amount and quality of native vegetation, and support other goals for managing the area to maintain aesthetic values and improve wildlife habitat values. Management actions will focus on maintaining and improving vegetation habitat values in the primary habitats in the marshland area.

Because the marshland is small, surrounded by urban development, and relatively isolated from other native and natural habitat areas, a rigorous program of habitat enhancement is not warranted. The actions described below are intended to achieve a moderate level of habitat improvement without requiring a large, ongoing effort to maintain the area. Also, these actions are intended to work in concert with the current operation of the water management system with only minor adjustments to operation and maintenance procedures. Following initial efforts to establish vegetation in some areas, little ongoing maintenance and monitoring will be needed. Figure 9 shows locations of vegetation management actions described below. Figure 10 is a cross section through the marshland that shows the relative heights and relationships between habitats for the future condition with implementation of the vegetation management actions described below. Figure 8 shows the elevation ranges of existing marshland habitats; these ranges were used to determine suitable locations for establishing the various habitats in the marshland.

Riparian Forest Enhancement

The riparian forest appears to be healthy, structurally diverse, and expanding. The present operation of the water management system, in combination with other factors, appears to be delivering adequate water to the marshland to support riparian vegetation here. Riparian forest enhancement will include periodic, long-term evaluations of invasive exotic species, establishment of cottonwood trees in suitable areas, and establishment of willows in areas currently dominated by poison hemlock.

Evaluation of Invasive Exotic Species

Eucalyptus and other invasive exotic trees appear to be spreading in the marshland. Although these exotic species have some aesthetic value by helping to screen views of the area where new digesters will be placed, they do not provide the high wildlife habitat values that native riparian forest vegetation generally provides. The native willows, including arroyo and Goodding's willows, provide higher habitat values because they provide cover, roosting, and nesting opportunities, and they attract insects, which, in turn, attract birds and other wildlife that forage in the area.

Because exotic trees provide some habitat and aesthetic values, they will be retained, unless they begin to substantially displace the native riparian vegetation. At present, no steps will be taken to remove or control exotic trees in the riparian habitat areas. After site planting, control of exotic trees will be reconsidered as a possible management action if they are found to be substantially displacing native riparian trees and if habitat and aesthetic values would not be jeopardized by controlling them. Comparison of aerial photographs and field inspection by a qualified biologist and arborist could be used to make this determination.

Establishment of Cottonwoods

The habitat value of the riparian forest would be enhanced by adding cottonwood trees to the species mix. Cottonwoods grow quickly; become established easily under the proper soil, light, and moisture conditions; and provide high-value habitat for wildlife by providing roosting, perching,

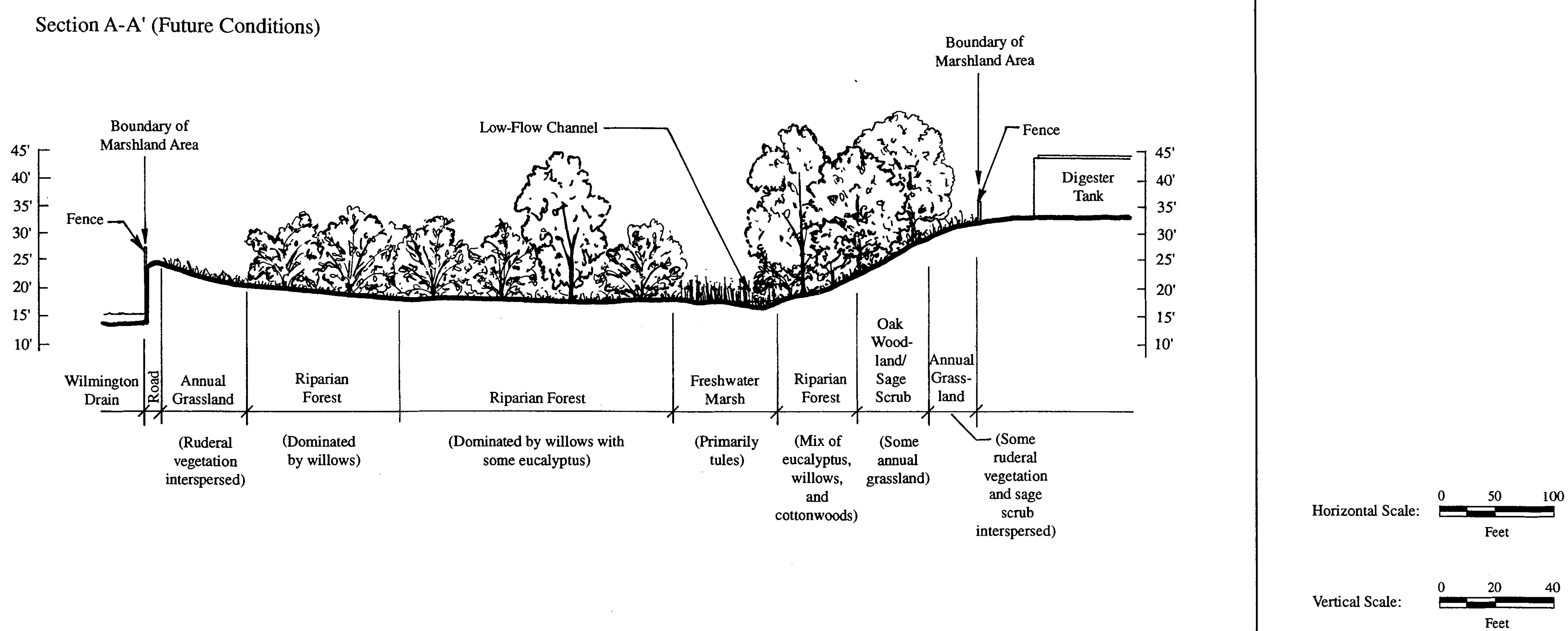

Figure 10
Cross Section of Future Vegetation

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

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and cover opportunities, supplying cavities and materials for nesting, and supporting insect populations that attract foraging birds. Additionally, cottonwoods would enhance the aesthetic character of the marshland and the surrounding area by providing year-round and seasonal variety of form and color and helping to screen views of the proposed digesters east of the marshland. For these reasons, patches of native cottonwood trees will be established in low-elevation areas along and near the base of the eastern slope where adequate soil, light, and moisture are present and where they could screen the digesters from the elevated Harbor Freeway (Figures 9 and 10).

Cottonwoods will be established by placing cuttings in suitable locations in the riparian areas during the winter when moisture and climate are appropriate (Figure 11). Cuttings will be taken from nearby locations when plants are dormant during the winter. Before establishing the cuttings, the soils will be tested to determine that proper soil conditions exist to support the trees (e.g., soil salinity, texture, pH, and other factors).

Enhancement of Willow Stands

Native willows that grow throughout the riparian forest habitat, including arroyo and Goodding's willows, provide high-quality habitat for wildlife by providing cover, roosting, and nesting opportunities and attracting numerous insects, which, in turn, attract birds and other wildlife to forage. In contrast, several patches of ruderal habitat dominated by poison hemlock (an invasive exotic species) in the northern and western parts of the marshland (Figure 6) provide very low-quality habitat values. These areas of poison hemlock are located adjacent to and generally within the same elevation range as riparian forest habitat areas (Figure 8). Portions of the hemlock habitat that are suitable for conversion based on elevation, soil conditions, and hydrology will be converted to willow-dominated riparian habitat.

Because control of poison hemlock is difficult, willow enhancement will be performed without a rigorous program of removal and control of poison hemlock. As the willows become established, they will eventually shade and dominate the poison hemlock. Before willows are planted, the soil in the area will be tested to confirm that conditions are suitable for willow establishment (e.g., soil salinity, texture, pH, and other factors).

To prepare the poison hemlock areas for planting, they will be mowed or disked if possible, and continuous, connected trenches will be excavated about 1.5 feet deep and 1.5 feet wide. Willow cuttings taken from local plants during their winter dormancy will be placed at about 15 feet on center in the trenches during winter, when climate and soil moisture are suitable. Cuttings will be placed using methods similar to those described and illustrated for cottonwood cuttings (Figure 11).

To supply irrigation water to the trenches for willow establishment in the two western sites, two temporary surface pipes will be installed to connect the outflow pipe from the pump to the trenches. Water will be supplied to the trenches and cuttings each time the pump is operated. The trenches will be graded to ensure that water flows to all cuttings.

Oak Woodland Establishment

Currently, no oak woodland habitat is present in the marshland. Establishing native oak trees would enhance habitat diversity and structure for the area and provide high-value habitat for wildlife by providing roosting, perching, and cover opportunities; supplying cavities and materials for nesting; and supporting insect populations that attract foraging birds and other wildlife. Although generally slow growing, oaks would also enhance the aesthetic character of the marshland and the surrounding area by providing more variety of form and color and eventually helping to screen views of the proposed digesters east of the marshland.

Because oak woodland habitat would provide a much higher habitat value than annual grassland and would be compatible with grassland habitat, it will be established within annual grassland habitat in the marshland. The best locations are on the west-facing slope on the east side of the marshland, where soil, light, and moisture may be suitable and where oaks might eventually screen views of the proposed digesters from the elevated Harbor Freeway (Figures 9 and 10).

Before attempting to establish oaks in this area, the soils will be tested to determine that proper soil conditions (e.g., soil salinity, texture, pH, and other factors) are present and adequate moisture is available to support oak habitat. If conditions are suitable, oaks will be established from seedlings or possibly acorns (Figure 11). Irrigation will be used to provide supplemental water for at least the first 2 years. Drip irrigation operated by an automatic control system, using water from a source near the new digesters, would provide the most reliable source of water for oak establishment. Hand watering may also be appropriate if a method could be found to ensure that regular and measured quantities of water could be applied.

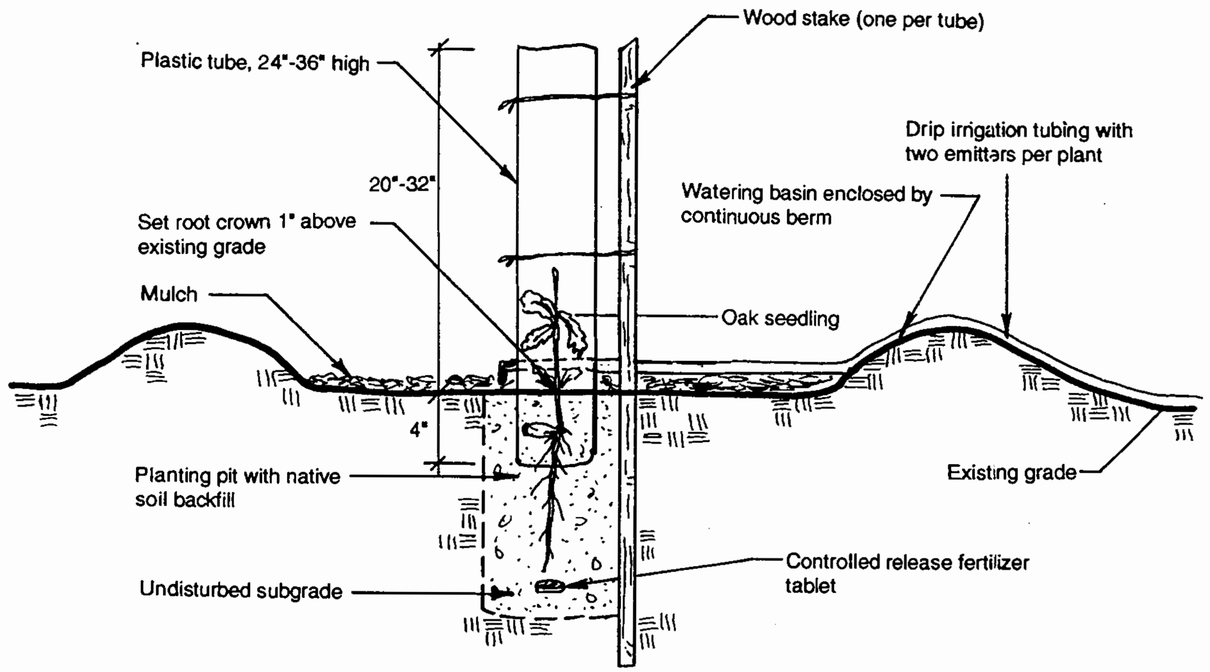
Oak establishment would be most successful if planting were performed by a qualified contractor and the contract included a specified maintenance and replacement period. Also, plant protection both above and below ground (e.g., plastic tubes) will be provided to reduce damage from herbivores. A watering basin filled with several inches of mulch and maintained free of weeds would also help support the oaks and ensure protection for the first several years of the establishment period. Approximately 100 oaks will be planted at about 15 feet on center in the areas identified in Figure 9.

Sagebrush Scrub Enhancement

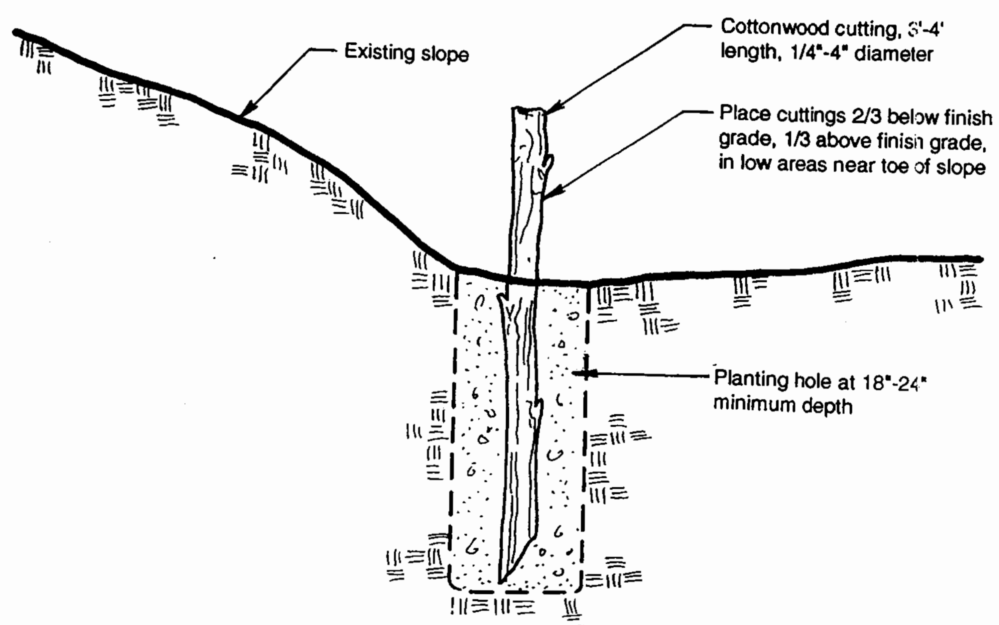
Currently, small patches of sagebrush scrub habitat and scattered plants are associated with this habitat in the marshland. These areas are generally located on the west-facing slope on the east side of the marsh. Establishing additional sagebrush scrub habitat in this area would enhance the value of the existing habitat as well as improve habitat value in the annual grassland area. Sagebrush scrub enhancement would improve the diversity and structure of the area and provide high-quality

Figure 11
Planting Details

Oak Seedling Planting Detail



Cottonwood Cutting Planting Detail



Note:

These details are illustrative and are not to be used for construction. Precise planting details should be prepared as part of construction drawings.

Not to scale

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habitat for wildlife by providing roosting, perching, and cover opportunities and improving foraging opportunities for birds and other wildlife.

Establishing typical sagebrush scrub species that are not present in the marshland and that produce useful seeds and berries would substantially enhance the quality of this habitat for wildlife. Suitable native sagebrush scrub and seed- and berry-producing plants include California sagebrush, California buckwheat, California encilia, lemonadeberry, and laurel sumac.

Patches of sagebrush scrub habitat will be interspersed with oak plantings in the areas indicated in Figure 9. A total of about 55 sagebrush scrub plants will be planted in small clusters of three to five plants with the spacing between plants about 15 feet on center. Planting and establishment methods for sagebrush scrub plants would be similar to those described above for oaks, including use of drip irrigation, plant protection, planting basins, mulch, and the maintenance period.

Freshwater Marsh Management

Management of the freshwater marsh habitat will continue as it is currently practiced through a cooperative agreement between the Districts and Public Works with minor improvements in operation and maintenance procedures. The freshwater marsh appears to be healthy and functioning. Recommended improvements to the system and regular inspections are described above under "Hydrology Management". Water levels and duration of standing water in the marsh should be monitored periodically and correlated with observations of vegetation health and changes in diversity. If vegetation health or vigor appears to decline, adjustments to the operation of the pump facility and outlet control structure should be made.

Management Actions

Vegetation Management: Maintain vegetation health and enhance the diversity, quality, and amount of native vegetation habitats in the marshland.

Objective V-1: Enhance riparian forest habitat by conducting periodic, long-term evaluations of invasive exotic species, establishing cottonwood trees in suitable areas, and establishing willows in areas currently dominated by poison hemlock.

> **Action V-1.1:** Conduct periodic, long-term evaluations of the expanse of invasive exotic species in the marshland and monitor the effects of these species on native vegetation and wildlife habitats to determine if a control program is warranted.

Action V-1.2: Establish patches of native cottonwood trees in low-elevation areas along and near the base of the eastern slope where adequate soil, light, and moisture conditions are present and where the trees could screen the digesters from view of travelers on the Harbor Freeway.

Action V-1.3: Establish native willows and cottonwoods to enhance riparian vegetation habitat in portions of those areas of the marshland dominated by poison hemlock.

Objective V-2: Establish oak woodland habitat to improve habitat values in portions of the annual grassland on the east side of the marshland.

Action V-2.1: Establish native oak woodland habitat in areas dominated by annual grassland on the west-facing slope on the east side of the marshland, where suitable soil, light, and moisture conditions are present and where oaks could eventually help screen the proposed digesters from view for travelers on the Harbor Freeway.

Objective V-3: Enhance the existing sagebrush scrub habitat to improve habitat values in portions of the annual grassland on the east side of the marshland.

Action V-3.1: Establish sagebrush scrub species that are not currently found in the marshland or that produce useful seeds and berries (e.g., California sagebrush, California buckwheat, California encilia, lemonadeberry, and laurel sumac) in areas dominated by annual grassland and interspersed with oak plantings on the west-facing slope on the east side of the marshland where suitable soil, light, and moisture conditions are present.

Objective V-4: Continue to manage the freshwater marsh habitat through a new cooperative agreement between the Districts and Public Works that would include minor improvements in operation and maintenance procedures.

Action V-4.1: Continue to manage the freshwater marsh habitat through the cooperative agreement between the Districts and Public Works that would include minor improvements in operation and maintenance as described in "Hydrology Management".

Action V-4.2: Monitor water levels and the duration of standing water in the marsh periodically, correlate the results with observations of vegetation health, and adjust the operation of the pump facility and outlet control structure as needed to maintain vegetation health and vigor.

WILDLIFE HABITAT MANAGEMENT

Wildlife habitats in the marshland would be managed to protect and improve conditions for native wildlife. This could be accomplished by:

- minimizing disturbance by humans,
- protecting existing habitats and selected habitat features, and
- enhancing wildlife habitats and habitat features.

Although human disturbance is probably low, homeless camps in the marshland could cause substantial disturbance because the marsh is a small, isolated wildlife habitat. One method by which impacts from humans on marshland wildlife will be reduced is the repair and maintenance of fences along the perimeter of the property, especially along the railroad grade. "No trespassing" signs will also be installed on the fences to discourage people from entering the marshland.

Snags (standing dead trees) provide nesting and roosting cavities and perches for wildlife such as bats, swallows, and American kestrels. Although often removed for reasons such as aesthetics, fire prevention, and public safety, snags will be retained wherever possible as long as they do not create a public safety hazard.

Few cavities suitable for bat roosting and rearing and American kestrel nesting are available in the marshland. Bat and kestrel roosting, rearing, and nesting habitats will be enhanced by constructing and placing nest and roost boxes in the marshland.

Proper placement of nest and roost boxes increases the likelihood that they will be occupied. Bat boxes will be placed on trees along the edge of the riparian habitat (e.g., mature eucalyptus trees), and a kestrel box will be placed on a post in the annual grassland (Figure 9). All boxes will be placed approximately 15 feet above the ground. The bat boxes will be placed on the south and southeast sides of trees, whereas the opening of the kestrel box will face southeast. Construction diagrams are shown in Figures 12 and 13. The boxes will be checked and maintained each year to ensure that they remain in good condition, although occupied boxes will not be disturbed. The boxes could be constructed by Districts staff or community groups (e.g., Boy Scouts or Audubon Society) or they could be purchased from conservation groups such as Bat Conservation International or commercial sources.

The Districts will enhance the wildlife habitat quality of the marshland by:

- establishing oak woodland habitat;

- planting riparian plants (e.g., willows and cottonwoods) in the riparian zone; and

- expanding the sagebrush scrub habitat by planting species with high wildlife habitat values, such as California sagebrush, California buckwheat, lemonadeberry, laurel sumac, and California encilia.

Refer to the vegetation management recommendations for additional information on habitat management.

Management Actions

Wildlife Management Goal: Maintain and enhance wildlife habitat values in the marshland.

Objective W-1: Protect and improve wildlife habitat values by reducing unauthorized human intrusion into the marshland.

Action W-1.1: Repair and maintain fences along the perimeter of the marshland, especially along the railroad grade, to reduce unauthorized human intrusion into the marshland and minimize wildlife disturbance.

Action W-1.2: Install "no trespassing" signs that explain reasons for restrictions at known and potential entry points to discourage unauthorized intrusion into the marshland.

Objective W-2: Enhance wildlife habitat values in the marshland by preserving and enhancing roosting, perching, and nesting opportunities for wildlife species and establishing native vegetation to improve foraging opportunities.

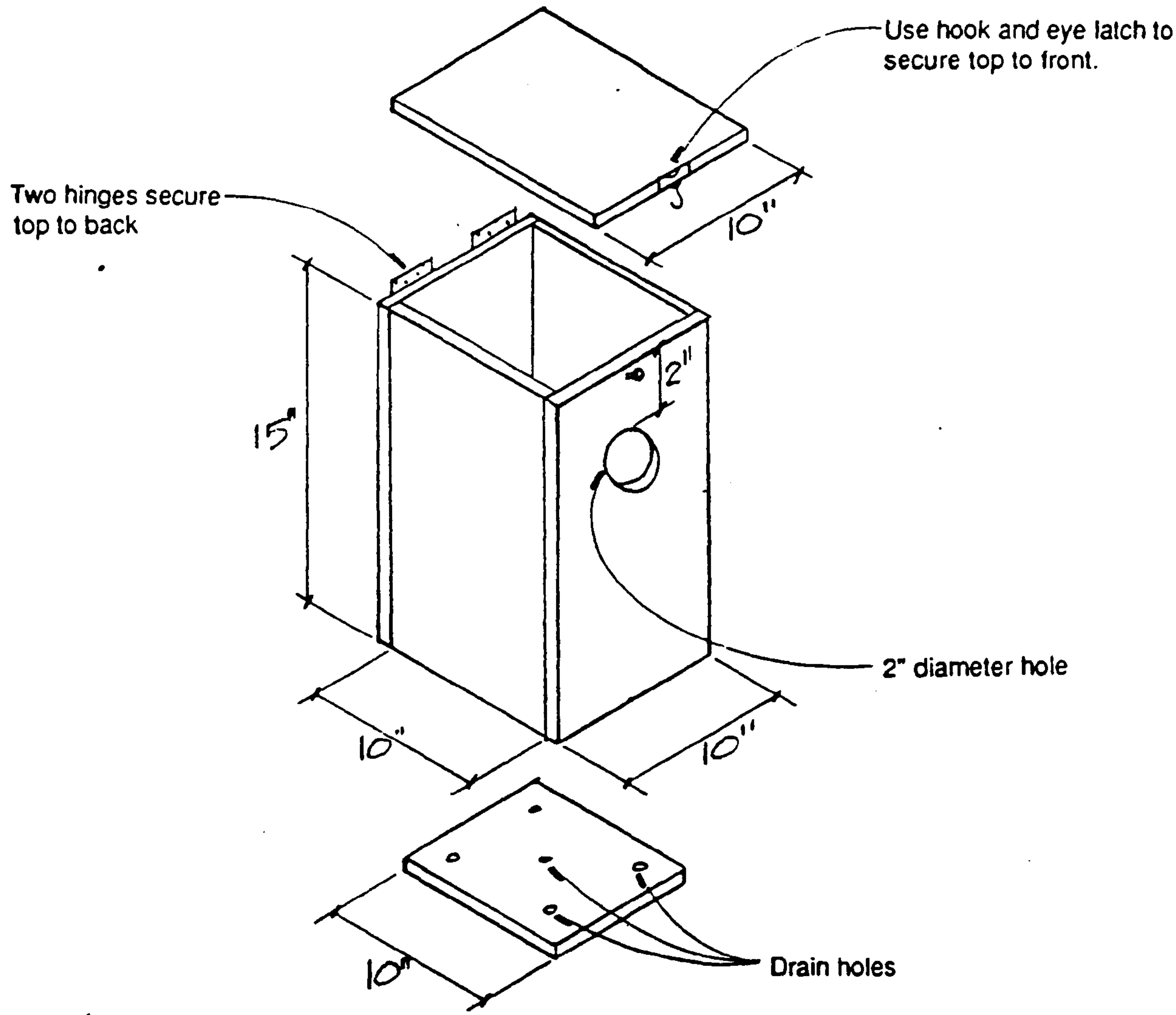
Action W-2.1: Retain snags whenever possible to preserve nesting and roosting cavities and perches for wildlife.

Action W-2.2: Place one American kestrel nest box and four bat boxes in the marshland to create and enhance nesting and roosting sites for kestrels and bats.

Action W-2.3: Enhance existing native riparian and upland habitats in the marshland by establishing native species of vegetation that may improve foraging, roosting, perching, and nesting opportunities (see actions under "Vegetation Management" above).

PUBLIC USE AND AESTHETICS MANAGEMENT

To protect the habitat quality and value of the marshland, access to the area will continue to be granted only to personnel from the Districts and Public Works and their representatives who are authorized to perform maintenance or inspect or monitor conditions in the area, as described in this



no scale

NOTE: Use 1/2" typical rough cut redwood or cedar lumber and galvanized finishing screws or hardware staples for nest box construction.

Figure 12
Kestrel Nest Box Details

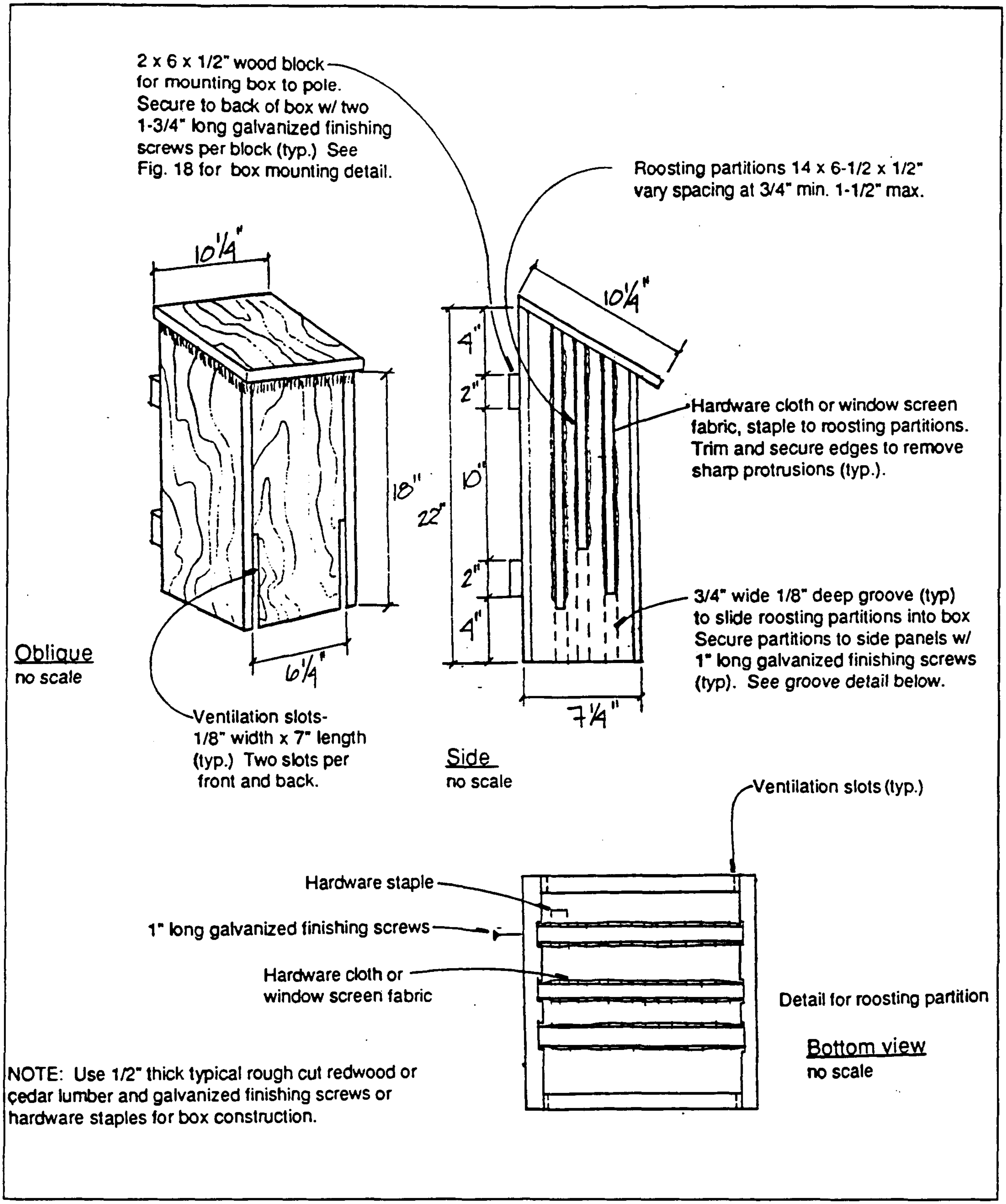


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Figure 13
Bat Roost Box Details

plan. To continue to control access to the area, the fence along the southern edge of the marshland, which separates it from the AT & SF Railroad, will be repaired and maintained, and "no trespassing" signs will be placed at locations identified in Figure 9. The signs will also explain the reasons for the access restriction, including the importance of the area for wildlife and the sensitive nature of the marshland.

If any homeless people, campsites, fires, or other evidence of unauthorized use of the marshland are observed during routine inspection or maintenance visits to the area, appropriate actions would be taken to remove the unauthorized people and clean up the area. This would be important to help maintain the quality of the vegetation and wildlife habitat, reduce the potential for further habitat damage, and protect the aesthetics of the marshland.

Various actions intended to enhance vegetation habitat in the marshland that are described in "Vegetation Management" will also help protect and enhance the aesthetic character and visual quality of the marshland.

Management Actions

Public Use and Aesthetics Management Goal: Continue to control public access to the marshland and maintain and enhance its aesthetic quality and function.

Implementing the various actions for the other management elements described above would achieve this goal.

MONITORING AND MAINTENANCE

Maintenance

The overall goal of the marshland management plan is to maintain and enhance the vegetation and wildlife habitat value of the area, thereby achieving a moderate level of habitat improvement while requiring a low level of maintenance and monitoring. Management goals and corresponding actions have been identified for each of the management elements. Several of these actions require minor repair to existing facilities followed by periodic inspections. Maintenance requirements for each of the management elements are described in detail below.

Hydrology

Following repair of the toggle gate at the outlet control structure, annual inspections of the water management facilities will be conducted by representatives of Public Works and the Districts. Annual inspections will be conducted in the spring, following the rainy season, and will include evaluation of the following features:

- level of function of the toggle gate at the outlet control structure,
- conveyance efficiency (presence or absence of vegetation, debris, sediments, or other obstructions) of the outflow channel from the pump facility to the marsh, and
- conveyance efficiency of the inlet to the pump facility from the Wilmington Drain.

Any sediments, debris, or obstruction observed to be blocking water flow or preventing proper operation of the water management system would be removed by the Districts or Public Works, as described in the "Hydrology Management" section above.

In addition to the annual inspections described above, monthly monitoring of the pump facility by Public Works will continue.

Vegetation

Proper maintenance is a key factor in successful plant establishment. During the early establishment period, immature plants are highly susceptible to stress resulting from weed encroachment, herbivory, and water deficiency. When plants become well established, maintenance requirements are substantially reduced because mature plants are better able to withstand a variety of environmental conditions.

After plant installation, maintenance activities will be performed, selected, and timed to minimize disturbance to wildlife. If herbicides are used, spraying would be timed to avoid nesting areas and activities.

Maintenance efforts associated with planting and vegetation management will consist mostly of weed control in the areas immediately around plants, watering, and operation and upkeep of the irrigation system. Some plant replacement would likely be necessary in the two years following plant installation. Once plants are well established, maintenance efforts will consist of minor noxious weed control.

Following the installation of the cottonwoods, oaks, and willows by a contractor, a specified contractor maintenance phase would begin. During this maintenance phase, the contractor would be responsible for weed control, operation and maintenance of the water supply and irrigation system, and plant upkeep and partial replacement. The Districts would assume responsibility for maintenance after the contractor maintenance period.

During the maintenance phase, the contractor would check and, if necessary, tend to every plant at least once in every two-week period. Irrigation emitters would also be checked at least once every other week during periods of irrigation system operation. If necessary, plant protection tubes would be adjusted, weeds removed, or plants pruned. Soil around the plants would be examined to ensure that adequate moisture is available, and the emitter or other aspects of the irrigation system would be adjusted if necessary. A log of all observations and adjustments would be kept by the contractor and submitted monthly to the Districts.

The Districts would inspect the contractor's maintenance activities in early June and early September each year of the maintenance phase. Additional inspections also may be conducted periodically. During this phase, plants would be counted in the fall by Districts staff or a representative and dead plants would be replaced by the contractor at the contractor's expense to achieve a 90% survival rate of original planted material.

At the conclusion of the contractor maintenance period, the Districts would assume responsibility for maintenance activities. These activities would include monthly inspection of the irrigation system during the period of its operation and general plant observation until plants mature enough to rely on below-ground water sources and irrigation can be terminated. Irrigation would probably be terminated within 3-5 years following initial planting.

Wildlife

The recommended wildlife management actions have been developed to require minimal maintenance. Once the perimeter fence is repaired and signs are installed, it will be inspected annually. This frequency of inspection would be sufficient to identify areas in need of repair and to evaluate the effectiveness of the fence in discouraging unauthorized human access. The condition of the American kestrel nest box and bat roost boxes will be evaluated annually and the boxes cleaned or repaired, if necessary, as part of the wildlife monitoring program described below.

Public Use and Aesthetics

The perimeter fence will be inspected annually to identify areas in need of repair, and issues related to unauthorized use of the marshland will be evaluated.

Monitoring

Monitoring is intended to support the overall goal of managing the marshland to maintain and enhance its vegetation and wildlife habitat value.

Hydrology

No long-term monitoring of the water management facilities is recommended aside from the annual inspection of these facilities described above in "Hydrology" under "Maintenance".

Vegetation

The vegetation monitoring program for the JWPCP marshland will include annual evaluation of all planting sites by the Districts or its representative. The number of live and dead plants will be recorded for each planted or enhanced habitat. General observations will also be made regarding plant height, canopy cover, and plant vigor. Success criteria and remedial actions for habitat establishment and enhancement are not required for regulatory compliance and, therefore, have not been developed. The Districts will evaluate the results of the annual vegetation monitoring and the feasibility of implementing additional actions to maintain and enhance the vegetation and wildlife habitat value of the area. Monitoring of plantings will continue until plants appear to be well established and regenerating, probably 5-10 years. After this time, monitoring could continue less frequently or be eliminated.

The success of maintaining the freshwater marsh habitat will also be evaluated annually by correlating monthly observations of water level and approximate duration of standing water in the marsh with general observations of marsh and riparian plant health and changes. If vegetation health or vigor appears to decline, the operation of the pump facility and outlet control structure would be adjusted.

In addition to annual monitoring, long-term monitoring of invasive exotic species at the site will be conducted by a qualified biologist. After site planting, the extent of invasive exotic species will be periodically evaluated using aerial site photographs verified by field inspection. The extent of exotic species would be mapped on the aerial photograph during the field inspection. The effectiveness of willow establishment in controlling the extent of poison hemlock at the site will also be assessed. Evaluation of potential encroachment by eucalyptus and other exotic trees into the riparian forest habitat will also be conducted. Based on the results of this evaluation, a program may be considered for controlling invasive exotic vegetation in the marshland or a determination made that such a control program is not necessary.

Wildlife

Reconnaissance-level wildlife surveys will be conducted at least annually by a qualified wildlife biologist. These surveys will include documentation of all wildlife species encountered and an evaluation of the condition and use of the American kestrel nest box and bat roost boxes. Wildlife success criteria are not required for regulatory compliance and, therefore, have not been developed. The Districts will evaluate the results of annual wildlife monitoring and the feasibility of implementing additional actions to maintain and enhance the wildlife habitat value of the area. The wildlife surveys will be conducted at least once each year, in the spring, and will require part of one day in the field. Wildlife surveys will be conducted at least annually for 5-10 years and may be extended or increased to twice each year (in spring and fall) if desired by the Districts. The use and condition of nest and roost boxes will be monitored yearly as long as the boxes are in place, and they would be cleaned and repaired or replaced as necessary to maintain them in good condition.

Public Use and Aesthetics

No long-term monitoring of public use and aesthetics for the marshland is necessary aside from annual inspection of the perimeter fenceline as described above.

Section 4. Citations

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PERSONAL COMMUNICATIONS

Chebabi, Youssef. Civil engineer, level I. Flood Maintenance Division, Los Angeles County Department of Public Works, Southgate, CA. August 9, 1995 - meeting.

Yamahara, David. Assistant deputy director. Planning Division, Los Angeles County Department of Public Works, Alhambra, CA. February 15, 1996 - letter.

Section 5. Report Preparation

TECHNICAL TEAM

Paul Cylinder	Principal-in-Charge and Vegetation Ecologist
Joe Donaldson	Project Manager and Landscape Architect (California license #2540)
Ed Whisler	Biologist
Simon Page	Hydrologist and Soils Specialist

PRODUCTION TEAM

Debra Lilly	Editor
Jane Palik	Word Processor
Debbie Bloom	Graphics
Bev Fish	Report Reproduction

Appendix A. Comments and Responses on the Draft Marshland Management Plan

Appendix A. Comments and Responses on the Draft Marshland Management Plan

This section contains copies of all comment letters received by the County Sanitation Districts of Los Angeles County (Districts) on the draft marshland management plan and the Districts' responses to those comments. Two comment letters were received from Mr. Frank O'Brien of the Ken Malloy Harbor Regional Park Advisory Board (Board); the letters are dated December 7, 1995, and February 16, 1996. One comment letter was received from the County of Los Angeles Department of Public Works (Public Works), dated February 15, 1996. Copies of the three comment letters are included in this appendix. All comments from Public Works have been addressed through revisions or clarifications in the final management plan. Comments received from Mr. O'Brien are summarized and addressed below immediately following copies of the three comment letters. The responses to Mr. O'Brien's comments were prepared by the Districts and Jones & Stokes Associates.

COMMENT LETTERS RECEIVED ON THE DRAFT MARSHLAND MANAGEMENT PLAN

The comment letters received on the draft marshland management plan are reproduced on the following pages. A summary of each substantive comment and the Districts' response appear on subsequent pages.

February 16, 1996

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road · PO Box 4998
Whittier, CA 90607-4998

ref : County Sanitation Districts of Los Angeles County
JWPCP Carson Facility Marshland Management Plan

attn: Gary K. Yoshida, Andy Christensen

Dear Mr. Carry :

The Advisory Board of Harbor Regional Park would like to provide the Districts comments on the Draft Marshland Management Plan.

The Advisory Board has previously provided comments to the Districts in a letter of December 7, 1995. The suggestions provided below supplement those comments.

The Advisory Board finds the Draft Plan an excellent baseline study of the marsh. The provisions of the plan are appropriate, and, if implemented, will substantially improve the resource values of the marsh.

We find that the plan is too narrow in scope, however, and recommend that the measures listed below be considered by the Districts in formulation of the Final Plan. The Advisory Board recognizes that the Draft Plan may reflect the specific mitigation measures approved as part of the JOS project, and that some of the measures we recommend may fall beyond the scope of the mitigation plan required under the approved JOS project.

To address this dimension of the project, the Advisory Board recommends that the Districts coordinate a temporary multi-agency planning group which, without commitment to any of the measures proposed, evaluate their feasibility and possible path to implementation.

We appreciate the effort which went into development of the Draft Plan and look forward to future work with the Districts in development of the Final Plan.

Sincerely Yours,

Frank O'Brien
K'MHRP Advisory Board

COMMENTS ON DRAFT MANAGEMENT PLAN

The Advisory Board recommends the following additional measures be incorporated into the Plan :

1. Relocation of existing commercial planting beds on Districts' property north of the marsh and restoration of this area with native upland plants.

2. Purchase of existing commercial development north of marsh and conversion to appropriate use such as Districts meeting center / visitors center.

3. Study of feasibility of removing flood control culverts adjacent to marsh.

4. Removal of all billboards currently in line-of-site from adjacent roads towards marsh.

5. Administrative measures :

   a. Assign "marshland manager".
   b. Provide quarterly progress reports.
   c. Establish a temporary multi-agency working group to evaluate and coordinate improvements at the Marsh with the Wilmington Drain and Harbor Park.

December 7, 1995

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation Districts of Los Angeles County
1955 Workman Mill Road   PO Box 4998
Whittier, CA 90607-4998

ref : County Sanitation Districts of Los Angeles County
      JWPCP Carson Facility   Marshland Management Plan

Dear Mr. Carry :

The County Sanitation Districts of Los Angeles County is in possession of a small but important fragment of freshwater wetland, upland and riparian woodland habitat at the northern portion of its JWPCP Carson facility. This type of natural area has been nearly eliminated in Los Angeles County.

In response to a request by Jones and Stokes Associates of Sacramento, California, an environmental consultant retained by the Districts, the Advisory Board of Ken Malloy Harbor Regional Park in Wilmington would like to provide the Districts initial comments on a Marshland Management Plan.

The Advisory Board appreciates the opportunity to provide these suggestions. We look forward to future cooperation on this interesting and important project.

Sincerely Yours,

Frank O'Brien
KMHRP Advisory Board

cc: City of Carson, Mayor Michael Mitoma
City of Gardena, Mayor Donald Dear
County Sanitation Districts of Los Angeles County
J. Gratteau, G. Yoshida, S. Raksit, A. Christensen
D. Avila [JWPCP Citizens Advisory Committee]
Los Angeles County Department of Public Works, Carl Blum
City of Los Angeles, Stormwater Management Division
Recreation and Parks
Environmental Affairs Department
State Regional Water Quality Control Board
✓Jones and Stokes Associates
Heal the Bay / UnPave LA
Natural Resources Defense Council
Wilmington Home Owners
Wilmington North Neighborhood Association

I. BACKGROUND

The draft environmental documents for the County Sanitation Districts Joint Outfall System improvements discussed the regional resource value of the JWPCP marshland. The Advisory Board commented on several aspects of the proposed project. The Board had particular concern about possible adverse impacts on the marsh and its adjacent upland from construction and operation of the Phase II digesters.

The Board recommended evaluation of alternative locations for these structures on Districts property. Staff including Mr. Yoshida and Mr. Raksit provided a satisfactory analysis which indicated that alternative sites were not cost-effective, did not eliminate all impacts below a significant level and created safety and other concerns. Based on their analysis, the Advisory Board was able to support the proposed project including the digesters at the recommended location.

As part of the project approval, a Marshland Management Plan at JWPCP Carson facility was included as a mitigation measure for identified significant project impacts. The Advisory Board was asked to provide preliminary input on the Plan; these comments followed.

II. MANAGEMENT PLAN : RECOMMENDATIONS

1. REGIONAL HISTORY & RATIONALE for a COMPREHENSIVE MANAGEMENT PLAN. The JWPCP marsh, although small in size and entirely surrounded by roadways and commercial and industrial facilities, is an important regional natural resource and as such warrants preservation and expansion through a competent management plan.

The Board recognizes that natural resource preservation and enhancement is not among the Districts' primary missions. At the same time, the Board proposes that natural resource preservation and enhancement provides an important public benefit, that this goal is established in the County of Los Angeles General Plan and elsewhere and that as a public agency the Districts have a stewardship responsibility for public resources within its jurisdiction.

Such fresh-water marshland was once extensive throughout Southern California and has now been nearly entirely eliminated by development. The JWPCP marsh is the northernmost fragment of the historical Canada de los Palos Verdes, a Wilmington-area landmark later known as the Bixby

Slough. In addition to the JWPCP marsh, existing portions of the Slough now consist of the Wilmington Drain and Ken Malloy Harbor Regional Park. The Wilmington Drain is an unlined flood control channel under the jurisdiction of Los Angeles County Department of Public Works. Harbor Regional Park is a City of Los Angeles public park under the jurisdiction of the City of Los Angeles Department of Recreation and Parks.

Prior to extensive urbanization in the South Bay, Bixby Slough was part of a far larger seasonal wetland and inland lake system. Over 10,000 acres of this system covered current day Carson and Gardena and was known during the early 1900s as the Nigger Slough. The 7.0 acre Gardena Willows, linked to the Dominquez Channel, are all that remain of this regional ecosystem.

[Note : The boundary of the Rancho San Pedro [the Dominquez Grant] and the Ranch Palos Verdes runs north along present day Figueroa Street, dividing JWPCP Carson, and turns left [west] at the intersection of Figueroa and Sepulveda north of the JWPCP marsh.]

2. SCOPE of PLAN. The plan should identify measures which restore the marsh, to the maximum extent practicable, to its condition as a riparian wetland and upland natural system prior to construction of the JWPCP.

We recommend a detailed study by qualified experts which addresses all elements of this ecosystem, including biological resources and water quality [urban stormwater run-off from adjacent freeway and railroad].

The plan should also consider the relationship between the JWPCP marsh and the wetland, riparian woodland and open water areas of Wilmington Drain and Harbor Regional Park.

We recommend that the Districts closely consult with Los Angeles County Public Works and City of Los Angeles Stormwater Management, Environmental Affairs and Recreation and Parks Departments. The Advisory Board maintains a list of responsible persons within these Departments of the City of Los Angeles should the Districts require this information.

The comprehensive plan we recommend should include an analysis of current and alternative practices of clearing natural habitat along the Wilmington Drain. In view of the importance of these channels for migrating birds and other wildlife, the Board recommends that a schedule to alternate clearing of only one of the parallel channels be developed and implemented.

Also, the plan should evaluate the feasibility of structural measures which would remove the extensive non-point source pollution which now enters Harbor Lake via the Wilmington Drain.

The plan should include provision for open water at the JWPCP marsh, expanded and enhanced uplands including provision for a native grassland zone. In order to maximize the size of the upland habitat area, the Board recommends that the existing nursery and flower beds adjacent to the marsh be relocated to another site, perhaps south of Lomita Boulevard.

Further, we recommend that the Districts purchase the existing commercial structure, now largely vacant, at the corner of Figueroa and Sepulveda and include this land in the upland restoration.

A small building at the corner site with meeting rooms for both Districts, City of Carson and general community use might be appropriate. [We note that there is a City of Carson public park at the northwest corner of this intersection.]

If necessary, the Districts should dedicate the entire area marsh and upland areas exclusively and in perpetuity for public open space.

3. MODIFICATION of FLOOD CONTROL CHANNEL. The Los Angeles County Department of Public Works has indicated interest in possible demonstration projects which retain or increase the necessary level of flood protection with other beneficial uses such as water conservation, passive recreation and habitat restoration.

Methods to enhance beneficial uses while achieving compliance with requirements established under the National Pollution Discharge Elimination System [NPDES] for abating non-point source pollution should be investigated.

The Board believes that the opportunity for a small-scale, and hence cost-effective project incorporating these objectives may exist at JWPCP.

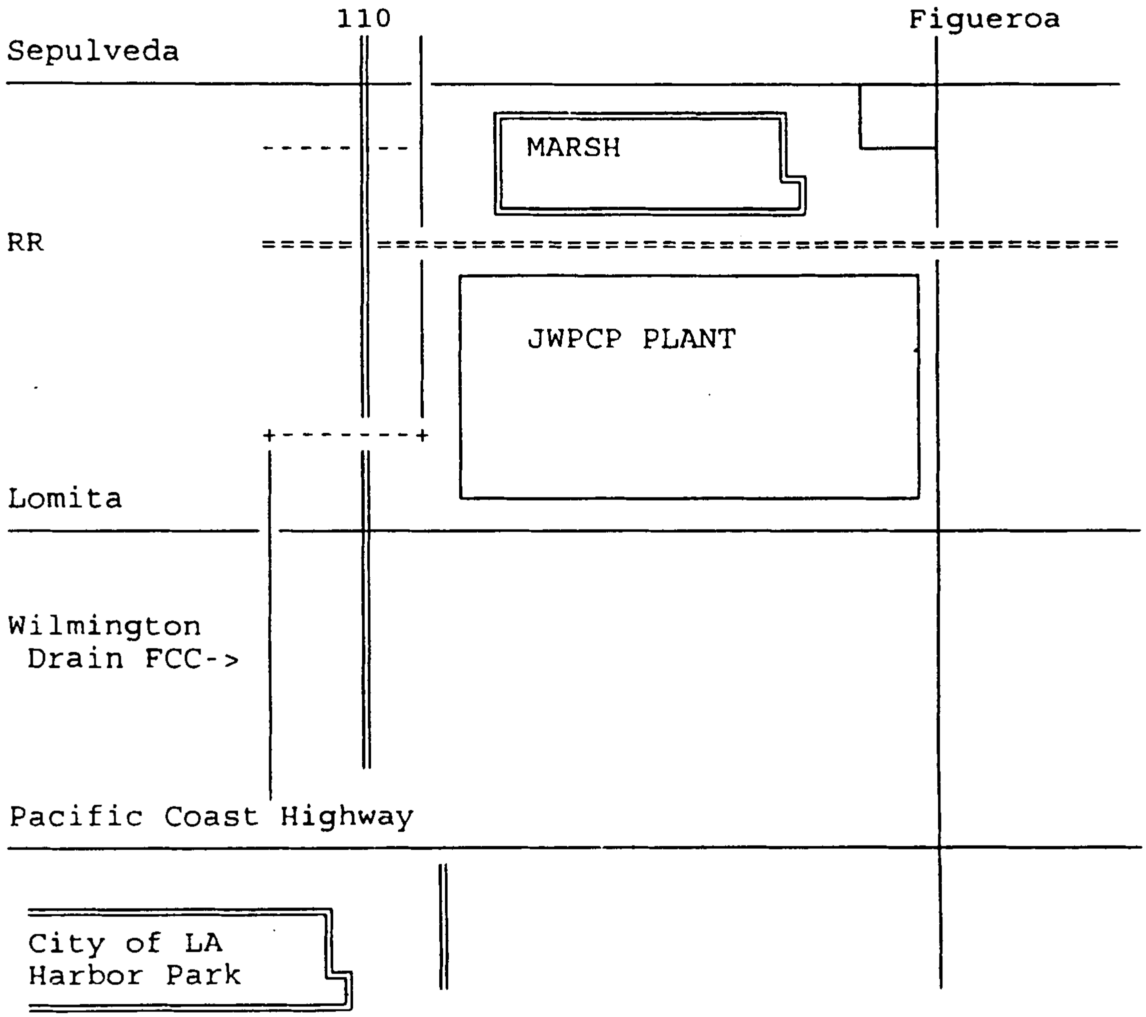
We recommend that the Districts work in cooperation with the Department of Public Works of Los Angeles County to evaluate the feasibility of removing segments of the existing concrete-lined flood control culvert adjacent to the marsh. It may be feasible to replace these culverts with gabions or other appropriate modern engineering elements which will restore the historical and natural features of this segment of the Canada de los Palos Verdes.

4. WORKING GROUP. Finally, we recommend that a multi-agency working group be established to determine the final scope of this project, to consult with interested individuals, organizations and community groups, to review any draft documents, identify multiple funding sources, to secure approvals by relevant agencies and coordinate implementation of any recommendations the plan may make.

Ken Malloy Harbor Regional Park Advisory Board
564 West 3rd Street
San Pedro, CA 90731

ref : County Sanitation Districts of Los Angeles County p5
JWPCP Carson Facility Marshland Management Plan

SCHEMATIC - NOT TO SCALE N ^



COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (818) 458-5100

HARRY W. STONE, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O.BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

February 15, 1996

IN REPLY PLEASE REFER TO FILE P-4

Mr. Charles W. Carry
Chief Engineer and General Manager
County Sanitation District
of Los Angeles
1955 Workman Mill Road
Whittier, CA 90601-4988

Dear Mr. Carry:

RESPONSE TO A DRAFT DOCUMENT
MARSHLAND MANAGEMENT PLAN

Thank you for the opportunity to provide comments on the Draft Document for the proposed Marshland Management Plan. We have reviewed the draft document and offer the following comments:

Design

On page 1-2, first paragraph under Background, last sentence, it states that "the channel was constructed to provide 100 year flood protection". It should be "protection from storm flows resulting from rainfall having a frequency of recurrence of once in 50 years".

On page 2-2, second and third paragraphs where it indicates Wilmington Drain, it should be Wilmington Drain, East Channel.

On Figure 4, show two separate channels for Wilmington Drain and call out as "East" and "West" Channels with a common wall.

If you have any questions regarding these comments, please contact Mr. Ray Hashim of our Design Division at (818) 458-7899.

Environmental Programs

The Marshland Management Plan should include a discussion regarding the protection of the quality of stormwater. The document should reference National Pollutant Discharge Elimination System Permit CA0061654 issued b the California Regional Water Quality Control Board to the County and local agencies. The document should indicate compliance with all relevant stormwater quality management programs of the Federal, State, County, and local agencies.

If you have any questions regarding these comments, please contact Ms. Simin Agahi of our Environmental Programs Division at (818) 458-5183.

<u>Flood Maintenance</u>

Figure 5, Pump Facility Profile, shows elevations different than our as-built plans. Enclosed is a copy of a portion of the plans depicting the as-built elevations. There is 2.18 feet difference in elevation between the two drawings. It could be that two different bench marks were used.

Figure 5, Pump Control Diagram, does not accurately reflect the pump operation. Enclosed is a flow chart describing the pump operation settings.

A marked up copy of page 2-2 is enclosed. It reflects the elevations of the as-built drawings. Elevations on page 3-2 will also need changing.

Minor corrections are marked on page 4-2.

Pages 3-1 to 3-3 indicate that sediment in Wilmington Drain may possibly block low flows from entering the inlet structure. The report notes that Wilmington Drain has accumulated a large amount of sediment and vegetation growth which may lead to blockage of the inlet unless the material is removed. Presumably this condition was observed during the writer's August 9, 1995 site visit. We have an annual routine to clean the channel invert which was completed on November 28, 1995.

The report states that the inlet will be inspected regularly and that Public Works will clear obstructions as necessary to maintain flows through the inlet. Action H-2.3 calls for an annual inspection of the inlet in spring following the rainy season and the removal of debris blocking the inlet structure. Our current routine calls for a monthly inspection of the pump sump and cleaning as needed. We can easily add the annual spring inspection of the inlet and localized cleaning of the Wilmington Drain invert to insure channel low flows can enter the inlet.

Page 3-12 calls for an annual inspection by Public Works and the Districts. This can be done at the same time as the inspection under Action H-2.3.

If you have any questions regarding these comments, please contact Mr. Youssef Chebabi at (310) 861-0316.

Hydraulic/Water Conservation

Our comment concerns the second sentence of the last paragraph on page 1-2. The total watershed area tributary to Wilmington Drain is approximately 14 square miles, not the 20 square miles referred to in the draft plan.

If you have any questions regarding these comments, please contact Mr. Mark Perrett of our Hydraulic/Water Conservation Division at (818) 458-6146.

If you have any questions regarding the environmental reviewing process of this Department, please contact Mr. Vik Bapna at the above street address or at (818) 458-4363.

Very truly yours,

HARRY W. STONE
Director of Public Works

Teri Grant for

DAVID YAMAHARA
Assistant Deputy Director
Planning Division

KD:my
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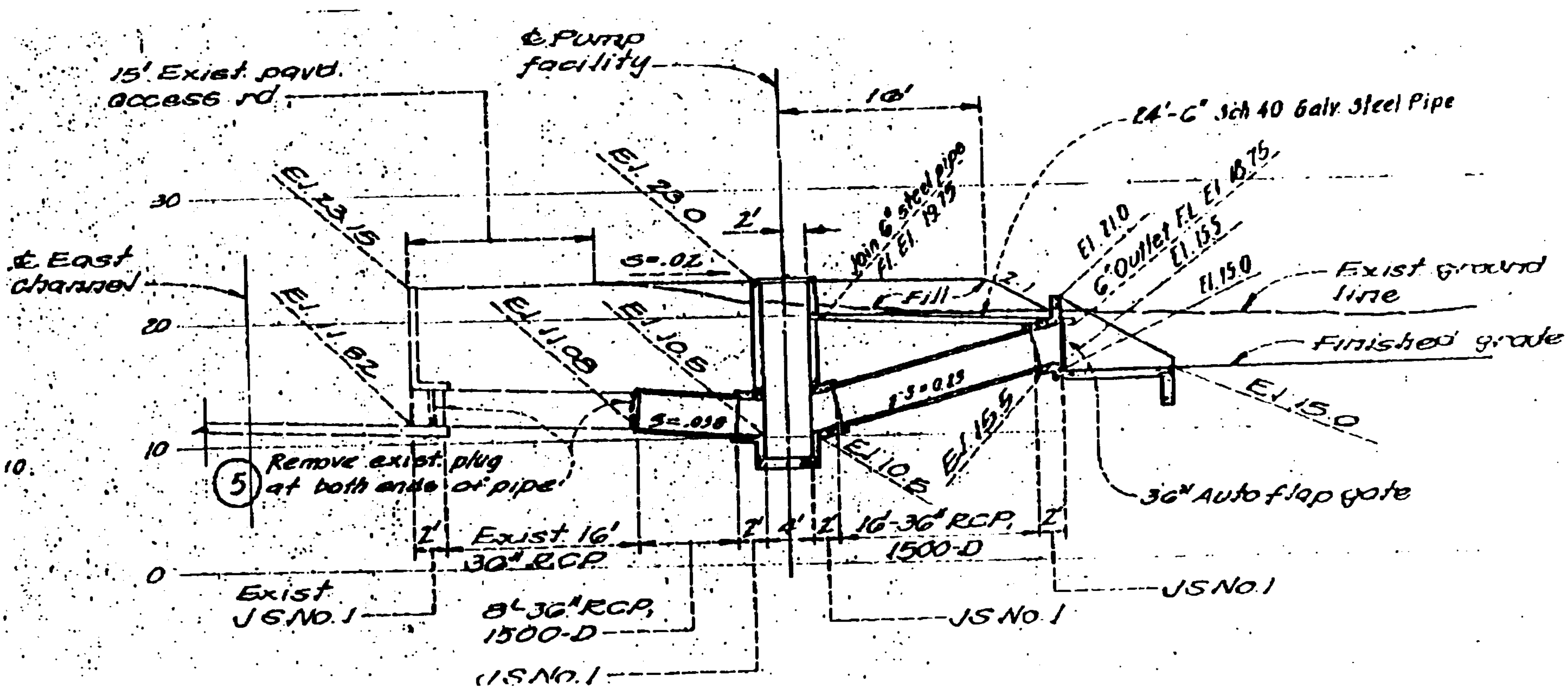
Enc.



WATER SURFACE ELEVATION:

10.5, SUMP, START PUMP

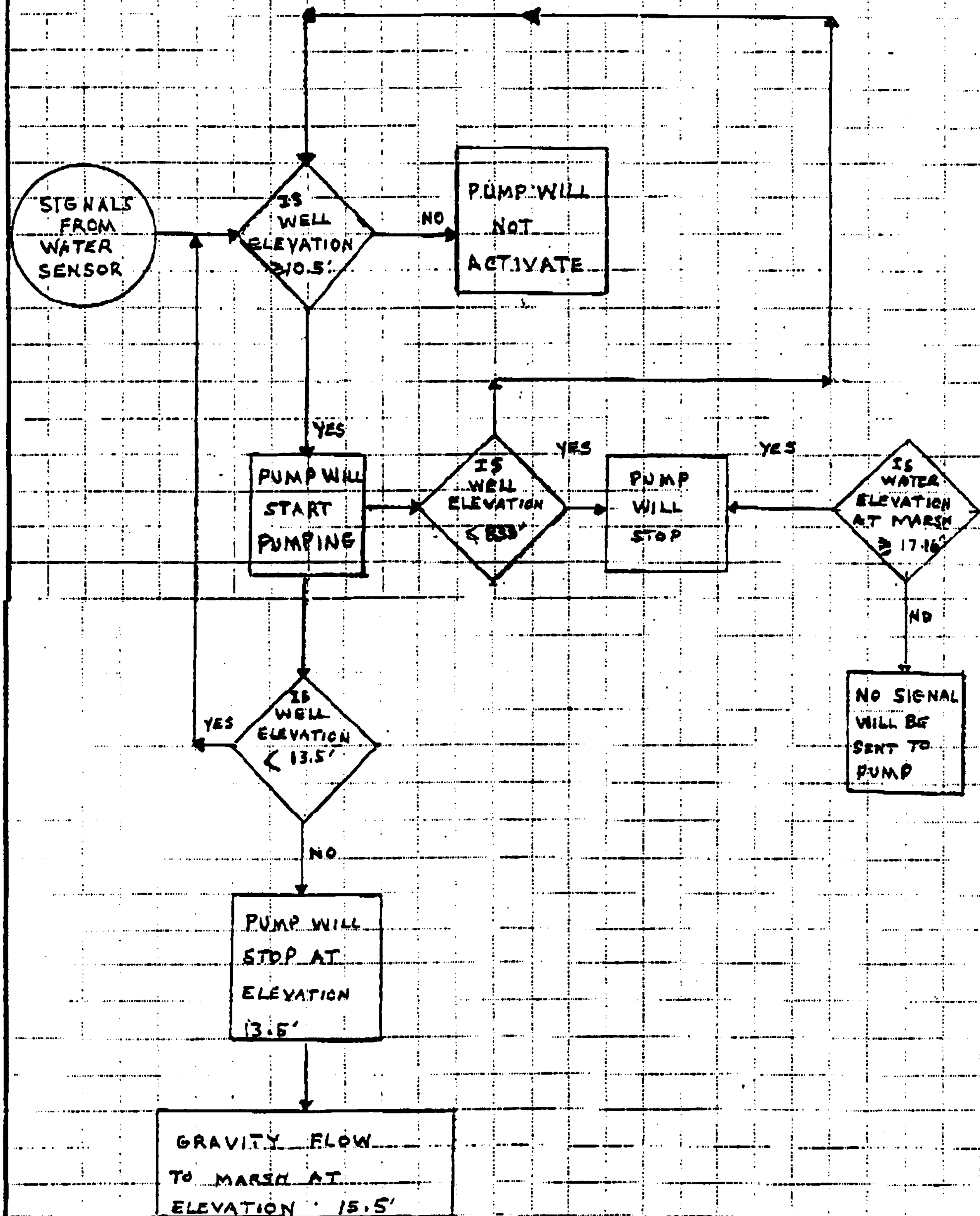
8.33, SUMP, STOP PUMP

13.5, SUMP, STOP PUMP

17.16, MARSH, STOP PUMP

PREPARED BY	DATE	COUNTY OF LOS ANGELES PUBLIC WORKS DEPT.	PAGE NO.
CHECKED BY	DATE	JOB PUMP OPERATION	SUBJECT WILM. DRAIN MARSH

WILMINGTON DRAIN MARSH
PUMP CONTROL DIAGRAM



RESPONSES TO COMMENTS RECEIVED ON THE DRAFT MARSHLAND MANAGEMENT PLAN

Following are the Districts' responses to comments received on the draft marshland management plan in two comment letters from Mr. O'Brien of the Board and one letter from Public Works. Each substantive comment from Mr. O'Brien is summarized below and followed by the Districts' response. Comments submitted by Public Works have been responded to in the text of the plan and are not addressed here.

Summary of Comments Dated February 16, 1996, and Responses

1. **Comment:** The Board recommends that the existing commercial planting beds on Districts' property north of the marsh be relocated elsewhere and that this area be restored using native upland plants.

Response: This area is currently under a long-term lease to a bedding plant nursery. A large portion of this area is planned to be occupied by the Phase 1 digesters that are scheduled to be constructed in 1999. The Districts prefer to reserve options for determining the future use of the remaining area until after the digesters have been constructed.

2. **Comment:** The Board recommends that the existing commercial development north of the marsh be purchased and converted to an appropriate use, such as a Districts meeting center and visitor center.

Response: The Districts currently maintain meeting areas at both the Joint Water Pollution Control Plant (JWPCP) and the Wilmington Boys and Girls Club. The commercial property would have low suitability for additional plant uses because it is separated from the JWPCP by the marshland and railroad. For these reasons, purchase of the commercial property would not be an appropriate use of public funds and would not be in the best interest of the Districts.

3. **Comment:** The Board recommends that the Districts study the feasibility of removing flood control culverts adjacent to the marsh.

Response: Public Works owns and maintains the Wilmington Drain and would be the appropriate agency to assess the feasibility of removing or altering the drain. The Wilmington Drain provides flood protection for the marsh, the JWPCP, and the surrounding community. Removing or altering the drain could reduce the ability of the JWPCP to provide wastewater treatment services during large storms, and the Districts would be opposed to any action that would increase the flooding potential at the JWPCP.

4. **Comment:** The Board recommends that all billboards currently in the line of sight from adjacent roads toward the marsh be removed.

Response: The Districts own one billboard that is within the described line of sight. A second billboard was recently removed. The Districts will consider removing the remaining billboard.

5a. **Comment:** The Board recommends that a marshland manager be assigned.

Response: The actions and activities described in the marshland management plan will be coordinated by a project engineer and performed by Districts staff in the Treatment Plant Operations and Planning and Property Management sections. A specific position with the title of marshland manager is not necessary.

5b. **Comment:** The Board recommends that quarterly progress reports be prepared.

Response: The Districts will prepare an annual report that documents the inspections, operation, and maintenance of the marshland.

5c. **Comment:** The Board recommends that a temporary multiagency working group be established to evaluate and coordinate improvements at the marsh with activities at the Wilmington Drain and Harbor Park.

Response: The Districts are committed to implementing the actions described in the marshland management plan. At this time, the Districts do not believe that it is either necessary or a good use of staff time and resources to organize and oversee a multiagency working group to evaluate and coordinate the improvements identified in the plan. If the Board wishes to form a similar group for the Harbor Park, the Districts would consider participating, if appropriate.

Summary of Comments Dated December 7, 1995, and Responses

1. **Comment:** The Board recommends that the plan identify measures that restore the marsh, to the maximum extent practicable, to its condition as a riparian wetland and upland natural system before construction of the JWPCP.

Response: As described in Section 2, "Site Analysis", of the plan under "Hydrology", historic aerial photographs that predate construction of the JWPCP show little, if any, indication of native woody riparian and marsh vegetation around the marshland. Restoring the marshland to its condition before construction of the JWPCP is not a goal of the plan. The marshland management plan provides a practicable approach to preserving and enhancing the marshland through measures that maintain and enhance the site's vegetation and wildlife habitat values.

2. **Comment:** The Board recommends that the plan consider the relationship between the JWPCP marsh and the wetland, riparian woodland, and open water areas of the Wilmington Drain and Harbor Regional Park.

Response: The marshland is a remnant of a much larger and more diverse system of habitats. Today, it is small, surrounded by urban development, and generally isolated (i.e., without connecting habitat corridors) from other nearby habitat areas. Thus, its habitat value and potential are limited. Opportunities for the Districts to connect the marshland to other nearby habitat areas (e.g., Harbor Park) appear to be limited by the concrete channel and surrounding urban development. The marshland management plan describes these limitations and the marshland's relationship to the features mentioned above; all of these factors were considered in preparing the habitat enhancement elements of the plan.

3. **Comment:** The Board recommends that the Districts closely consult with Public Works and the City of Los Angeles Stormwater Management, Environmental Affairs, and Recreation and Parks Departments.

Response: The Districts have coordinated closely with Public Works in preparing the management plan. The Districts did not coordinate with the City of Los Angeles because the JWPCP and marshland are outside of the city's jurisdiction.

4. **Comment:** The Board recommends that the plan include an analysis of current and alternative practices for clearing natural habitat along the Wilmington Drain and that a schedule to alternate clearing of only one of the parallel channels be developed and implemented.

Response: Although the Wilmington Drain is hydraulically connected to the marsh and the marsh receives water from it, the scope of the management plan does not extend to maintaining the drain beyond the requirement to maintain the supply of water to the marsh. The scope of the management plan focuses on maintaining and enhancing the marshland area on the Districts' property. Public Works owns and operates the Wilmington Drain and is responsible for channel maintenance practices and activities.

5. **Comment:** The Board recommends that the plan evaluate the feasibility of structural measures that would remove the extensive nonpoint-source pollution that now enters Harbor Lake.

Response: It is within neither the Districts' authority nor the scope of the marshland management plan to control or remove nonpoint-source pollution that may be generated throughout the large drainage area for Harbor Lake. That drainage area is apparently much more extensive than the 14-square-mile drainage basin for the Wilmington Drain upstream of the JWPCP marshland.

Also, nonpoint-source pollution does not enter Harbor Lake as a result of the Districts' operations.

6. **Comment:** The Board recommends that the plan include provisions for open water and expanded and enhanced uplands, including a native grassland zone, at the JWPCP marsh.

Response: The management plan has been developed to provide open water habitat, enhance freshwater marsh habitats, expand and enhance riparian forest and upland habitats, and increase the diversity and value of habitats at the marshland. Establishing and maintaining native grassland habitat in the marshland would be difficult and require a large amount of ongoing maintenance to prevent reestablishment of invasive exotic weeds. Native grassland would provide low additional habitat value relative to the higher values provided by enhancing sage scrub, riparian, and oak woodland habitats at the marshland. For these reasons, establishment of native grassland habitat was not included as part of the management plan.

7. **Comment:** The Board recommends that the existing nursery and flower beds adjacent to the marsh be relocated to another site.

Response: This comment is addressed above in the response to comment 1 for the letter dated February 16, 1996.

8. **Comment:** The Board recommends that the Districts purchase the commercial structure at the corner of Figueroa and Sepulveda to include this land in the upland restoration and provide meeting rooms in a small building there.

Response: This comment is addressed above in the response to comment 2 for the letter dated February 16, 1996.

9. **Comment:** The Board recommends that the Districts dedicate the entire marsh area and upland areas exclusively and in perpetuity for public open space.

Response: The Districts intend to maintain the marshland as open space; however, public access to the marshland will be limited to protect habitat values, public safety, and the security of JWPCP facilities.

10. **Comment:** The Board recommends that the Districts investigate methods to enhance beneficial uses while achieving compliance with the National Pollutant Discharge Elimination System (NPDES) requirements for abating nonpoint-source pollution.

Response: The Districts believe that preserving the marsh is the most beneficial use of the marshland. The JWPCP currently meets NPDES requirements. Nonpoint-source pollution is addressed above in the response to comment 5 for the letter dated December 7, 1995.

11. **Comment:** The Board recommends that the Districts work with Public Works to evaluate the feasibility of removing segments of the concrete-lined flood control culvert adjacent to the marsh.

Response: This comment is addressed above in the response to comment 3 for the letter dated February 16, 1996.

12. **Comment:** The Board recommends that a multiagency working group be established to determine the final scope of this project; consult with interested individuals, organizations, and community groups; review draft documents; identify multiple funding sources; secure approvals by relevant agencies; and coordinate implementation of any recommendations in the plan.

Response: This comment is addressed above in the response to comment 5c for the letter dated February 16, 1996.

Appendix B. Common and Scientific Names of Plant Species Mentioned in the Text

Appendix B. Common and Scientific Names of Plant Species Mentioned in the Text

Common Name	Scientific Name
Alkali heath	*Frankenia salina*
Arroyo willow	*Salix lasiolepis*
Black sage	*Salvia mellifera*
Bulrush	*Scirpus californicus*
California buckwheat	*Eriogonum fasciculatum*
California encilia	*Encilia californica*
California sagebrush	*Artemisia californica*
Castor bean	*Ricinus communis*
California rose	*Rosa californica*
Cattail	*Typha* spp.
Cheeseweed	*Malva parviflora*
Coast live oak	*Quercus agrifolia*
Cocklebur	*Xanthium strumarium*
Coyote brush	*Baccaris pilularis*
Fan palm	*Livistona chinensis*
Fennel	*Foeniculum vulgare*
Fremont's cottonwood	*Populus fremontii*
Gooddings willow	*Salix gooddingii*
Horehound	*Marrubium vulgare*
Laurel sumac	*Malosma laurina*
Mexican elderberry	*Sambucus mexicanus*

Mulefat	*Baccharis salicifolia*
Peruvian peppertree	*Schinus mollis*
Peruvian peppertree	*Schinus mollis*
Poison hemlock	*Conium maculatum*
Purple sage	*Salvia leucophylla*
Red gum	*Eucalyptus camaldulensis*
Red willow	*Salix laevigata*
Redberry	*Rhamnus crocea*
Ripgut brome	*Bromus diandrus*
Soft chess	*Bromis mollis*
Toyon	*Heteromeles arbutifolia*
Tule	*Scirpus acutus*
Water primrose	*Ludwigia* spp.
White sage	*Salvia apiana*
Wild radish	*Raphanis sativa*
Wild mustard	*Brassica nigra*
Yellow nut-sedge	*Cyperus erogrostis*
Yellow willow	*Salix lutea*

Note: Scientific names follow Hickman 1993.

Appendix C. Common and Scientific Names of Wildlife Species Mentioned in the Text

Appendix C. Common and Scientific Names of Wildlife Species Mentioned in the Text

Common Name	Scientific Name
American kestrel*	*Falco sparverius*
American pipit	*Anthus rubescens*
Barn swallow*	*Hirundo rustica*
Belted kingfisher*	*Ceryle alcyon*
Big brown bat	*Eptesicus fuscus*
Black phoebe*	*Sayornis nigrans*
Botta's pocket gopher*	*Thomomys bottae*
Bushtit	*Psaltriparus minimus*
Cactus wren	*Campylorhynchus brunneicapillus*
California gnatcatcher	*Polioptila californica*
California ground squirrel*	*Citellus beecheyi*
California myotis	*Myotis californicus*
Cliff swallow	*Hirundo pyrrhonota*
Gopher snake	*Pituophis melanoleucus*
Horned lark	*Eremophila alpestris*
House finch*	*Carpodacus mexicanus*
Long-eared myotis	*Myotis evotis*
Marsh wren*	*Cistothorus palustris*
Mexican free-tailed bat	*Tardarida brasiliensis*
Mourning dove*	*Zenaida marcroura*
Northern mockingbird*	*Mimus polyglottos*

Common Name	Scientific Name
Orange-throated whiptail	*Cnemidophorus hyperythrus*
Pacific chorus frog	*Pseudacris regilla*
Rock dove*	*Columba fasciata*
Raccoon	*Procyon lotor*
Scrub jay*	*Aphelocoma coerulescens*
Song sparrow	*Melospiza melodia*
Striped skunk*	*Mephitis mephitis*
Western meadowlark	*Sturnella neglecta*

* Observed at the marshland during field surveys.

Wetlands Research Associates
San Rafael, California
phone (415) 454-8868
fax (415) 454-0129

From: Crystal Acker **Date:** 3/01/2004

To: Mary Jacobs

Project: Joint Water Pollution Control Plant Marshland Enhancement Project

Subject: Significant native and non-native vegetation present within the JWPCP marshland

MEMORANDUM

Summary

The following existing conditions were observed during a habitat assessment conducted on November, 18, 2003:

1. Marsh habitat present on-site appears to be healthy and is dominated by a single native species, California tule;
2. Riparian habitat present on-site is co-dominated by native and non-native trees and shrubs;
3. The native riparian community appears to be in senescence (no seedlings were observed);
4. Uplands are dominated by non-native annual species and non-native trees and shrubs.

A detailed description of habitat areas is provided in the following sections.
Attached graphics and tables include:

A copy of *Figure 6. Vegetation Habitat* from the MMP.

Figure 1. Significant Native and Non-Native Vegetation is a representative mapping of dominant native and non-native vegetation including numbered data points.
Figure 2. Significant Native Vegetation is a simplified version of the mapping showing only native species.
Figure 3. Significant Non-Native Vegetation is a simplified version of the mapping showing only non-native species.

Table 1 contains detailed field data associated with the numbered points shown on Figure 1. For example, non-native (yellow) point 25 shown near the SW corner of Figure 1 can be looked up in Table 1 to determine that the data point represents a cluster of four castor bean shrubs.

Methodology and Purpose of the Assessment Field Visit

A reconnaissance-level habitat assessment was conducted in the marsh by WRA on November 18, 2003. Field data was collected in order to develop an existing conditions habitat map illustrating approximate distributions of various vegetation communities (riparian, marsh, upland) and individual species of special interest within the marshland. Species of special interest included native trees and shrubs, non-native trees and shrubs, and patches of non-native herbaceous species. Data was not collected at a species inventory level. We did not identify every plant species observed and did not count and map the location of every tree and shrub observed; however, we did estimate numbers of trees and shrubs and map their approximate locations, allocating time first to the drainage corridors and second to the remainder of the site. In dense and/or shrubby areas, numbers were estimated based on major visible trunks, so that a single multi-stemmed tree may have been counted as more than one plant. Locations and extent of herbaceous species and communities were also estimated and mapped. The data collected and graphics produced are a good representation of relative abundance and distribution of dominant and other special-interest plant species within the marshland.

Assessment of Existing Habitats within the JWPCP Marshland

<u>Habitat Overview</u> - In contrast to the habitat mapping presented in the Marshland Management Plan (MMP, Figure 6) which shows riparian forest within the majority of the northern half of the marshland, we observed riparian trees and shrubs primarily along drainage courses (Figure 1). A few additional willows were located in other areas and a narrow band of mulefat was present along the road in the northwest portion of the site. Marshland was present in two areas in the south-central and northeast portions of the site (Figure 1). The current distribution of marshland appears to be similar to that presented in the MMP. Upland areas followed a similar distribution to that presented in the MMP along the western border of the site between the marsh and the access road, and along the eastern border of the site between the riparian community and the digesters. However, the entire northeast portion of the site between the marsh and the access road is currently upland, not riparian forest as presented in the MMP. A more detailed discussion of plant species present within each habitat area is provided in the following sections.

<u>Riparian Habitat</u> - The primary riparian corridor was located along the eastern edge of the site and included a small tributary at the north end. The corridor extends from the NE corner of the site along the eastern edge to the SE corner. At this point, the riparian community ends; however the channel continues along the southern edge of the site and empties into Wilmington Drain through an outlet at the SW corner. Riparian habitat in this area was dominated by trees and shrubs. Willows were the dominant species observed, primarily Goodding and arroyo willow (*Salix gooddingii*, *S. lasiolepis*). Eucalyptus (*Eucalyptus* sp.), and mulefat (*Baccharis salicifolia*) were also frequent. Additional non-native trees and shrubs were observed, but were not dominant. A few seasonal wetland plants were observed including rough cocklebur (*Xanthium strumarium*), curly dock (*Rumex crispus*), and fat-hen (*Atriplex triangularis*), but overall there was little to no herbaceous wetland understory. No willow seedlings or saplings were observed, indicating that the community may not be self-sustaining under current conditions. The apparent lack of seedling

regeneration is likely due to replacement by highly-competitive non-native species, poor environmental conditions for germination and establishment (primarily a lack of appropriate hydrology), or a combination of both. In addition, many adult willow trees had fallen over at some time in the past and re-sprouted vertically from fallen horizontal trunks forming dense shrubby thickets. This may be a result of shallow rooting in an area which previously received more continuous surface water than it currently does causing a decline in willow health, followed by periodic high storm-flows and subsequent dislodging. At the location of native tree point 35 (Figure 1), an ordinary high water mark was observed on the trunk of a willow within the streambed at 1.5 feet above ground level, indicating that the channel has conveyed substantial amounts of water during recent high flows. In many areas, willows on adjacent upper banks were several feet higher in elevation than the channel bottom (to a maximum of 4 feet measured at one location), indicating that the stream channel has eroded over time. This elevation difference was most pronounced in the upper northeast corner of the riparian area where ground elevation is lower than surrounding areas. Also in this corner, adventitious roots were observed on willow trunks 2 to 3 feet above ground level indicating that a substantial amount of water has ponded in this low area in the past. This elevation seems to correlate to outlet elevation, which may link the phenomena to a past season in which the marsh was flooded. However, adventitious roots may be generated as a result of a single growing season and are persistent, so do not indicate that inundation to this level is a normal or recent hydrologic condition. Willows were also present within the stream channel itself. No surface water was present during the November 18 site visit.

Patches of coastal sage (*Artemisia californica*), coyote brush (*Baccharis pilularis*), and herbaceous upland plants inter-graded with riparian vegetation, usually in areas where adjacent banks and terraces were at significantly higher elevation than the channel.

The west-east tributary originates at a pump station located on the western edge of the site and flows east until it joins the main corridor. This channel had fewer trees and, therefore, more patchy canopy cover than the main channel. Fewer willows and more non-native and ornamental trees and shrubs were present along the tributary including eucalyptus, fan palm (*Washingtonia* sp.), European olive (*Olea europaea*), ash (*Fraxinus* sp.), and castor bean (*Ricinus communis*). A portion of the channel was vegetated by tules (Figure 1), and a few seasonal wetland plants such as tall flatsedge (*Cyperus eragrostis*), rough cocklebur, and curly dock were also present in the understory. However, a majority of understory and adjacent vegetation was composed of non-native upland species.

<u>Marsh Habitat</u> - The marshland in both locations was dominated by native California tule (*Scirpus californicus*). One small patch of cattail was observed in the northern portion of marsh (Figure 1); none was observed in the southern portion, but most of the southern marsh area was not traversed. Several large shrubby arroyo willows were observed within the southern marsh on patches of slightly higher ground. Some seasonal wetland vegetation was present around edges of the marsh, including rough cocklebur, curly dock, and Bermuda grass (*Cynodon dactylon*), but the wetland edge was more often abruptly separated from adjacent herbaceous upland vegetation with no seasonal transition.

Upland Habitat - Upland habitat appears to occupy the most acreage within the site. Although not mapped, all habitat areas outside of the marsh and the riparian corridors are upland. To the west and north of the marsh, the upland is ruderal and is vegetated almost entirely by non-native species. Dominant species observed included black mustard (*Brassica nigra*), poison hemlock (*Conium maculatum*), fennel (*Foeniculum vulgare*),wild radish (*Raphanus sativus*), horseweed (*Conyza* sp.), and bull thistle (*Cirsium vulgare*). Non-native trees and shrubs were present throughout these upland areas including eucalyptus, fan palm, and castor bean. A few native shrubs, including coyote brush and mulefat were also present. Upland areas had previously been characterized in the MMP as non-native annual grassland; however, grasses did not appear to be dominant during our site visit.

Upland habitat on the eastern border of the site was located along an embankment between riparian habitat and the new digesters. Portions of this area were vegetated by many of the same non-native annuals, shrubs and trees as other upland areas; however, some patches of native coastal sage and coyote brush were also present. The entire upper slope of the embankment had been seeded with an erosion-control grass and wildflower mix. In addition, several seedlings of coast live oak and cottonwood had been planted along the embankment.

Assessment of Significant Native and Non-Native Vegetation within the JWPCP Marshland

Significant Native Vegetation - Figure 2 illustrates the approximate locations and extent of native vegetation within the site. Tule marsh is a native-dominated community vegetated primarily by California tule. Native tree and shrub points shown on Figure 2 represent willows and mulefat; 142 native points were taken which represent most but not all native trees and shrubs present. The northern portion of the primary riparian corridor (above the confluence) is dominated by native trees and shrubs; however, below the confluence natives are co-dominate with non-native trees and shrubs. Other native species observed on the site but not shown on Figure 2 due to their limited extent include small patches and individuals of coyote brush and coastal sage in uplands.

Significant Non-Native Vegetation - Figure 3 illustrates the approximate locations and extent of non-native vegetation within the site. Non-native tree and shrub points represent eucalyptus, fan palm, date palm (*Phoenix* sp.), Peruvian pepper tree (*Schinus molle*), castor bean, tree of heaven (*Ailanthus altissima*) and pampas grass (*Cortaderia* sp); 212 data points were taken which represent most but not all non-native trees and shrubs present. Additional eucalyptus and fan palm seedlings were observed throughout the site, but were not mapped. “Other” tree points (15 total) represent planted or escaped ornamental species which are non-native. These include European olive, ash, and myoporum (*Myoporum laetum*). Of all non-native tree and shrub species, fan palm, eucalyptus, castor bean and olive were observed to be the most numerous. Two dense patches of poison hemlock are shown on Figure 3; however, it should be noted that this species was distributed throughout upland areas of the site along with other non-native annual species. All upland areas west and north of marsh areas were dominated by non-native vegetation.

Not all non-native species are invasive and disruptive to natural habitats. Those that are considered to be a serious threat to wildlands in California have been identified by the California Invasive Plant Council (Cal-IPC). Cal-IPC has published a list which categorizes non-natives of concern according to their degree of invasiveness. List A includes plants documented as aggressive invaders that displace natives and disrupt natural habitats; List A-1 plants are widespread in California, List A-2 have regional distribution. List B includes plants of lesser invasiveness which either spread less rapidly or cause less habitat disruption. Plants included on Cal-IPC Lists A and B are generally targeted for control during restoration projects. Non-natives observed within the JWPCP site which are listed by Cal-IPC are given below:

Table A. Cal-IPC status of non-native plants observed within the marsh

List A-1	List A-2	List B
pampas grass	myoporum	Peruvian pepper tree
fennel	tree of heaven	castor bean
		European olive
		poison hemlock
		bull thistle
		black mustard

Eucalyptus and fan palm are not currently listed by Cal-IPC; however, both are on the 2004 Weed List Revision and may be listed in the future.

Crystal Acker

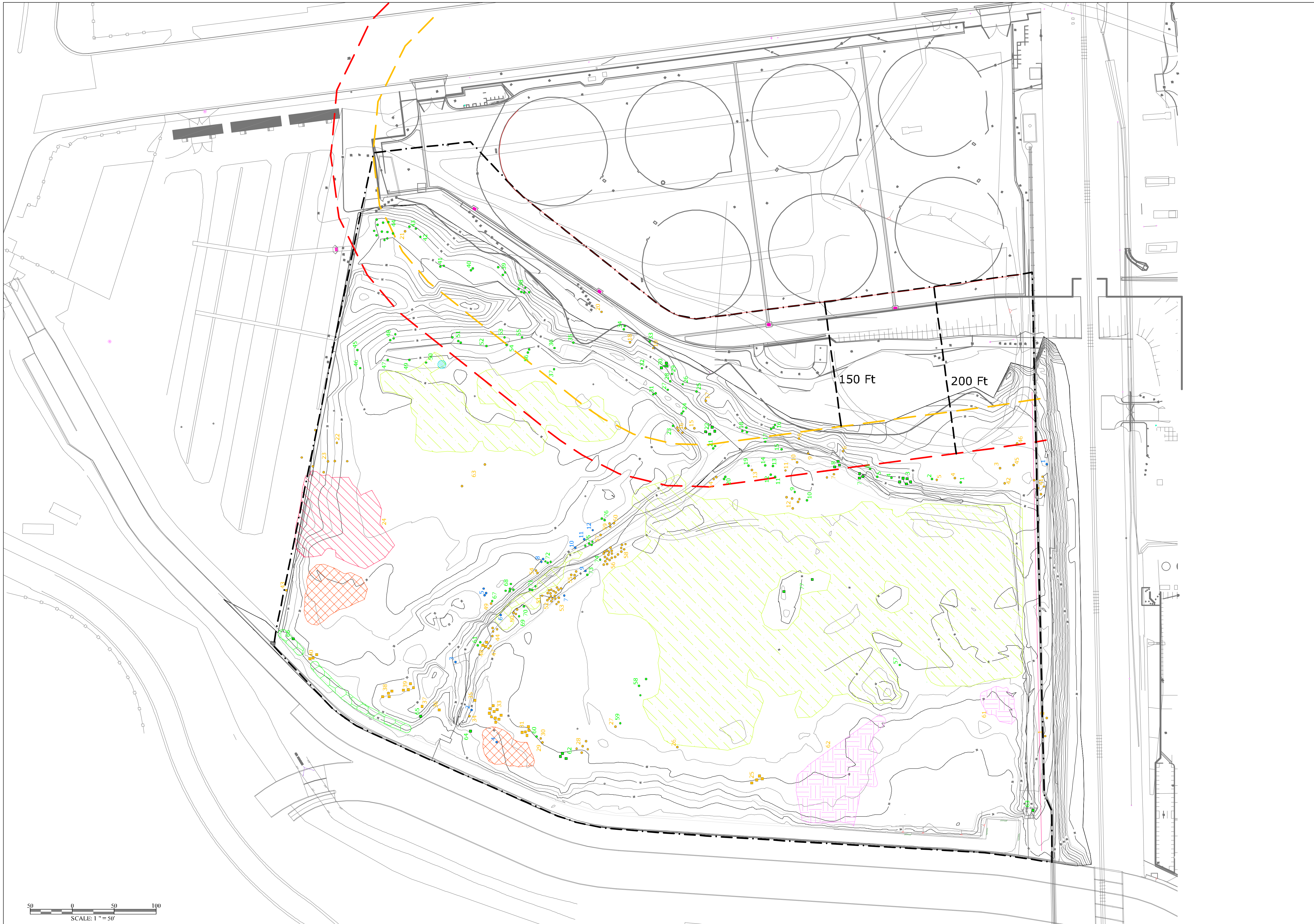
Biologist and Permit Specialist

Figure 6
Vegetation Habitat

Sources: 1987 aerial photograph and field observation by Jones & Stokes Associates in August 1995.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

Jones & Stokes Associates, Inc.



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JWPCP

Los Angeles County, California

Legend

Study Area Boundary
150 foot Buffer
200 foot Buffer

Approximate Tree and Shrub Locations
- Native Tree
- Native Shrub
- Non-Native Tree
- Non-Native Shrub
- Other Tree

Estimated Areas

Native
- Mulefat
- Cattail Marsh
- Tule Marsh

Non-Native
- Palm
- Castor Bean
- Poison Hemlock

Note:

Detailed information associated with numbered point groups is shown in Data Table 1.

Date	Issues And Revisions	No.
Feb. 2004	Draft	

PROJECT #13039
DRAWN BY: GwO
ORIGINAL DRAWING SIZE: 24" X 36"

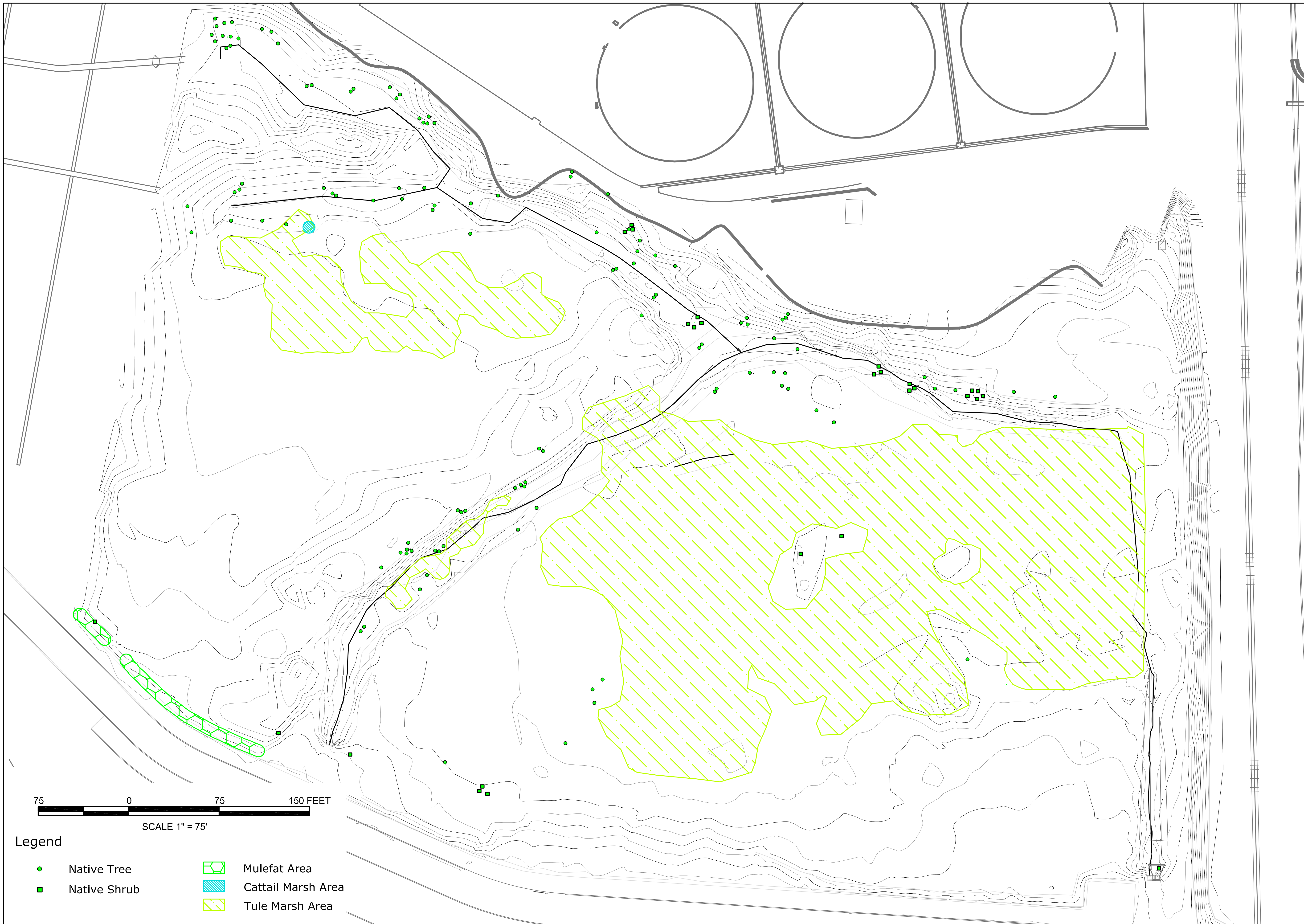
SCALE: 1" = 50'

Figure 1

Significant Native and Non-Native Vegetation

Basemap: JWPCP

May 26, 2006 - 10:25am L:\Acad 2000 Files\13000\13039\JWPCP_010803.DWG (Figure 1)



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JWPCP

Los Angeles County, California

Figure 2

Significant Native Vegetation

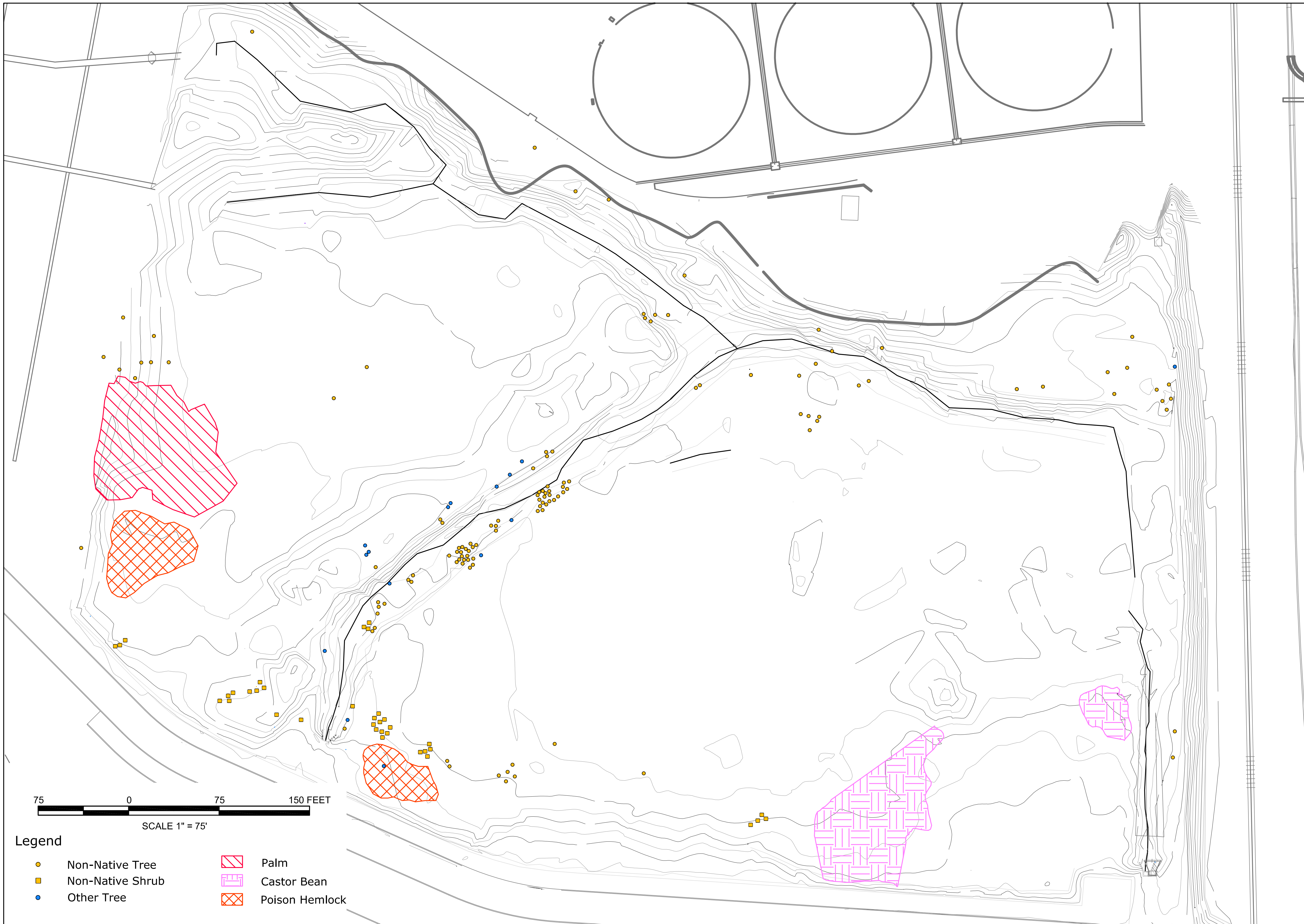
Date	Issues And Revisions	No.
Jan 2004	Draft	

PROJECT #13039
DRAWN BY: GwO
ORIGINAL DRAWING SIZE: 11" X 17"

SCALE: 1" = 75'

N

Source: JWPCP
Datum: NAD 83 CA State Plane Zone 5



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JWPCP

Los Angeles County, California

Figure 3

Significant Non-Native Vegetation

Date	Issues And Revisions	No.
Jan 2004	Draft	

PROJECT #13039
DRAWN BY: GwO
ORIGINAL DRAWING SIZE: 11" X 17"

SCALE: 1" = 75'

N

Source: JWPCP
Datum: NAD 83 CA State Plane Zone 5

May 26, 2006 - 10:18am L:\Acad 2000 Files\13000\13039\JWPCP_010803.DWG (Fig 3)

Table 1. **Native Points**

ID	Species	Type	Category	Number	Note
1	willow	tree	N	1	
2	willow	tree	N	1	
3	willow	shrub	N	5	
4	willow	tree	N	1	
5	willow	tree	N	1	
6	willow	tree	N	1	
7	willow	shrub	N	3	
8	willow	shrub	N	3	
9	willow	tree	N	1	
10	willow	tree	N	1	
11	willow	tree	N	1	
12	willow	tree	N	1	
13	willow	tree	N	1	
14	willow	tree	N	1	
15	willow	tree	N	1	
16	willow	tree	N	3	
17	willow	tree	N	1	
18	willow	tree	N	3	
19	willow	tree	N	1	
20	willow	tree	N	2	
21	willow	tree	N	2	
22	willow	shrub	N	4	
23	willow	tree	N	1	
24	willow	tree	N	2	
25	willow	tree	N	1	
26	willow	tree	N	1	
27	willow	tree	N	1	
28	willow	shrub	N	1	
29	willow	shrub	N	1	
30	willow	shrub/tree	N	4	3 shrubs/ 1 tree
31	willow	tree	N	2	
32	willow	tree	N	1	
33	willow	tree	N	1	
34	willow	tree	N	2	
35	willow	tree	N	1	**data tree**
36	willow	tree	N	1	
37	willow	tree	N	1	
38	willow	tree	N	5	
39	willow	tree	N	3	
40	willow	tree	N	2	
41	willow	tree	N	2	
42	willow	tree	N	2	
43	willow	tree	N	1	
44	willow	tree	N	11	
45	willow	tree	N	1	
46	willow	tree	N	1	
47	willow	tree	N	1	
48	willow	tree	N	3	
49	willow	tree	N	1	
50	willow	tree	N	1	
51	willow	tree	N	3	
52	willow	tree	N	1	
53	willow	tree	N	1	
54	willow	tree	N	1	
55	willow	tree	N	1	
56	willow	tree	N	2	
57	willow	tree	N	1	
58	willow	tree	N	3	
59	willow	tree	N	1	
60	willow	tree	N	1	
61	willow	tree	N	2	
62	mulefat	shrub	N	3	
63	mulefat	shrub	N	1	
64	mulefat	shrub	N	1	
65	mulefat	shrub	N	1	
66	mulefat	shrub	N	1	
67	willow	tree	N	1	
68	willow	tree	N	5	
69	willow	tree	N	1	
70	willow	tree	N	1	
71	willow	tree	N	3	
72	willow	tree	N	3	
73	willow	tree	N	1	
74	willow	tree	N	1	
75	willow	tree	N	4	
76	mulefat	shrub	N	2	
77	willow	shrub	N	2	

Table 1. cont. **Non-Native Points**

ID	Species	Type	Category	Number	Note
1	palm	tree	NN	1	
2	palm	tree	NN	1	
3	pepper tree	tree	NN	1	
4	eucalyptus	tree	NN	1	
5	eucalyptus	tree	NN	1	
6	eucalyptus	tree	NN	1	
7	palm	tree	NN	2	
8	eucalyptus	tree	NN	1	
9	eucalyptus	tree	NN	1	
10	eucalyptus	tree	NN	1	
11	eucalyptus	tree	NN	1	
12	eucalyptus	tree	NN	5	
13	eucalyptus	tree	NN	1	
14	eucalyptus	tree	NN	2	
15	eucalyptus	tree	NN	1	
16	palm	tree	NN	4	
17	eucalyptus	tree	NN	1	
18	eucalyptus	tree	NN	1	
19	eucalyptus	tree	NN	1	
20	pepper tree	tree	NN	1	
21	palm	tree	NN	1	
22	palm	tree	NN	1	
23	palm	tree	NN	7	
24	palm	tree	NN	40	estimated poly and number
25	castor bean	shrub	NN	4	
26	palm	tree	NN	1	
27	palm	tree	NN	1	
28	palm	tree	NN	5	
29	castor bean	shrub	NN	1	
30	palm	tree	NN	1	
31	castor bean	shrub	NN	5	
32	olive	tree	Other	0	moved to Other pt 4
33	castor bean	shrub	NN	10	
34	palm	tree	NN	1	
35	tree of heaven	shrub	NN	1	
36	castor bean	shrub	NN	1	
37	castor bean	shrub	NN	1	
38	castor bean	shrub	NN	4	
39	Pampas	shrub	NN	4	
40	castor bean	shrub	NN	3	
41	palm	tree	NN	5	
42	pepper tree	tree	NN	1	
43	castor bean	shrub	NN	1	
44	eucalyptus	tree	NN	4	
45	eucalyptus	tree	NN	1	
46	eucalyptus	tree	NN	1	
47	palm	tree	NN	2	
48	pampas grass	shrub	NN	3	
49	palm	tree	NN	1	
50	eucalyptus	tree	NN	3	
51	palm	tree	NN	4	
52	eucalyptus	tree	NN	16	
53	eucalyptus	tree	NN	1	
54	palm	tree	NN	2	
55	palm	tree	NN	4	
56	eucalyptus	tree	NN	17	
57	palm	tree	NN	1	
58	eucalyptus	tree	NN	5	
59	palm	tree	NN	2	
60	eucalyptus	tree	NN	1	
61	castor bean	shrub	NN	5	estimated number within poly
62	castor bean	shrub	NN	12	estimated number within poly
63	eucalyptus	tree	NN	2	

Other Point

ID	Species	Type	Category	Number	Note
1	ash	tree	Other	1	ornamental ash?
2	ash	tree	Other	1	ornamental ash?
3	myoporum	shrub	Other	1	
4	European olive	tree	Other	1	mature tree
5	European olive	tree	Other	3	shrubby seedling
6	ash	tree	Other	1	ornamental ash?
7	ash	tree	Other	1	ornamental ash?
8	European olive	tree	Other	2	shrubby seedling
9	ash	tree	Other	1	ornamental ash?
10	European olive	tree	Other	1	shrubby seedling
11	European olive	tree	Other	1	shrubby seedling
12	European olive	tree	Other	1	shrubby seedling

Wildlife Habitat Assessment

JOINT WATER POLLUTION CONTROL PLANT
MARSHLAND ENHANCEMENT PROJECT
CARSON, LOS ANGELES COUNTY
CALIFORNIA

Prepared For:
County Sanitation Districts of Los Angeles County
Planning and Property Management Section
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August 2005

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LIST OF APPENDICES

1.0 INTRODUCTION

The Joint Water Pollution Control Plant (JWPCP) marshland is located in the city of Carson, Los Angeles County, California. It is bounded by a concrete flood control channel (the Wilmington Drain) and the Harbor Freeway to the west, commercial development and Sepulveda Boulevard to the north, JWPCP wastewater treatment facilities and Figueroa Street to the east, and the Atchison, Topeka & Santa Fe Railroad line and JWPCP facilities to the south.

The marshland is owned and managed by the County Sanitation Districts of Los Angeles County (Districts). Proposed expansion of secondary treatment facilities at the JWPCP property was included in the Districts' final program environmental impact report (EIR) for the Joint Outfall System 2010 Master Facilities Plan (Jones & Stokes Associates 1995). As mitigation for potential impacts associated with construction and operation of the proposed secondary treatment digesters, preparation and implementation of a Marshland Management Plan (MMP) was required by the EIR (Mitigation Measure 11-2). The purpose of the MMP would be to maintain and enhance the wildlife and habitat value of the JWPCP marsh site. Specific requirements of the EIR were to:

- Establish a cooperative agreement with Los Angeles County Flood Control District for access to water from and disposal of marsh water to the Wilmington Drain;
- Maintain or enhance the habitat quality of the freshwater marsh by managing the flow to and water quality of the marsh site;
- Enhance riparian forest by gradual replacement of non-native trees with native trees and native shrubs;
- Convert ruderal habitat to native riparian forest and scrub habitat through weed management and the installation of native riparian trees and shrubs; and
- Prepare and implement short-term and long-term monitoring programs that include specific success criteria; methods for measuring success of native vegetation establishment and levels of wildlife use; and provisions for remedial actions.

In April 1996, a Marshland Management Plan was proposed (Jones & Stokes Associates). However, planned operation of the marsh resulted in unforeseen adverse impacts to the constructed digesters (groundwater rise resulted in a potential loss of structural integrity), and the MMP was never fully implemented. A new Marshland Enhancement Project (Project) has since been proposed (WRA 2004). The new Project has been designed to uphold the goals of the previous MMP, but incorporates more comprehensive enhancement measures and has also been designed to avoid adverse impacts to adjacent JWPCP facilities.

The purpose of this report is to describe the existing wildlife resources within the JWPCP site to serve as a baseline for understanding potential restoration opportunities and constraints, and for identifying any impacts that may be associated with the proposed enhancement.

A wildlife habitat assessment provides general information on the potential presence of sensitive species. The assessment is not an official protocol level survey for listed species that may be required for project approval by local, state, or federal agencies. However, specific findings on the occurrence of any species may require that protocol surveys be conducted. This assessment is based on information available at the time of the study and on site conditions that were observed on the date of the site visit.

1.1 General Study Area Description

The Joint Water Pollution Control Plant (JWPCP) marshland is located in the city of Carson, Los Angeles County, California. It is bounded by a concrete flood control channel (the Wilmington Drain) and the Harbor Freeway to the west, commercial development and Sepulveda Boulevard to the north, JWPCP wastewater treatment facilities and Figueroa Street to the east, and the Atchison, Topeka & Santa Fe Railroad line and JWPCP facilities to the south.

Habitat types observed on-site during the assessment included freshwater marsh, riparian woodland, and grassland/upland areas. Marshland was present in two areas in the south-central and northeast portions of the site. Riparian trees and shrubs were primarily located along drainage courses; a few additional willows were located in other areas and a narrow band of mulefat was present along the road in the northwest portion of the site. Upland areas were present along the western border of the site between the marsh and the access road, and along the eastern border of the site between the riparian community and the digesters. In addition, the entire northeast portion of the site between the marsh and the access road is upland, dominated by non-native species.

1.2 Regulatory Background

Special status species include those plants and wildlife species that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under the federal Endangered Species Act (ESA) or California Endangered Species Act (CESA). These Acts afford protection to both listed and proposed species. In addition, California Department of Fish and Game (CDFG) Species of Special Concern, which are species that face extirpation in California if current population and habitat trends continue, and U.S. Fish and Wildlife Service (USFWS) Species of Concern are considered special status species. Although California and USFWS Species of Concern generally have no special legal status, they are given special consideration under the California Environmental Quality Act (CEQA). In addition to regulations for special status species, most birds in the United States, including non-status species, are protected by the Migratory Bird Treaty Act of 1918. Under this legislation, destroying active nests, eggs, and young is illegal. Plant species on California Native Plant Society (CNPS) Lists 1 and 2 are also considered special status plant species. Impacts to these species are considered significant according to the California Environmental Quality Act (CEQA). The CNPS List 3 and 4 plants have little or no protection under CEQA, but are included in this analysis for completeness. (The assessment may also include species of local concern as indicated by the USFWS list for the quad/county, or as designated by a City or County).

2.0 METHODS

On August 3, 2005, the Study Area was traversed on foot to determine if existing conditions provided suitable habitat for any special status wildlife species, and to identify species that are currently in the Study Area. All wildlife species encountered were recorded, and are summarized in Appendix B.

2.1 Special Status Species

2.1.1 Literature Review

Potential occurrence of special status species in the Study Area was evaluated by first determining which special status species occur in the vicinity of the Study Area through a literature and database search. Database searches for known occurrences of special status species included the Torrance 7.5 minute USGS quadrangle and the eight surrounding USGS quadrangles. The following sources were reviewed to determine which special status and common wildlife species have been documented to occur in the vicinity of the Study Area:

- California Natural Diversity Database records (CNDDB) (CDFG 2005)
- CDFG publication "California's Wildlife, Volumes I-III" (Zeiner et al. 1990)
- CDFG publication "Amphibians and Reptile Species of Special Concern in California" (Jennings and Hayes 1994)
- Dominguez Watershed Management Master Plan (County of Los Angeles Department of Public Works 2004)
- Marshland Management Plan, Joint Water Pollution Control Plant, Carson, California (Jones & Stokes Associates 1996)
- Joint Water Pollution Control Plant Marshland Enhancement Project, Biological Resources (WRA 2005)

2.1.2 Site Assessment

A site visit was conducted to search for suitable habitats within the Study Area for those species identified as occurring within the vicinity. Potential for special status species to occur in the Study Area was then evaluated according to the following criteria:

(1) Not Present. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

(2) Low Potential. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

(3) Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

(4) High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

(5) Present. Species is observed on the site or has been recorded (i.e. CNDDB, other reports) on the site recently.

Appendix A presents the special status wildlife species with a potential to occur within the Study Area, their habitat requirements, and a rating of potential for occurrence.

3.0 RESULTS AND DISCUSSION

3.1 Plant Communities

Emergent Freshwater Marsh Unlike typical marsh systems, the JWPCP marshland is composed of primarily one plant zone, tall emergent marsh, dominated by native California tule (*Scirpus californicus*) with one small patch of cattail (*Typha* sp.) in the northern portion of marsh. No cattail was observed in the southern portion, but most of the southern marsh area was not traversed. Several large shrubby arroyo willows were observed within the southern marsh on patches of slightly higher ground. Some seasonal wetland vegetation was present around edges of the marsh, including rough cocklebur, curly dock, and Bermuda grass (*Cynodon dactylon*), but the wetland edge was more often abruptly separated from adjacent herbaceous upland vegetation with no seasonal transition. Small seasonal wetland areas were not mapped separately from emergent marsh.

Riparian Woodland The primary riparian corridor is located along the eastern edge of the site and included a small tributary at the north end. The corridor extends from the NE corner of the site along the eastern edge to the SE corner. At this point, the riparian community ends; however the channel continues along the southern edge of the site and empties into Wilmington Drain through an outlet at the SW corner.

The northern portion of the primary riparian corridor (above the confluence) is dominated by native trees and shrubs; however, below the confluence natives are co-dominate with non-natives. Willow trees were the dominant native species observed, primarily Goodding and arroyo willow (*Salix gooddingii, S. lasiolepis*), although mulefat shrubs (*Baccharis salicifolia*) were also frequent. Non-native trees included eucalyptus (*Eucalyptus* sp.), Peruvian pepper tree (*Schinus molle*), fan palm (*Washingtonia* sp.), and date palm (*Phoenix* sp.). A few seasonal wetland plants were observed including rough cocklebur (*Xanthium strumarium*), curly dock (*Rumex crispus*), and fat-hen (*Atriplex triangularis*), but overall there was little to no herbaceous wetland understory.

The west-east tributary originates at a pump station located on the western edge of the site and flows east until it joins the main corridor. This channel has fewer trees and, therefore, more patchy canopy cover than the main channel. The tributary is dominated by non-natives and ornamentals including eucalyptus, fan palm, European olive (*Olea europaea*), ash (*Fraxinus* sp.), tree of heaven (*Ailanthus altissima*), castor bean (*Ricinus communis*), and pampas grass (*Cortaderia* sp.). A portion of the channel is vegetated by native emergent marsh, and a few seasonal wetland plants such as tall flatsedge (*Cyperus eragrostis*), rough cocklebur, and curly dock were observed in the understory. However, a majority of the understory and adjacent vegetation was composed of non-native upland species, indicating that hydrology in this channel is typically short-lived.

Patches of coastal sage (*Artemisia californica*), coyote brush (*Baccharis pilularis*), and herbaceous upland plants inter-graded with riparian vegetation along the eastern edge of the marshland, usually in areas where adjacent banks and terraces were at significantly higher elevation than the channel.

<u>Non-Native Grassland/ Upland</u> Upland habitat occupies most of the site and consists of several different vegetation types including: non-native annual grassland; ruderal areas dominated by weedy or non-native upland herbs, trees and/or shrubs; small areas of native coastal sage scrub; and unvegetated areas. To the west and north of the emergent marsh, the upland is ruderal and is vegetated almost entirely by non-native species. Two dense patches of poison hemlock (*Conium maculatum*) were found; however, it should be noted that this species was distributed throughout upland areas of the site along with other non-native annual species including black mustard (*Brassica nigra*), fennel (*Foeniculum vulgare*), wild radish (*Raphanus sativus*), horseweed (*Conyza* sp.), bull thistle (*Cirsium vulgare*), and non-native annual grasses.

A dense grove of fan palms was located along the northern edge of the marshland and two patches of castor bean in the southwest corner; however non-native trees and shrubs were present throughout upland areas. Non-natives present in uplands included adults and seedlings of eucalyptus, fan palm, date palm, castor bean, European olive, and myoporum (*Myoporum laetum*).

Upland habitat on the eastern border of the site was located along an embankment between riparian habitat and the new digesters. Portions of this area were vegetated with many of the same non-native annuals, shrubs and trees as other upland areas; however, some patches of native coastal sage and coyote brush were also present. The entire upper slope of the embankment had been seeded with an erosion-control grass and wildflower mix. In addition, several planted seedlings of coast live oak (*Quercus agrifolia*) and cottonwood (*Populus* sp.) were present along the embankment.

A patch of native mulefat is present along the access road near the pump station. Other native species observed in uplands include small patches and individuals of coyote brush and coastal sage. All upland areas west and north of marsh areas were dominated by non-native vegetation.

3.2 Special Status Species

Forty special status species of wildlife have been documented in the general vicinity of the JWPCP marshland (Appendix A). Most of these are found in habitats dissimilar to existing habitats of the marshland (e.g., coastal dune, lagoon, coastal bluff, salt marsh, perennial stream, perennial lake or pond, chaparral, desert, woodland, and forested habitats). On-site habitats are marginally suitable for the remaining species; however, the JWPCP marshland is not likely to actually support these species due to the limited extent (e.g., patches of coastal sage do not constitute sufficient habitat), poor quality (e.g., grassland dominated by non-native plant species), and/or isolated nature of available on-site habitats.

No federal or state listed wildlife species have ever been observed at the JWPCP marshland, and none are thought to be present due to the unsuitability of the habitat and/or urbanization surrounding the marshland which would form a barrier to dispersion. No non-listed special status wildlife species have been observed at the JWPCP marshland.

3.3 Other Wildlife

Twenty-eight species of wildlife have been documented to occur in or adjacent to the Study Area during this and other studies conducted at the marshland (Appendix B). All of the wildlife observed in the Study Area are commonly found species, and many are adapted to occupying disturbed or urban areas. No special status wildlife species were observed.

4.0 CONCLUSION

No special status wildlife species are likely to occur in the Study Area due to poor habitat conditions and isolation from larger areas of suitable habitat. The proposed enhancement project is unlikely to impact special status wildlife species.

Several common wildlife species have been documented to occur in the Study Area, including 13 birds that likely breed in the various habitats at the marshland site (Appendix B). Although conducted during the non-breeding season, the proposed ground disturbance and vegetation removal associated with the enhancement project will temporarily remove breeding habitat for some of these species in the following year. It is expected that most of these birds will disperse and find suitable nesting sites in nearby landscaping and other vegetated areas, such as vegetation along the Wilmington Drain and Lomita Marsh to the south (Table 1). The emergent marsh will be avoided and will remain largely intact, providing breeding habitat for blackbirds, song sparrow, and common yellowthroat. As the habitat develops, an increasing diversity of wildlife will occur within the Study Area, including open water species such as waterfowl and coots.

Table 1. Species observed during this and other studies that may nest in the Study Area, and potential alternative nesting areas during the enhancement project.

SPECIES	Typical Breeding Habitat and Existing Breeding Habitat in Study Area	Alternate Breeding Habitat in Project Vicinity During Temporary Habitat Loss
mallard	usually on ground in concealing vegetation, often far from water; most of Study Area provides suitable nesting habitat	avoided emergent vegetation, vegetated areas along Drain
mourning dove	nest usually located in a tree or shrub, and occasionally on the ground in open habitats; most of Study Area provides suitable nesting habitat	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development
Anna's hummingbird	nest usually on branch of tree or shrub, sometimes in vines, on wires, and under eaves; most of Study Area provides suitable nesting habitat	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development
western scrub-jay	nest usually in tree or shrub; riparian woodland provides suitable nesting habitat in Study Area	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development
marsh wren	nest placed in cattails or tules	avoided emergent vegetation
bushtit	nest usually in tree or shrub; riparian woodland provides suitable nesting habitat in Study Area	vegetated areas along railroad ROW and Wilmington Drain
northern mockingbird	nest typically placed in dense shrub or tree; riparian woodland provides suitable nesting habitat in Study Area	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development
California towhee	nest typically placed in dense shrub or tree; riparian woodland provides suitable nesting habitat in Study Area	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development
song sparrow	nest usually on ground in clump of vegetation and sometimes in shrubs and marsh vegetation; riparian woodland and emergent vegetation provide suitable nesting habitat in Study Area	avoided emergent vegetation

SPECIES	Typical Breeding Habitat and Existing Breeding Habitat in Study Area	Alternate Breeding Habitat in Project Vicinity During Temporary Habitat Loss
common yellowthroat	nest is placed low in wetland vegetation and willow thickets; emergent vegetation provides suitable nesting habitat in Study Area	avoided emergent vegetation
Bullock's oriole	nest placed in tall trees, including palms in residential areas; trees in Study Area provide suitable nest sites	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development
house finch	nest placed in various sites, including trees, palms, ivy, planters, and natural or man-made cavities; suitable nest sites are present in palms and riparian woodland within Study Area	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development
American goldfinch	nest usually placed in shrubs or trees; riparian woodland in Study Area provides suitable nesting habitat	vegetated areas along railroad ROW, Drain, and in landscaping of commercial and residential development

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Appendix A. Special Status animal and plant species that may occur, or are known to occur, in the vicinity of the JWPCP marshland. List compiled from a search of CDFG Natural Diversity Database (CDFG 2005) occurrence records for the Torrance, Venice, Redondo Beach, San Pedro, Long Beach, South Gate, and Inglewood 7.5 minute USGS quadrangles, CDFG County lists for Los Angeles County and other available biological literature for the region.

SPECIES	STATUS	HABITAT	HABITAT SUITABILITY
Invertebrates			
Tryonia imitator mimic tryonia	FSC	Inhabits coastal lagoons, estuaries, and salt marshes, found only in submerged areas in a variety of sediment types, able to withstand a wide range of salinities.	**Not Present.** No coastal lagoon or salt marsh habitat is present in Project Area.
Cicindela hirticollis gravida sandy beach tiger beetle	FSC	In habits areas adjacent to non-brackish water along the coast from San Francisco Bay to northern Mexico, found in clean, dry, light-colored sand in the upper zone. Subterranean larvae prefer moist sand not affected by wave action.	**Not Present.** No coastal dune habitat is present in Project Area.
Cicindela senilis frosti tiger beetle	FSC	Inhabits the marine shoreline, form central California coast to the salt marshes of San Diego, found in dark-colored mud in the lower zone and in dried salt pans in the upper zone.	**Not Present.** No marine shoreline habitat is present in Project Area. Host plant has not been observed on-site.
Coelus globosus globose dune beetle	FSC	Inhabits coastal sand dunes from Sonoma County to Mexico, found in foredunes and sand hummocks; it burrows beneath the sand surface and is most common beneath dune vegetation.	**Not Present.** No coastal dune habitat is present in Project Area.
Onychobaris langei Lange's El Segundo Dune weevil	FSC	Known only from El Segundo dunes.	**Not Present.** No dune habitat is present in Project Area.
Trigonoscuta dorothea dorothea Dorothy's El Segundo Dune weevil	FSC	Coastal sand dunes in Los Angeles County.	**Not Present.** No coastal dune habitat is present in Project Area.
Brennania belkini Belkin's dune tabanid fly	FSC	Inhabits coastal sand dunes of southern California.	**Not Present.** No coastal dune habitat is present in Project Area.

SPECIES	STATUS	HABITAT	HABITAT SUITABILITY
Danaus plexippus monarch butterfly	none	(wintering sites) Winter roost sites extend along the coast from Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	**Not Present.** Trees present in Project Area not preferred roost types. Site is isolated from the coast and suitable roost areas by urban development.
Eucosma hennei Henne's eucosman moth	FSC	Endemic to the El Segundo Dunes (type locality), Los Angeles County. Larval foodplant is *Phacelia ramosissima* var. *austrolitoralis* (branching phacelia), larvae can be found on woody stems and upper root parts.	**Not Present.** No coastal dune habitat is present in Project Area. Host plant has not been observed on-site.
Euphilotes battoides allyni El Segundo blue butterfly	FE	Restricted to remnant coastal dune habitat in southern California. Host plant is *Eriogonum parvifolium* (sea-cliff buckwheat), larvae feed only on the flowers and seeds; used by adult as major nectar source.	**Not Present.** No coastal dune habitat is present in Project Area. Host plant has not been observed on-site.
Glaucopsyche lygdamus palosverdesensis Palos Verdes blue butterfly	FE	Restricted to the cool, fog-shrouded, seaward side of Palos Verdes hills, Los Angeles Co. Host plant is *Astragalus trichopodus* var. *lonchus* (Santa Barbara milk-vetch).	**Not Present.** No seaside habitat is present in Project Area. Host plant has not been observed on-site.
Panoquina errans wandering (saltmarsh) skipper	FSC	Southern California coastal salt marshes, requires moist salt grass for larval development.	**Not Present.** No coastal salt marsh habitat is present in Project Area.
Fishes			
Gila orcutti Arroyo chub	CSC	Arroyo chubs are found in the Los Angeles Basin south coastal streams in slow-moving or backwater sections of warm to cool (10-24 C) streams with mud or sand substrates. Feed heavily on aquatic vegetation and associated invertebrates.	**Not Present.** Suitable habitat not available in flood control channel and connectivity to other suitable waterways lacking.
Gila bicolor mohavensis Mohave tui chub	FE, SE	Endemic to the Mohave River Basin, adapted to alkaline, mineralized waters. Needs deep pools, ponds, or slough-like areas and vegetation for spawning.	**Not Present**. No connection to Mohave River basin to allow dispersal into Project Area. Marsh water is either pumped in from man-made flood control channel (Wilmington Drain) or comes from precipitation.

SPECIES	STATUS	HABITAT	HABITAT SUITABILITY
Reptiles and Amphibians			
Emys (Clemmys) marmorata pallida southwestern pond turtle	FSC, CSC	Occurs in perennial ponds, lakes, rivers, and streams with suitable basking habitat and submerged shelter	**Not Present.** Marsh habitat present in Project Area is not perennial in most years. In addition, presence is unlikely due to urbanization surrounding the marsh which would form a barrier to dispersal.
Spea (Scaphiopus) hammondii western spadefoot toad	FSC, ST	Elevations of occurrence extend from sea level to 1363 m (4500 ft) in the southern Sierra foothills. This species occurs primarily in grassland situations, but occasional populations also occur in valley-foothill hardwood woodlands. Adults remain in underground burrows most of the year.	**Low Potential.** Species has been known to occur in habitats similar to Project Area, however, isolation from other suitable habitat areas makes occurrence unlikely.
Phrynosoma coronatum (blainvillei) Coast (San Diego) horned lizard	CSC	Inhabits coastal sage scrub and chaparral in arid and semi-arid climate conditions. Prefers friable, rocky, or shallow sandy soils.	**Low Potential.** No true sage scrub habitat present in Project Area, however scattered sage and coyote brush may supply marginal habitat. Site is isolated from other more suitable habitats.
Birds			
Gymnogyps californianus California condor	FE, SE, CFP	Endangered, permanent resident of the semi-arid, rugged mountain ranges surrounding the southern San Joaquin Valley. Forages over wide areas of open rangelands, roosts on cliffs and in large trees and snags.	**Not Present.** Suitable mountainous terrain and foraging habitat not available.
Aquila chrysaetos golden eagle	CSC, CFP	Found in rolling foothill and mountain areas, sage-juniper flats, dessert. Cliff-walled canyons provide nesting habitat in most parts of range.	**Not Present**. Suitable foothill or open flat habitat is not available. Nesting habitat is not present in vicinity.

SPECIES	STATUS	HABITAT	HABITAT SUITABILITY
Elanus leucurus white-tailed kite	FSC, CSC, CFP	Year-long resident of coastal and valley lowlands. Preys on small diurnal mammals and occasional birds, insects, reptiles, and amphibians. Nests in trees.	**Low Potential.** Limited foraging habitat is available in open grassland marsh areas. Potential nesting trees are also present. Isolation from natural habitat areas and surrounding development limit suitability.
Haliaeetus leucocephalus bald eagle	FPD, FT, SE, CFP	Requires large bodies of water, or free-flowing rivers with abundant fish adjacent snags or other perches. Nests in large, old-growth, or dominant live tree with open branchwork. Winter visitor in southern California.	**Not Present.** Open water foraging habitat and large trees for roosting and nesting are are not available at the Project Area.
Circus cyaneus northern harrier	CSC	Found in open grasslands, prairies, and marshes. Tend to nest near water.	**Low Potential.** Limited foraging habitat is available in open grassland and marsh areas. Nesting shrubs and vegetation are also available. Isolation from natural habitat areas and surrounding development likely preclude presence.
Buteo swainsoni Swainson's hawk	FSC, ST	Breeds in stands with few trees in juniper-sage flats, riparian areas and oak savannah. Requires adjacent suitable foraging areas such as grasslands or grain fields supporting rodent populations.	**Not Present.** Open foraging habitat is not available at the Project Area. Surrounding development further limits suitability.
Accipiter cooperii Cooper's hawk	CSC	Inhabits areas with dense tree stands or patchy woodlands. Usually nests in deciduous riparian areas or second-growth conifer stands near streams.	**Low Potential.** Suitable woodland habitat and foraging areas available. Isolation of Project Area from other habitat areas and surrounding development limit suitability.
Falco mexicanus prairie falcon	CSC	Uncommon permanent resident and migrant that ranges from southeastern deserts northwest along the inner Coast Ranges and Sierra Nevada. Distributed from annual grasslands to alpine meadows, but associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas.	**Not Present.** Open grassland habitat not present at Project Area.

SPECIES	STATUS	HABITAT	HABITAT SUITABILITY
Laterallus jamaicensis coturniculus California black rail	ST, CFP	Rarely seen, scarce, year long resident of saline, brackish, and fresh emergent wetlands. Dependent on upper zones of saline emergent wetlands for nesting and refuge from high tides.	**Not Present** No coastal, sandy nesting habitat is present. Freshwater marshland on-site is not suitable for this species due to its isolation from the coast.
Charadrius alexandrinus nivosus western snowy plover	FT, CSC	(Nesting) Federal listing applies only to the Pacific coastal population. Sandy beaches, salt pond levees, and shores of large alkali lakes. Needs sandy, gravelly or friable soils for nesting.	**Not Present.** No coastal, sandy nesting habitat is present at the Project Area.
Charadrius montanus mountain snowy plover	FSC, CSC	Winter resident in short grasslands and plowed fields below 1000m.	**Not Present.** Short grassland and/or plowed field wintering habitat not present at the Project Area.
Sterna antillarum browni California least tern	FE, SE	(Nesting colony) Nests along the coast from San Francisco Bay south to Northern Baja California. Colonial breeder on bare or sparsely vegetated , flat substrates such as sand beaches, alkali flats, land fills, or paved areas.	**Not Present.** No coastal, barren nesting habitat is present.
Athene cunicularia burrowing owl	FSC, CSC	(burrow sites) Frequents open grasslands and shrublands with perches and burrows. Dependent upon burrowing mammals, most notably, the California ground squirrel.	**Not Present.** Grassland and shrubland habitats in Project Area are limited to slopes and berms around the marshland, however, may supply marginal habitat. Burrowing mammals not likely to be present at high enough concentration to support owl. Project Area is isolated from other more suitable habitats.
Asio flammeus s hort-eared owl	CSC	Found in open, treeless areas with elevated sites for perches and dense vegetation for roosting and nesting. Tule patches/tall grass needed for nesting and daytime seclusion.	**Not Present.** Substantial open grassland habitat not present at Project Area. Project Area is isolated from other suitable habitats.
Cypseloides niger black swift	FSC, CSC	Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above surf. Forages widely.	**Not Present.** Isolation and presence of surrounding developed areas limits the potential that this species may forage over the Project Area.

SPECIES	STATUS	HABITAT	HABITAT SUITABILITY
Vireo bellii pusillus Least Bell's vireo	FE, SE	Summer resident of southern California. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, baccharis, mesquite. Found in low riparian in vicinity of water.	**Low Potential.** Some riparian habitat available but lack of summer water makes habitat less suitable, and isolation of Project Area by surrounding development makes this species use of such habitat unlikely.
Polioptila californica californica California coastal gnatcatcher	FT, CSC	Obligate, permanent resident of coastal sage scrub below 2500 ft. in southern California. Frequents low, coastal sage scrub in arid washes, on mesas and slopes.	**Not Present.** No true sage scrub habitat present in Project Area. Although not ideal, scattered sage and coyote brush may supply marginal habitat. Not likely to be present because Project Area is isolated from other more suitable habitats.
Icteria virens yellow-breasted chat	CSC	An uncommon summer resident and migrant in coastal California and in foothills of the Sierra Nevada. Found up to about 1450 m (4800 ft) in valley foothill riparian, and up to 2050 m (6500 ft) east of the Sierra Nevada in desert riparian habitats.	**Not Present.** Desert riparian habitat not available. Project Area is isolated from other natural habitats.
Aimophila ruficeps canescens southern California rufous-crowned sparrow	CSC	Occupies coastal sage scrub habitat in southern California.	**Not Present.** Coastal sage scrub habitat is not available at the Project Area.
Passerculus sandwichensis beldingi Belding's savannah sparrow	SE	Mid- to upper-littoral zones of coastal salt marshes. Nests in Salicornia on and about margins of tidal flats.	**Not Present.** No coastal salt marsh habitat is present in Project Area.
Agelaius tricolor tricolored blackbird	FSC, CSC	Nests near freshwater marsh with dense emergent vegetation near trees and shrubs; also may nest in thickets; wanders widely in winter.	**Low Potential.** Marsh habitat present in Project Area is not perennial in most years; Study Area provides poor foraging habitat.

SPECIES	STATUS	HABITAT	HABITAT SUITABILITY
Mammals			
Perognathus longimembris pacificus Pacific pocket mouse	FE, CSC	Inhabits the narrow coastal plains from the Mexican border north to El Segundo, Los Angeles Co. Seems to prefer soils of fine alluvial sands near the ocean, but much remains to be learned about the species' habitat requirements.	**Not Present.** No coastal plain habitat present, and Project Area is isolated from other more suitable coastal habitats by urban development which acts as a barrier to dispersal.
Neotoma lepida intermedia San Diego desert woodrat	FSC, CSC	Coastal southern California from San Diego to San Luis Obispo Counties. Prefers moderate to dense canopies, particularly abundant in rock outcrops and rocky cliffs and slopes.	**Not Present.** No rocky outcrop habitat present, and Project Area is isolated from other more suitable habitats by urban development which acts as a barrier to dispersal.

*Key to status codes used above:

FE	Federal Endangered
FT	Federal Threatened
FC	Federal Candidate
FCS	Federal Species of Concern
SE	State Endangered
ST	State Threatened
SR	State Rare
CSC	California Department of Fish and Game (CDFG) Species of Special Concern
CFP	CDFG Fully Protected Animal

APPENDIX B. Wildlife species observed within and/or adjacent to the Study Area.

Species	Study Area Habitat Association	Source	Comments
MAMMALS			
Botta's pocket gopher *Thomomys bottae*	non-native grassland/upland	WRA Aug. 2005; JSA Apr. 1996	abundant in region in relatively undisturbed uplands
California ground squirrel *Spermophilus beecheyi*	non-native grassland/upland	JSA Apr. 1996	abundant in region
striped skunk *Mephitis mephitis*	non-native grassland/upland; riparian forest	WRA Aug. 2005; JSA Apr. 1996	scat observed in upland areas
BIRDS			
great egret *Ardea alba*	Wilmington Drain	County of Los Angeles 2004	likely feeds on mosquitofish and treefrog larvae in Drain
snowy egret *Egretta thula*	Wilmington Drain	WRA Aug. 2005	likely feeds on mosquitoes and treefrog larvae in Drain
mallard *Anas platyrhynchos*	Wilmington Drain	WRA Aug. 2005	several observed feeding in Drain
American kestrel *Falco sparverius*	riparian forest	JSA Apr. 1996	no suitable nesting cavities in Study Area
barn owl *Tyto alba*	non-native grassland/upland	WRA Aug. 2005	pellets found below possible palm tree roost; typically nests in crevices
mourning dove *Zenaida macroura*	riparian woodland; non-native grassland/upland	WRA Aug. 2005; JSA Apr. 1996; County of Los Angeles 2004	abundant in region; often nests in developed areas
rock dove *Columba livia*	riparian woodland; non-native grassland/upland	JSA Apr. 1996	abundant in region; non-native species
Anna's hummingbird *Calypte anna*	riparian woodland	WRA Aug. 2005; County of Los Angeles 2004	common in region; nectar sources appear poor in Study Area; often nests in developed areas
belted kingfisher *Ceryle alcyon*	Wilmington Drain	JSA Apr. 1996	likely feeds on mosquitofish and treefrog larvae in Drain
black phoebe *Sayornis nigricans*	Wilmington Drain; emergent freshwater marsh	WRA Aug. 2005; JSA Apr. 1996	common in region; likely nests within Drain culverts

Species	Study Area Habitat Association	Source	Comments
western scrub-jay *Aphelocoma californica*	riparian forest	JSA Apr. 1996	common in most habitats in region; often nests in developed areas
barn swallow *Hirundo rustica*	emergent freshwater marsh; Wilmington Drain	WRA Aug. 2005; JSA Apr. 1996	common in region; likely nests within Drain culverts or nearby buildings
marsh wren *Cistothorus palustris*	emergent freshwater marsh	JSA Apr. 1996	probably nests within emergent marsh of Study Area
bushtit *Psaltriparus minimus*	riparian woodland	WRA Aug. 2005	common in region; likely nests within riparian woodland
northern mockingbird *Mimus polyglottos*	riparian woodland	JSA Apr. 1996	common in region; likely nests within riparian woodland
European starling *Sturnus vulgaris*	riparian woodland; non-native grassland/upland	County of Los Angeles 2004	abundant in region; non-native species
California towhee *Pipilo crissalis*	riparian woodland; non-native grassland/upland	County of Los Angeles 2004	common in region; likely nests within riparian woodland
song sparrow *Melospiza melodia*	emergent freshwater marsh; riparian woodland	WRA Aug. 2005; County of Los Angeles 2004	common in region; likely nests within riparian woodland and emergent freshwater marsh
common yellowthroat *Geothlypis trichas*	emergent freshwater marsh	County of Los Angeles 2004	possibly nests within emergent marsh of Study Area
Bullock's oriole *Icterus bullockii*	riparian woodland	WRA Aug. 2005	common; nests in palms and other trees, often in developed areas
house finch *Carpodacus mexicanus*	riparian woodland; non-native grassland/upland	WRA Aug. 2005; JSA Apr. 1996; County of Los Angeles 2004	common in most habitats in region; often nests in developed areas
American goldfinch *Carduelis tristis*	non-native grassland/upland	WRA Aug. 2005; County of Los Angeles 2004	common in region; likely nests within riparian woodland
REPTILES			
western fence lizard *Sceloporus occidentalis*	non-native grassland/upland	WRA Aug. 2005	abundant in upland habitats in region
INVERTEBRATES			

Species	Study Area Habitat Association	Source	Comments
western tiger swallowtail *Papillo rutulus*	riparian woodland	WRA Aug. 2005	willows are host plants
cabbage white *Pieris rapae*	non-native grassland/upland	WRA Aug. 2005	host plants include many species in Mustard Family

PROJECT MEMORANDUM

NOBLE CONSULTANTS, INC.

2201 DUPONT DRIVE, SUITE 620, IRVINE, CA 92612 (949) 752-1530
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To:	George Salvaggio
From:	Wenkai Qin & Scott Noble
Date:	July 15, 2004
RE:	Hydrological Analysis and Evaluation of the Pump Station and Outlet Weir for the Joint Water Pollution Control Plant (JWPCP) Marshland Enhancement Project
Cc:	

This memorandum summarizes the hydrological analysis and evaluation of the pump station and outlet weir that has been conducted by Noble Consultants Inc. (NCI) to assist in the design of the marsh and the development of an operational plan for the Joint Water Pollution Control Plant (JWPCP) Marshland Enhancement Project. Wetland Research Associates (WRA) developed several preliminary plan alternatives for the enhancement project. NCI was involved in reviewing the preliminary plans and providing comments and suggestions with regard to the plan revisions. The selected alternative was then considered for further detailed hydrological analysis and evaluation. For comparison, an analysis was also performed for the existing marshland conditions. The analysis evaluated marsh configuration, open water surface area and storage volume, the inlet pump station and inlet operation, the outlet weir and operation, and water circulation and water quality within the marsh.

In this analysis, elevations of control structures were obtained from as built drawings and survey. Except where noted in this report, the difference between the elevations is insignificant. Surveyed elevations ultimately should be considered existing conditions. However, the analyses and discussion are based on as built elevations because it was a more complete data set.

1. SITE CONDITIONS

The JWPCP marsh in Carson, California consists of natural and disturbed habitats surrounded by urban land uses. **Figure 1** is a contour map of the site based on a topographic survey conducted in the summer of 2002. Discrete channels, islands and relatively flat areas are found in the marsh. The main hydrological channel on the east side of the marsh is as low as 15 feet MSL, while the elevation of the islands reaches 24 feet MSL.

Figure 2 shows the topography based on the proposed enhancement plan developed by WRA. The proposed marsh consists of a meandering, centralized flow channel in the west, an emergent marsh in the middle and south, high land in the east, and isolated islands. The meandering main channel consists of a sediment basin at the inlet with a bottom elevation of 14 feet MSL, and five open water ponds with a bottom elevation of 12 feet MSL. The ponds are connected by channels with a bottom elevations ranging between 15 and 16 feet MSL. The longitudinal profile of the meandering channel is shown in **Figure 3**.

2. WATER SURFACE AREA AND STORAGE VOLUME

The open water surface area and storage volume for different water surface elevations were calculated using the existing and proposed topography. The results of the calculations are shown in **Figure 4** and **Table 1**.

Table 1. Water Surface Area and Storage Volume

Water Surface Elevation (ft, MSL)	Water Surface Area (acres)		Storage Volume (acre-ft)	
	Existing	Proposed	Existing	Proposed
16.00	0.8	1.8	0.1	4.7
16.93 (Outlet Toggle Gate)	1.5	2.5	0.5	6.4
17.00	1.7	2.7	0.5	6.6
18.00	4.6	5.5	2.2	10.2
19.00	7.4	6.2	6.7	15.8
19.34 (Existing Pump Shutoff)	7.9	6.3	8.8	17.9
20.00 (Proposed Water Level)	8.5	6.9	13.3	22.1
20.18 (Outlet Weir Crest)	8.7	6.9	14.7	23.3
24.18 (Marsh Perimeter Road)	10.7	10.7	52.6	58.4

The open water surface area will decrease from 7.9 acres for the existing marsh at a high water level of 19.34 feet MSL to 6.9 acres for the proposed marsh at a design water level of 20 feet MSL. This reduction is due to the required decrease in water surface area to obtain the 200-foot setback from the plant digesters. Conversely, the open water surface area will increase from the existing condition to the proposed plan at the low water level. At the outlet toggle gate elevation of 16.93 feet MSL (lowest level the marsh can be drained to exclusive of infiltration, evaporation, or pumping), the open water surface area will increase from 1.5 acres for the existing condition to 2.5 acres for the proposed plan. The increase in water surface area will occur until a water elevation of approximately 18 feet MSL as shown in **Figure 4**.

The proposed plan would significantly increase the storage volume of the marsh by creating open water habitat in the form of a channel distribution system and deep ponds. The storage volume would be approximately 22.1 acre-feet at the design water level of 20 feet MSL for the proposed plan compared to 8.8 acre-feet at the pump shutoff level of 19.34 feet MSL for the existing condition. If the pump was reprogrammed to shut off at 20 feet MSL, the existing storage volume would be 13.3 acre-feet, still significantly less than the proposed plan.

Figures 5 and **6** show the water depth for different water levels for the existing condition and for the proposed plan, respectively. Also shown on the figures is the 200-foot setback line from the digesters. It can be seen that the proposed plan would eliminate standing water within 200 feet of the digester and result in a much more centralized flow path with regular flow conditions compared to the existing condition.

3. INLET OPERATION AND FLOW CONDITIONS

Inlet Structures and Operations

The existing pump/gravity-flow facility was constructed during the mid-1970s to provide water to the marsh. The pump system can be controlled by a series of water level sensors or can be operated manually. Our analysis assumed an automatic operation. Currently, it is turned off until the marsh is reconfigured to prevent "floating" of the new plant digester tanks. The pump system operates when the water surface elevation in the East Channel of the Wilmington Drain is lower than 15.68 feet MSL. Historically, the pump system was programmed (see Jones and Stokes[1]) so that it activated when the water level in the sump exceeded 12.68 feet MSL (5 feet of water in the sump), and operated until the water level in the sump dropped to 10.51 feet MSL (approximately 2.8 feet of water in the sump) or until the water level in the marsh increased to an elevation of 19.34 feet MSL.

Gravity flow occurs and water enters the marsh through a 36-inch diameter flap gate when the water surface elevation exceeds 17.68 feet MSL in the Wilmington Drain[1]. A flap gate is located at the outlet of the pipe to prevent water from leaving the marsh through the gravity pipe. A photograph of the 6-inch diameter pump outlet and the flap gate at the marsh inlet is shown in **Figure 7**. **Table 2** lists the key operational elevations for the inlet structure.

Table 2. Inlet Structure Elevations

Description	Elevation (feet, MSL)	
	As built	Surveyed
36" RCP inlet at Wilmington Drain (invert)	14.00	–
36" RCP outlet at marsh (invert)	17.68	17.79
6" pump discharge pipe outlet at marsh (invert)	20.93	–
12" sump inlet #1	11.68	–
12" sump inlet #2	9.68	–
Bottom of sump	7.68	–

The proposed design water level for the marsh is 20 feet MSL. The invert elevation of the 6-inch diameter pump discharge pipe outlet to the marsh is 20.93 feet MSL. The pump is currently programmed to shutoff when the water level in the marsh reaches an elevation of 19.34 feet MSL. Hence, the pump operation needs to be modified to meet the design water level of 20 feet MSL.

[1] Source: Marshland Management Plan, Joint Water Pollution Control Plant, Carson, California. Prepared for County Sanitation Districts of Los Angeles County by Jones & Stokes Associates, Inc.

Based on our two site visits that were conducted in November, 2003 and April, 2004, the pump seems to be able to operate utilizing base flow in the Wilmington Drain. However, further information about the flow condition in the drain is required in order to verify the feasibility of operating the pump year-round using base flow for the proposed plan.

Gravity Flow through the Inlet Structure

No detailed information is available on how often and the duration stormwater runoff flows by gravity into the marsh. However, the County Sanitation Districts of Los Angeles County (LACSD) estimated the annual occurrence of gravity flow over the past seven years[2]. The results are presented in **Table 3**. In the analysis a range (maximum and minimum) of potential gravity flow events was estimated. The maximum number of events was determined by a limiting rainfall value of 0.2 inches, i.e., gravity flow into the marsh occurs if the rainfall is at least 0.2 inches. Similarly, the minimum number of events was determined by a limiting rainfall value of 0.7 inches.

Table 3. Estimated Occurrence of Gravity Flow into the Marsh

Year	Annual Occurrence	
	Maximum	Minimum
1997 – 1998	28	14
1998 – 1999	12	1
1999 – 2000	13	6
2000 – 2001	21	7
2001 – 2002	6	1
2002 –2003	12	8
2003 - 2004	3	1

The LACSD also collected data for water depths in the Wilmington Drain during four rain events in early 2004[2]. The results are presented in **Table 4**. The water level in this table was derived by adding the measured water depth in the channel to the bottom elevation of the drain at approximately 14 feet MSL. It is noted that during three of the four events the water surface elevation in the Wilmington Drain exceeded 17.68 MSL (water depth deeper than 3.68 feet) when stormwater enters the marsh via gravity flow. However, the highest water level in the drain only reached 18.20 feet MSL. This suggests a water depth of only 6 inches in the 36-inch diameter pipe. Additionally, gravity flow only occurred during one or two hours of each event.

This limited data indicates that an insignificant amount of water enters the marsh through gravity flow. Hence, the operation of the pump facility will be the main method to provide water to the marsh.

[2] Email contacts with Mr. Steven Krai of the County Sanitation Districts of Los Angeles County.

Table 4. Measured Water Depth in Wilmington Drain during Four Rain Events in 2004

03/01 to 03/02	Rain	0.5” late on 03/01 and 0.33” early on 03/02					
	Time	22:00	00:00	02:00	04:00		
	Water Level (ft)	16.2	18.2	14.9	14.3		
02/25 to 02/26	Rain	0.89” in 02/25 evening and 1.05” in 02/26 morning					
	Time	21:00	23:00	01:00	03:00	05:00	08:00
	Water Level (ft)	15.9	17.8	17.0	18.1	15.4	14.7
02/22	Rain	0.45” in 02/21 evening and 0.92” in 02/22					
	Time	3:30	4:30	5:30	07:30	09:00	
	Water Level (ft)	18.0	16.8	15.1	14.8	15.0	
02/02 to 02/03	Rain	0.72” in 02/02 evening					
	Time	19:00	20:30	21:30	22:30	00:30	
	Water Level (ft)	14.0	16.2	17.6	16.3	14.4	

Pump Operation Time

There is no information available on the discharge capacity of the 6-inch diameter pump system. For the purposes of this analysis we assumed the pump discharge to be approximately 1500 gallons per minute for a lift of about 7 feet. Based on this capacity, the time required to raise the water level in the marsh from an initially dry marsh to various water levels was calculated for both the existing condition and the proposed enhancement plan. The results are shown in **Figure 8**. It is estimated that the pump needs to operate approximately 2 hours to fill the existing marsh from a dry condition to the toggle gate elevation, and an additional 30 hours to raise the water level to an elevation of 19.34 feet MSL, when the pump automatically turns off. The time required for the pump to fill the proposed marsh is much longer due to the significantly increased storage capacity (22.1 acre-feet compared to 8.8 acre-feet). It would take approximately 23 hours to raise the water level from 12 feet MSL, the proposed bottom elevation of the ponds, to the toggle gate elevation, and an additional 57 hours to raise the water to the design level of 20 feet MSL.

4. OUTLET OPERATION AND FLOW CONDITIONS

Outlet Structures and Operations

The existing outlet control structure was constructed in the 1970s when the JWPCP was expanded and the natural outlet of the marsh was blocked. The structure allows surplus water in the marsh to flow back to the Wilmington Drain and controls the water surface elevation within the marsh. The outlet structure consists of a weir with a crest elevation at 20.18 feet MSL, and a 12-inch diameter toggle gate with an invert elevation at 16.93 feet MSL[1]. A photograph of the outlet control structure is shown in **Figure 9**. **Table 5** presents the elevations of the outlet structure components.

Table 5. Outlet Structure Elevations

Description	Elevation (feet, MSL)	
	As built	Surveyed
12” toggle gate (invert)	16.93	–
Weir crest	20.18	19.75
Top of the abutment wall	24.18	23.65
Abutment apron		16.64
42” RCP at outlet structure (invert)	16.33	16.44
42” RCP at Wilmington Drain (invert)	–	14.96

The proposed design water level of 20 feet MSL in the marsh is lower than the as built elevation of outlet weir crest at 20.18 feet MSL. Therefore, flow over the weir will only occur if the pump is programmed to exceed an elevation of 20.18 or rainfall increases the water in the marsh above 20.18. Hence, the toggle gate is the component that will control outlet flow.

As mentioned in the introduction of this report, the difference between as built and surveyed elevations are generally insignificant. **Table 5** indicates the surveyed elevations for the crest of the weir is 0.43 feet (5 inches) lower than shown on the as built drawings. If this is correct, the design water level, and programmed pump shutoff elevation should be set to 19.75 feet MSL. This is approximately 3 inches lower than the design water level. If the 3-inch difference is significant to the operation of the marsh then the weir crest elevation should be increased.

<u>Draining Time</u>

In this analysis, flow through the toggle gate is modeled as flow through an orifice. The flow discharge through an orifice can be written as

$$Q = kA\sqrt{2gh}$$

where Q is the flow discharge, h is water head across the orifice, the gravity acceleration g = 32.2 ft/sec^2, the area of the orifice $A = \pi d^2/4$ in which d is the diameter of the orifice, and k is an empirical coefficient depending on the orifice configuration and assumed as k = 0.7 in this analysis. When the water within the marsh is drained through the toggle gate, the time required for the water level to drop by Δh is

$$\Delta t = \frac{\Delta V}{Q}$$

where ΔV is the change in the marsh storage volume when water level drops by Δh.

The cumulative time for the toggle gate to drain the existing and proposed marsh to various water levels is shown in **Figure 10**. It is estimated that approximately 21 hours are required for the toggle gate to lower the water level within the existing marsh from 19.34 feet to 16.93 feet (toggle gate invert elevation), and 39 hours to drain the proposed marsh from 20 feet to 16.93 feet MSL.

The degree to which the marsh can be drained can be observed in **Table 1**. At an elevation of 16.93 feet MSL (invert of the toggle gate), approximately 0.5 acre-feet of water remains in the existing marsh and 6.4 acre-feet of water will remain in the proposed marsh. Since the invert of the toggle gate is only 0.29 feet above the abutment apron, it would be costly to lower the toggle gate to drain more of the marsh.

5. CIRCULATION AND WATER QUALITY WITHIN THE MARSH

Water circulation in the marsh is essentially static when inflow or outflow is not occurring. Water circulation in the marsh may be induced by winds, which would help improve water quality. However, this wind-induced water circulation is considered to be weak because of the limited water surface area. Hence, intermittent inlet pump and outlet toggle gate operation are recommended for the marshland management plan in order to provide water circulation and to improve water quality within the marsh.

For the proposed plan, the water volume for the design low water level of approximately 17 feet MSL is 6.6 acre-feet, which is approximately 30 percent of the design marsh storage volume at a water level of 20 feet MSL. By operating the toggle gate to drain water from the marsh, followed by operating the pump to fill the marsh, at least 70 percent of the retained water can be exchanged through the advection process. The quality of the other 30 percent of retained water that will not be drained out will be improved through the dilution process.

To manage the water quality within the marsh, it is recommended that a monitoring program be developed and implemented to measure water quality parameters (dissolved oxygen, etc.). Results of the monitoring program can be used to revise operational procedures and/or implement mitigation measures. Operational changes could include reprogramming the pump shutoff elevation and/or increasing frequency of opening the toggle gate. Mitigation measures could include installing aerators, water mixers, etc.

6. SUMMARY AND RECOMMENDATIONS

The key hydrological data of the proposed plan compared to the existing marsh are summarized in **Table 6**. The proposed plan would eliminate standing water within 200 feet of the digests, decrease open water surface area at the proposed water level of 20 feet MSL, and significantly increase the storage volume by creating open water habitat in the form of a channel distribution system and deep ponds, which would result in a much more centralized flow path with regular flow conditions. The existing pump facility is the main component to provide water to the marsh. The toggle gate is the component that controls outlet flow. Because of the increased storage volume in the proposed plan, the time for the pump to fill the marsh or for the toggle gate to drain the marsh will increase over existing conditions.

Table 6. Summary of Key Hydrological Data

Design Parameters	Existing Condition	Proposed Plan
Design Water Level (ft, MSL) (Inlet Pump Shutoff Water Level)	19.34	20.00
Outlet Toggle gate Invert Elevation (ft, MSL)	16.93	16.93
Outlet Weir Crest Elevation (ft, MSL)	20.18	20.18
Water Surface Area (acres)		
at Design Water Level	7.9	6.9
at Toggle Gate Elevation	1.5	2.5
Water Storage Volume (acre-ft)		
at Design Water Level	8.8	21.1
at Toggle Gate Elevation	0.5	6.4
Time to Drain Marsh (hours) (Design Water Level to Toggle Gate Elevation)	21	39
Time to Fill Marsh with Pumping (hours) from Dry Marsh to Toggle Gate Elevation from Toggle Gate Elevation to Design Water Level	 2 30	 23 57
Pump Operation Elevation (ft, MSL) Start (Stilling Well) Stop (Stilling Well) Stop (Marsh)	 12.68 10.51 19.34	 12.68 10.51 20.00*
Bottom Elevation of the Drain (ft, MSL)	14.00	14.00

* Requires Re-programming of pump operation

It is recommended that the pump be re-programmed to achieve the design water level. The outlet weir crest should be raised if the 3 inch-difference between the proposed design water level and surveyed weir crest elevation is significant to the operation of the marsh. The outlet toggle slide gate is in disrepair and should be replaced. To maintain water quality it is recommended that the pump and toggle gate be regularly operated to increase water exchange. There are many scenarios to accomplish this. Two possible scenarios include:

1. Open the toggle gate for 8 hours. During this time the water level will drop approximately 9 inches. It would then take the pump approximately 15 hours to refill the marsh.

2. Open the toggle gate over a weekend. This will drain the marsh to the invert of the toggle gate at an elevation of 17 feet MSL. It would then take the pump approximately 57 hours to refill the marsh.

The recommended monitoring plan will help to determine the best operational plan for the marsh.

Attachments: Figures 1 to 10

Attachments

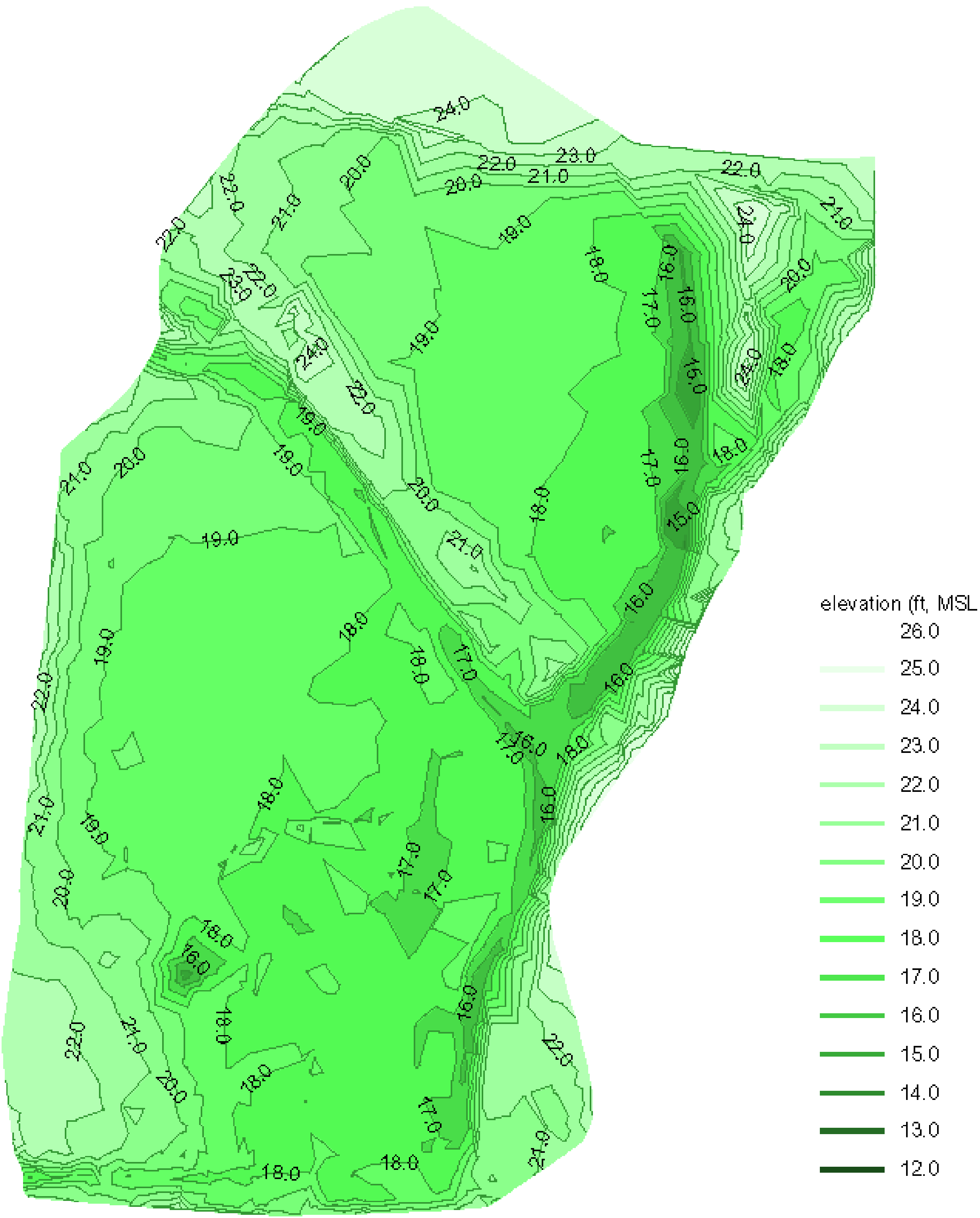


Figure 1 Topography for the Existing Marsh

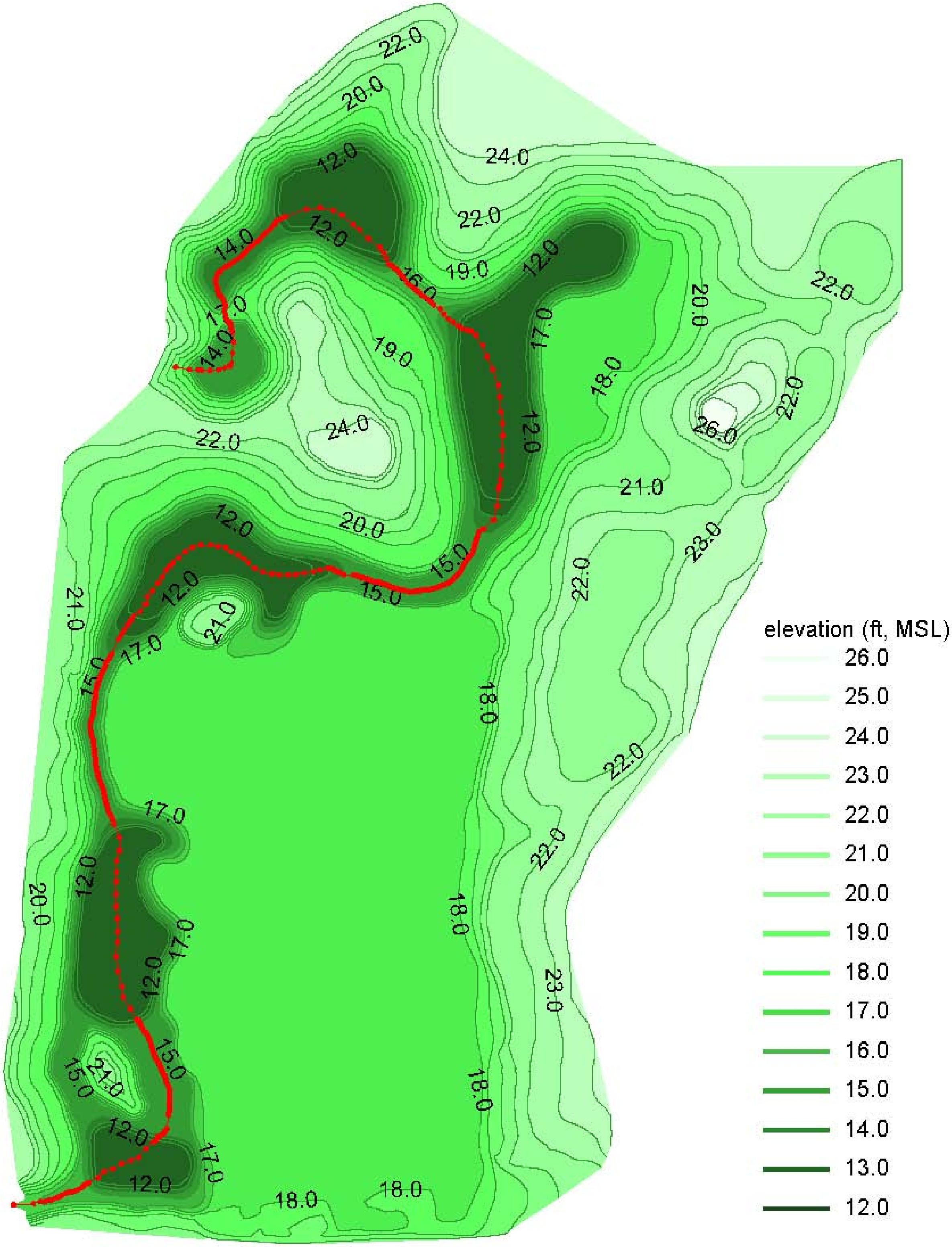


Figure 2 Topography for the Proposed Marsh

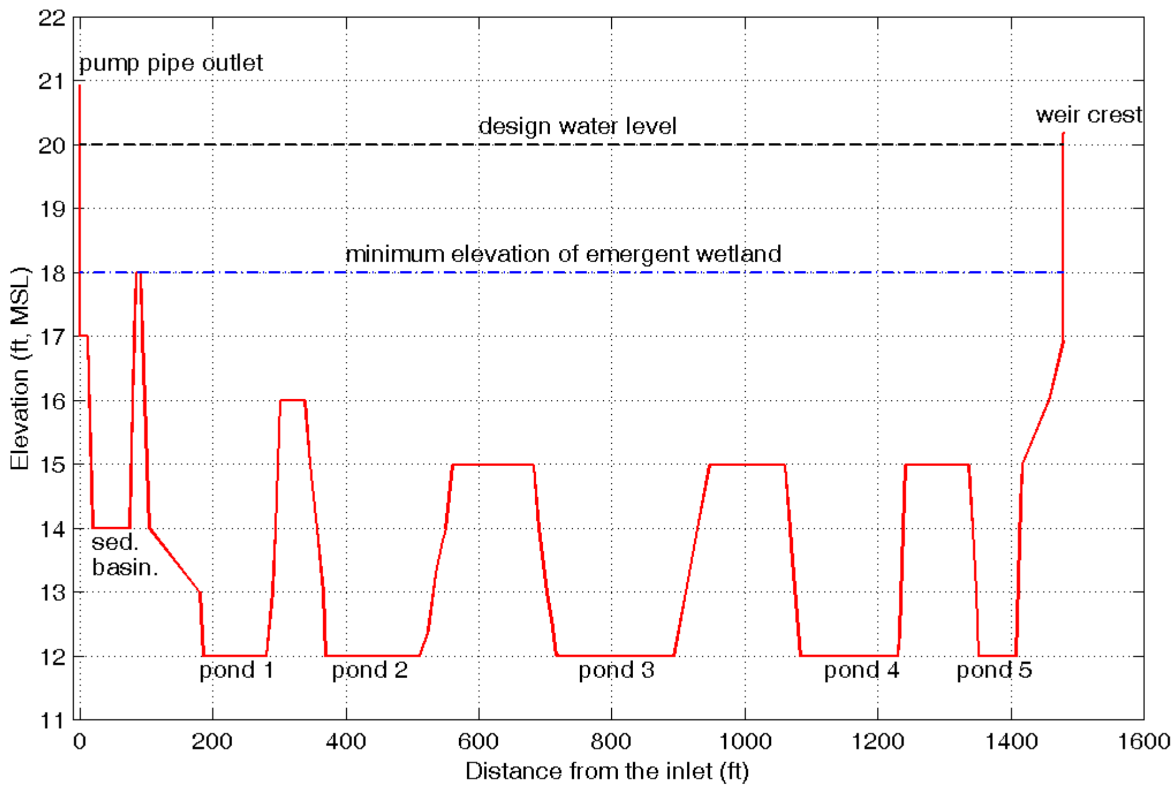


Figure 3 Longitudinal Profile of the Proposed Main Channel

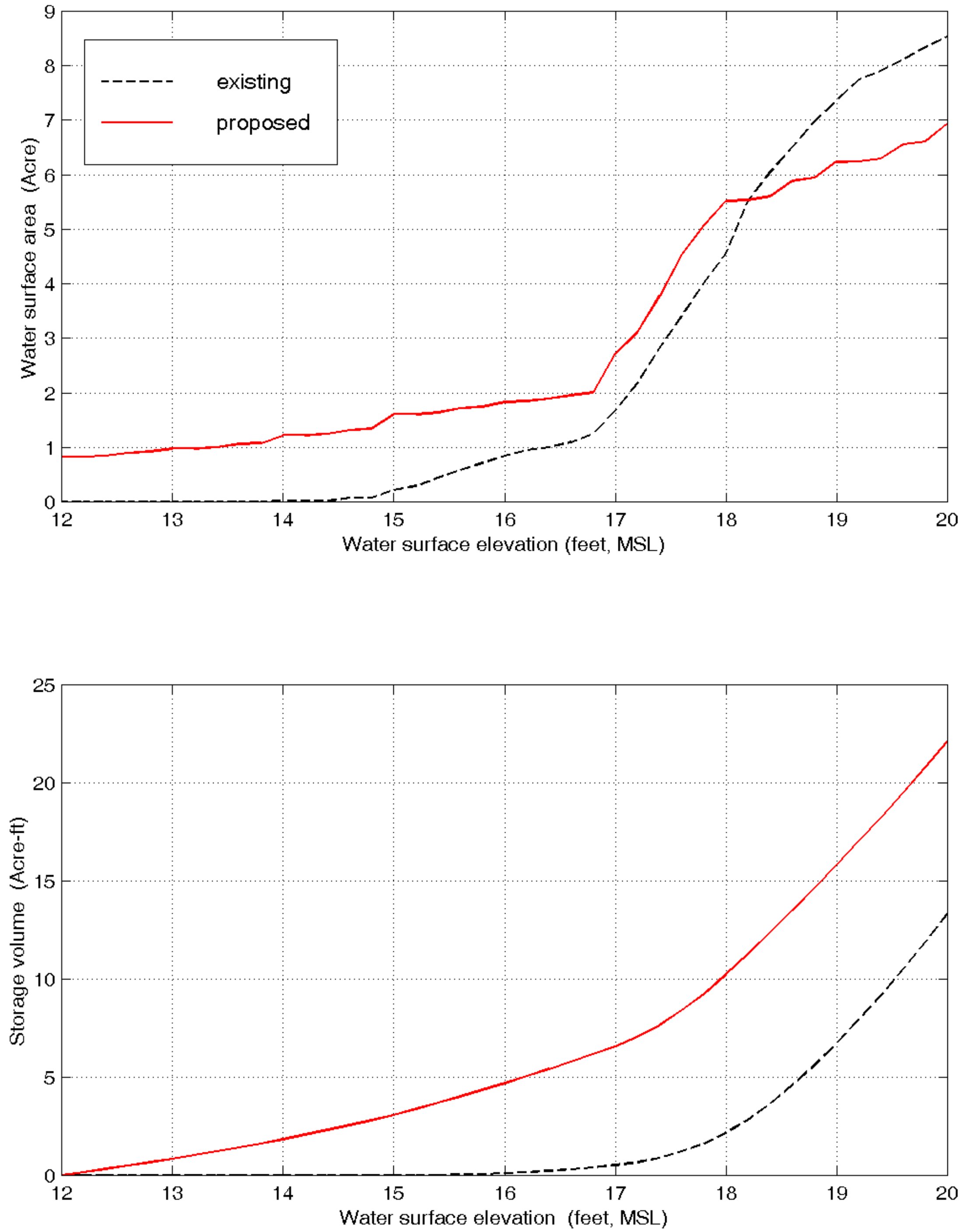
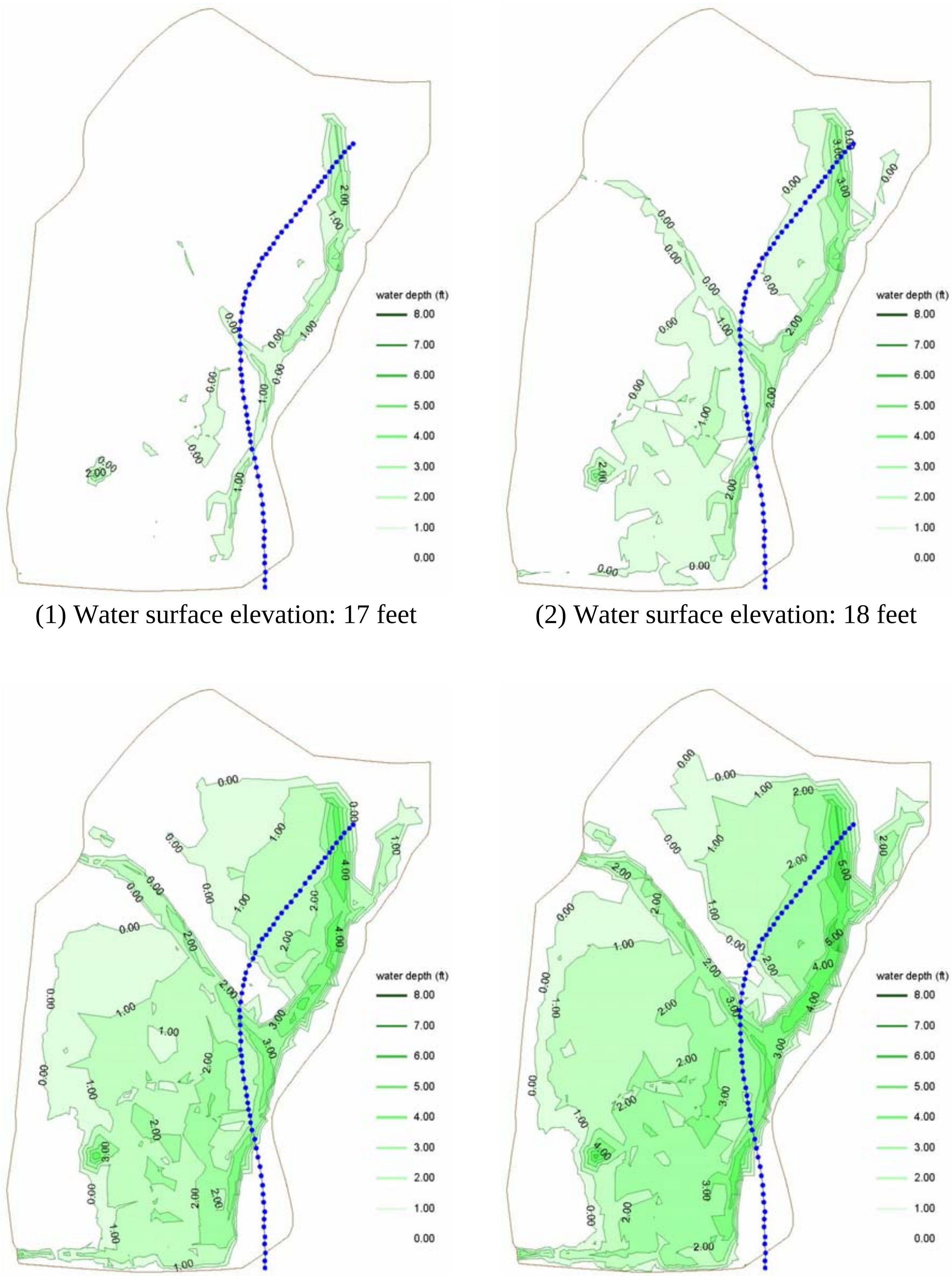


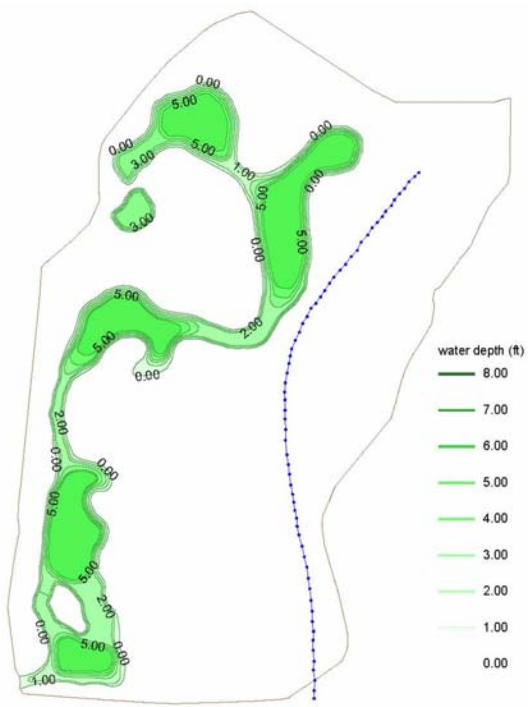
Figure 4 Water Surface Area and Storage Volume for Various Elevations



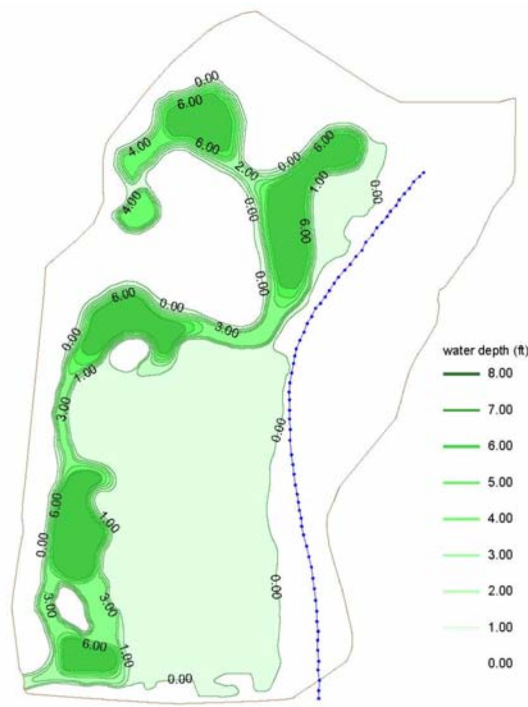
(1) Water surface elevation: 17 feet (2) Water surface elevation: 18 feet

(3) Water surface elevation: 19.34 feet (4) Water surface elevation: 20 feet

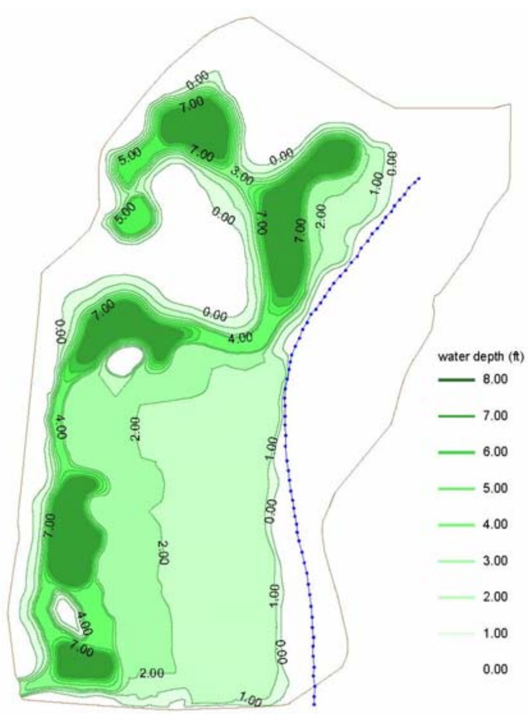
Figure 5. Water Depth versus Water Surface Elevation for the Existing Marsh
(Blue line represents the 200-foot setback from plant digesters)



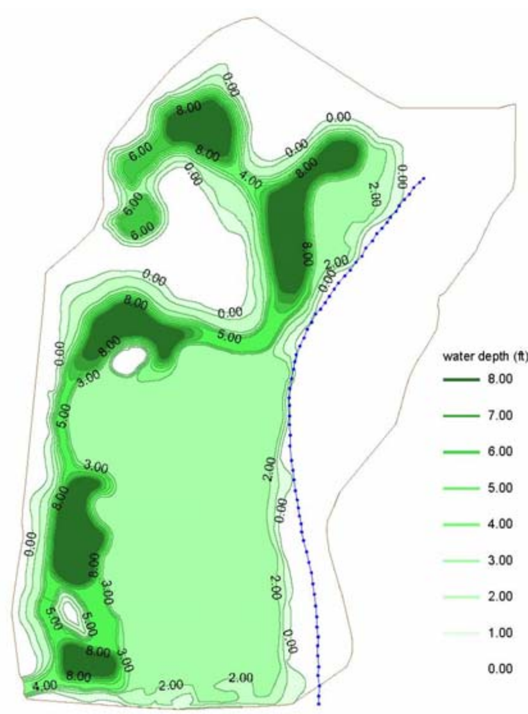
(1) Water surface elevation: 17 feet



(2) Water surface elevation: 18 feet



(3) Water surface elevation: 19.34 feet



(4) Water surface elevation: 20 feet

Figure 6 Water Depth versus Water Surface Elevation for the Proposed Marsh
(Blue line represents the 200-foot setback from plant digesters)

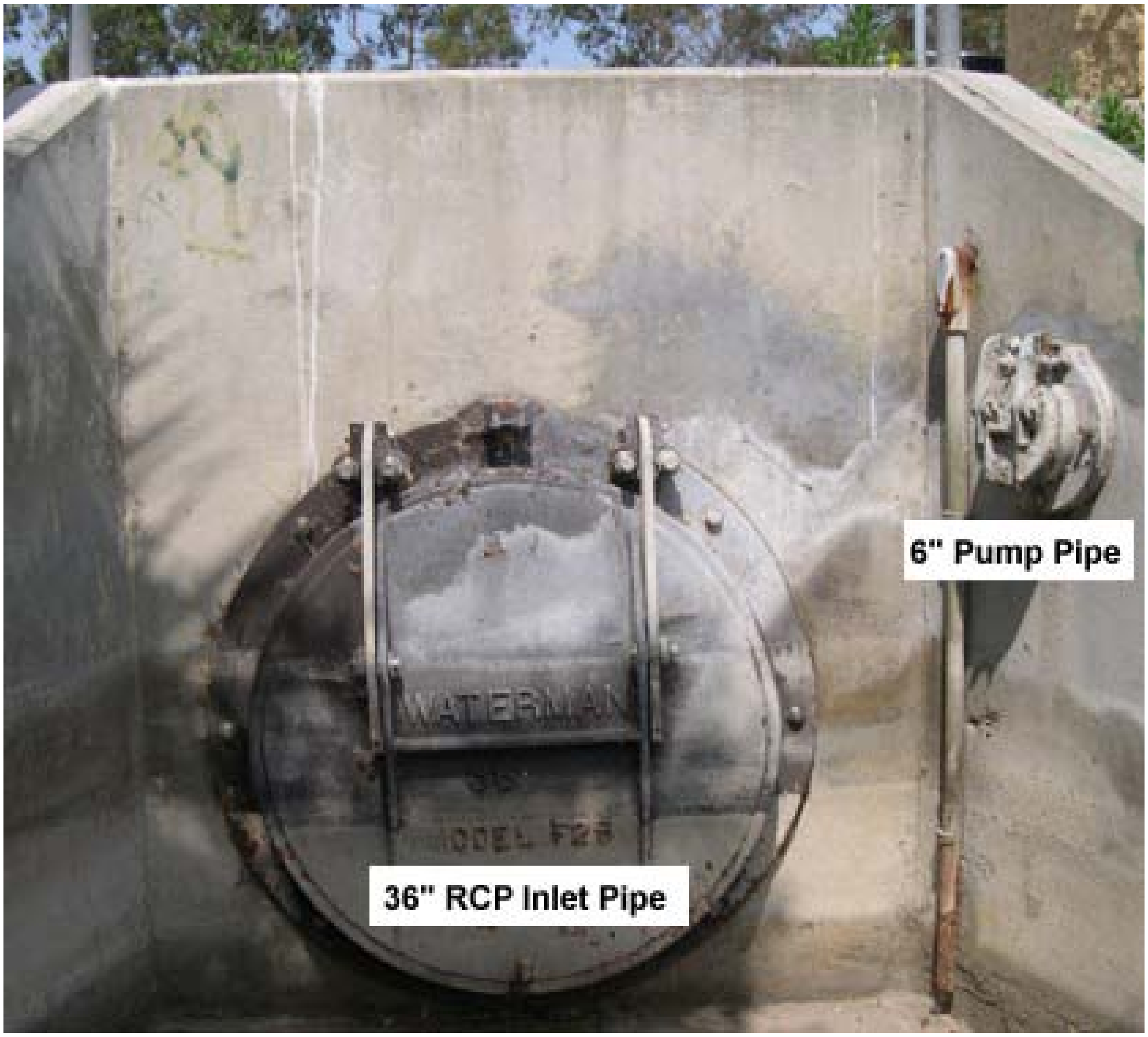


Figure 7 Photograph of Existing Marsh Inlet Structure

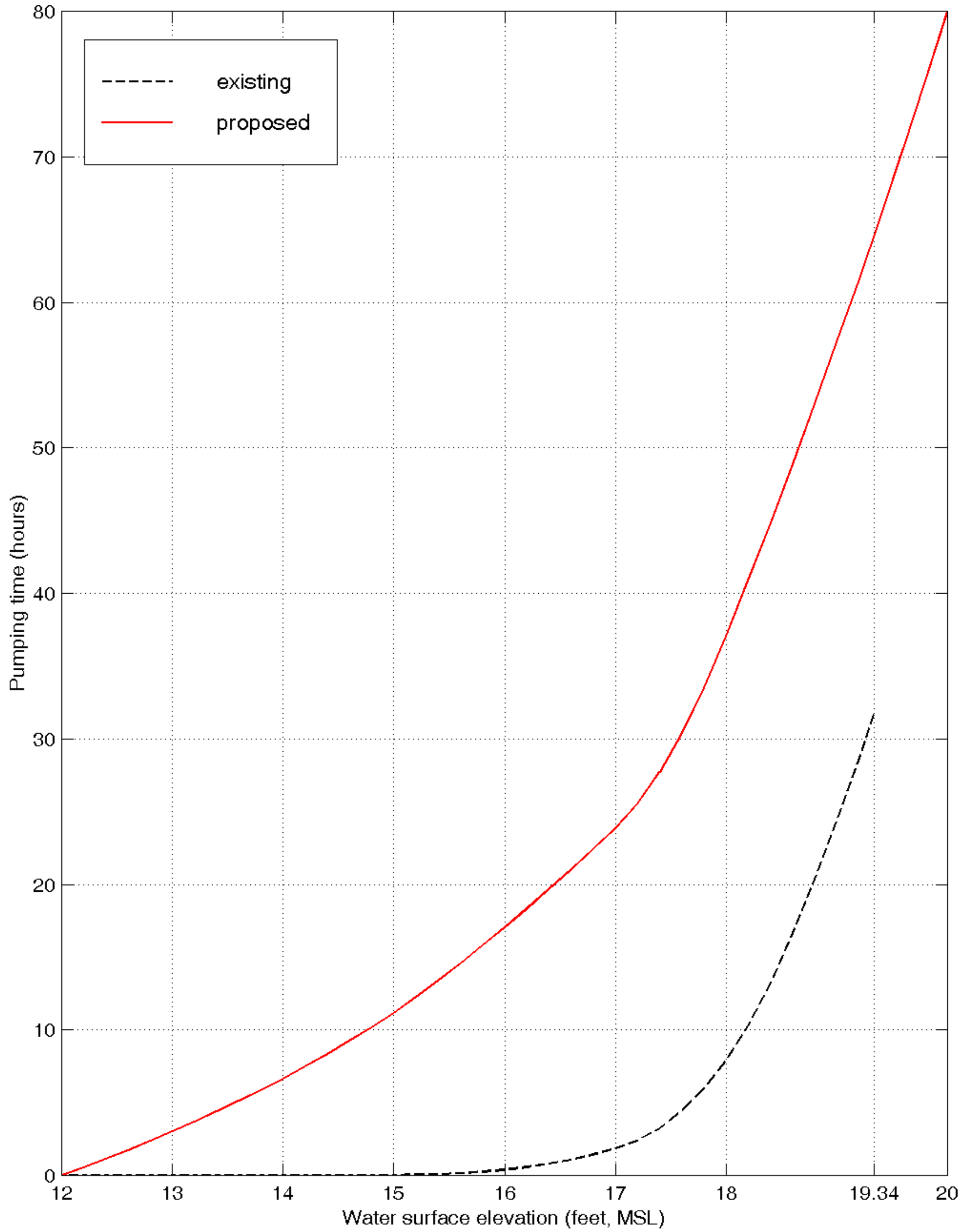


Figure 8 Time to Pump Water to the Marsh

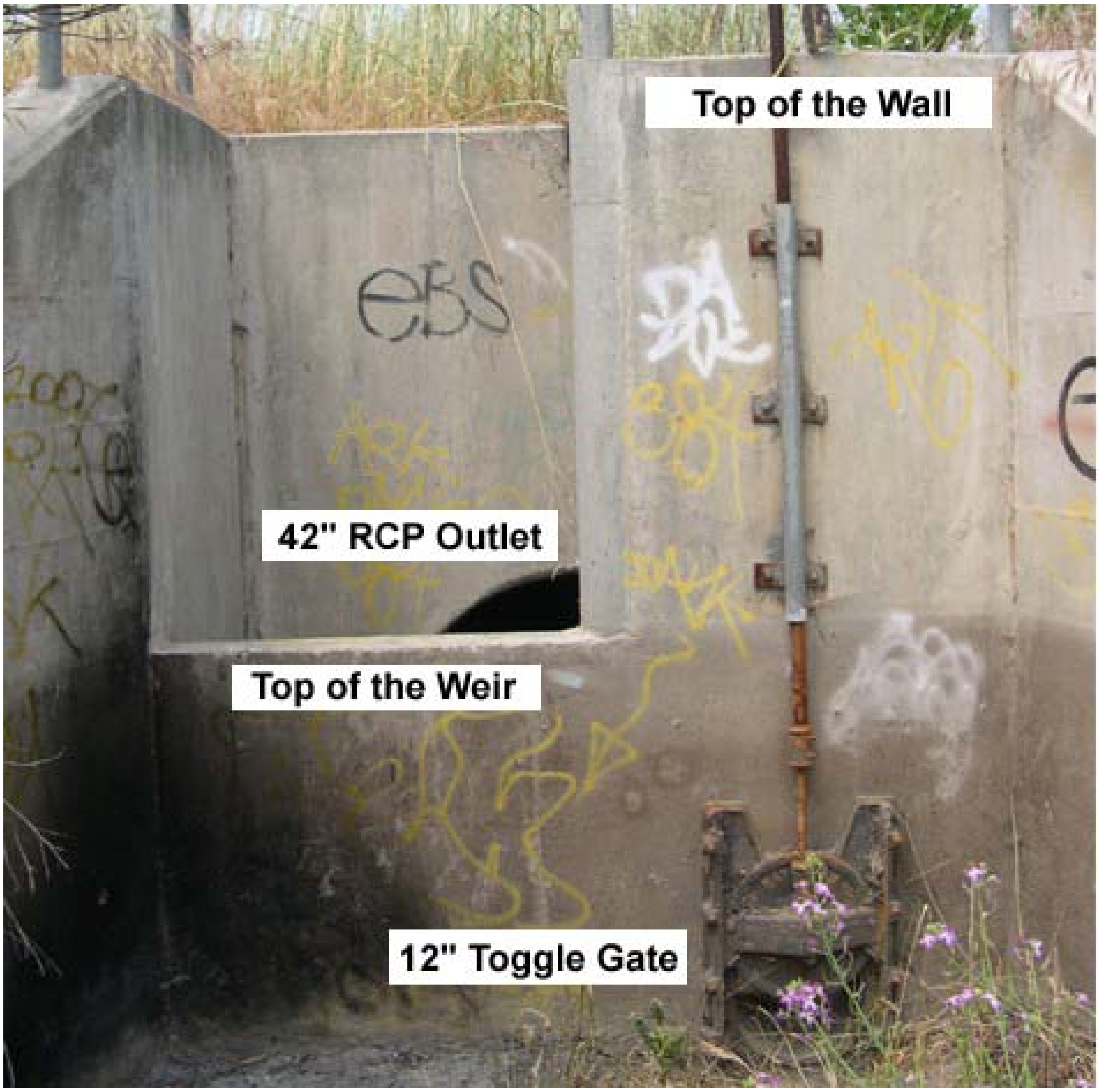


Figure 9 Photograph of Existing Marsh Outlet Structure

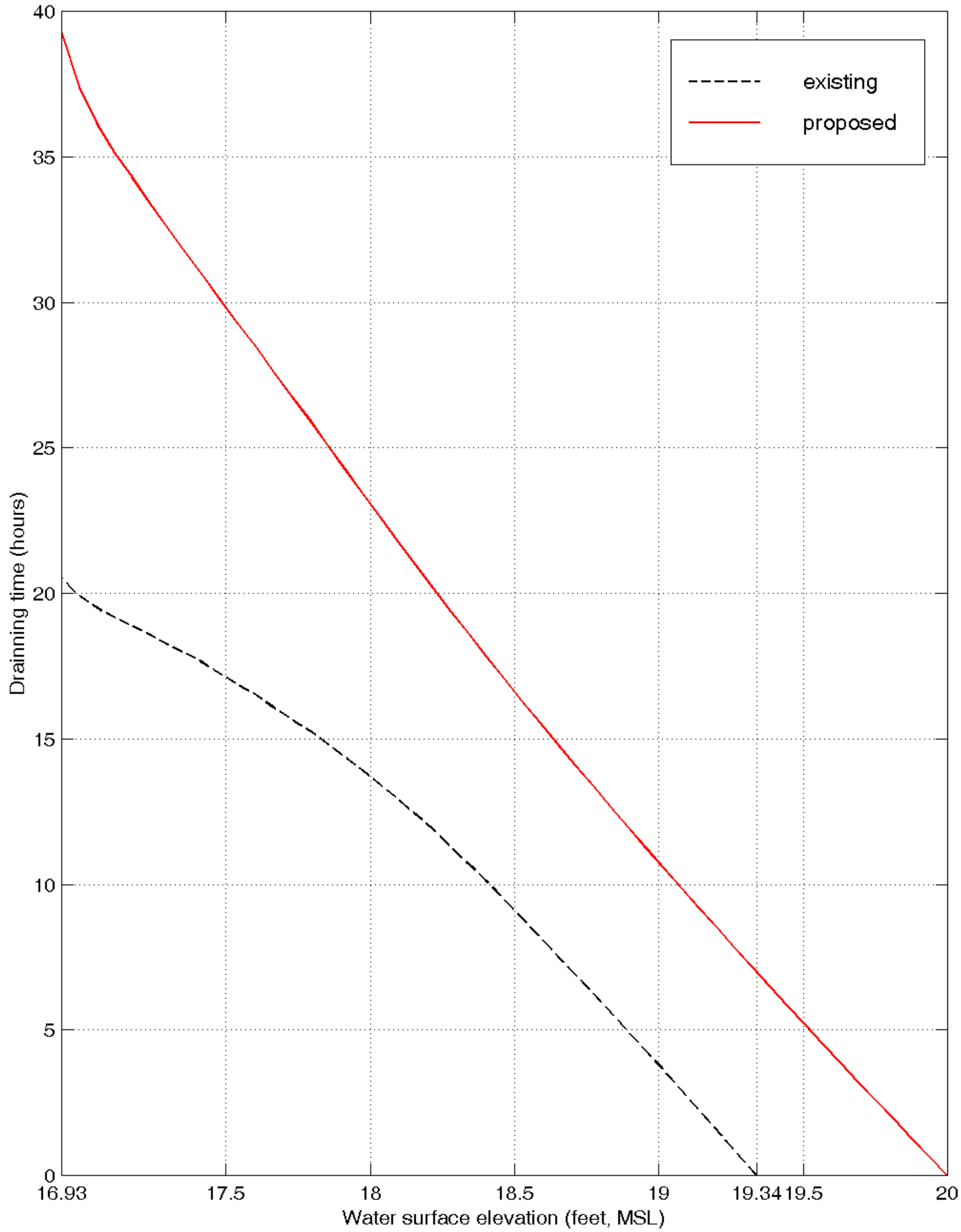


Figure 10 Time to Drain Water from the Marsh

Technical Report 461
September 2005

Assessment of Best Management Practice (BMP) Effectiveness

Jeffrey S. Brown

Steven M. Bay

Southern California Coastal Water Research Project

Assessment of Best Management Practice (BMP) Effectiveness

Final Report

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September 2005

Technical Report #461

Executive Summary

Best Management Practices (BMPs) are often relied upon to reduce or eliminate water quality impairments caused by trash, nutrients, or toxic constituents in urban runoff. The BMPs are extremely varied and may include public education, installation of treatment facilities/devices, the routing of runoff through grassy/wetland habitats, or diversion to sanitary sewers. Selection of the appropriate BMP for a given situation is a difficult decision that should consider factors such as cost, engineering parameters, and effectiveness in attaining the desired result. Previous studies have examined the effectiveness of BMPs in southern California, but they have limited utility for assessing effectiveness regarding toxicity due to a limited suite of constituents analyzed. Most studies of BMP effectiveness do not include measures of toxicity.

The goal of this project was to assess the effectiveness of BMPs in southern California for improving water quality impacts related to toxicity. Collaborative monitoring was established with local research and stormwater management agencies that implement BMPs in the southern California coastal area. Samples of stormwater or dry weather flow from upstream and downstream of the BMP were analyzed for toxicity to aquatic life and the concentration of contaminants associated with runoff toxicity.

Five BMP technologies were assessed for their effectiveness to reduce contaminant concentrations and toxicity at field sites in southern California. The sites included an enhanced stream wetland in Laguna Niguel (Wet CAT), constructed sub-surface flow wetland cells at the Orange County Water Department field station in Anaheim (OCWD SSF), a screening/settlement sump in Los Angeles (L.A. metal recycling yard), three sites with hydrodynamic devices using Continuous Deflection Separation (CDS) units (Pico-Kenter in Santa Monica, BC120 in Culver City, and a site in South Pasadena), and a site that used a combination of screening, microfiltration, and UV treatment [Santa Monica Urban Runoff Recycling Facility (SMURRF)].

Four to five sampling events were conducted at each site. Samples were collected both before and after the BMP treatment process in order to evaluate the effectiveness of each BMP system. The L.A. metal recycling yard and South Pasadena sites were sampled only during storm events, while the Wet CAT, Pico-Kenter, and SMURRF sites were sampled only during dry weather flow. The BC120 site was sampled during both wet and dry weather events. Finally, the OCWD SSF site was experimentally dosed with a mixture of Cu, Zn, and diazinon over a six-week period. Most of the data in this study were collected specifically for this investigation, however some of the data were obtained from existing monitoring programs. Each BMP site was evaluated for consistency at reducing contaminant levels by more than would be expected from analytical variability. If at least 75% of the samples had a meaningful reduction for a given constituent, the BMP was then evaluated for its ability to attain the appropriate chronic water quality criterion.

The effectiveness of the Wet CAT wetland site usually varied by constituent, and often appeared to be related to constituent concentration. There was a consistent reduction (at least 75% of the samples) in concentrations of total suspended solids (TSS), diazinon, total Al, Cd, Cu, Ni, Se, and Zn, and dissolved Al, Cd, Ni, and Zn between inflow and outflow samples at the Wet CAT site. Outflow concentrations of total Al, dissolved Cd and dissolved Ni were also reduced below the water quality criteria after treatment at this site. Concentrations of dissolved Cu were probably too low in the inflow samples to expect large reductions in the outflow. Other constituents (dissolved Zn, diazinon) were reduced in the outflow, but the inflow concentrations were below the chronic criteria, and therefore could not be evaluated for attainment of water quality criteria. Toxicity, when present, was reduced after treatment.

The sub-surface flow wetlands at the OCWD field station were very effective at reducing concentrations of total and dissolved Cu and Zn, but not as effective at reducing diazinon. Concentrations of dissolved Cu were consistently reduced below the chronic water quality criterion, when the inflow levels exceeded this threshold. Concentrations of dissolved Zn, while reduced between inflow and outflow, were consistently below the chronic criterion in the inflow. Therefore attainment of the criterion could not be evaluated. Concentrations of diazinon were consistently reduced between the inflow and outflow samples, but concentrations in the outflow were rarely reduced below the chronic criterion. Toxicity in the inflow samples was rare, and was reduced after treatment.

Most of the hydrodynamic devices using the CDS units were ineffective at reducing metal concentrations or toxicity, and had mixed results with TSS. The CDS units at Pico-Kenter, South Pasadena, and the wet weather samples at BC120 did not consistently reduce the concentrations of total or dissolved metals. However, the dry weather samples from BC120 had consistent reductions in total Al, Cu, Pb, and Zn. Total Al concentrations (the only one of these metals with a water quality criterion) were not reduced below the chronic criterion. TSS was reduced in both of the dry weather samples from BC120, but was not reduced in the wet weather samples from BC120, and was inconsistently reduced in the samples from Pico-Kenter and South Pasadena. Chlorpyrifos was the only pesticide found in at least two sampling events. This pesticide was only measured in two inflow and outflow samples from the South Pasadena site. Chlorpyrifos was not consistently reduced, and was never found below the chronic criterion. In general, the CDS units had no effect on toxicity. This is not surprising, since the CDS units were designed to remove solids from runoff, yet the fraction usually associated with toxicity is the dissolved phase, and the CDS units had little effect on the dissolved metals.

The treatment process at the SMURRF site was effective at reducing concentrations of most total metals and TSS. Concentrations of total Al, Cr, Cu, Ni, Pb and Zn were reduced in the effluent. The SMURRF treatment process also reduced the levels of dissolved Al and Zn, while most other dissolved metals were probably too low to expect large reductions. The dissolved metals could not be evaluated for attainment of water quality criteria because the inflow concentrations were always below these thresholds. The SMURRF site consistently reduced TSS levels by >94%. The toxicity data could not be used to evaluate toxicity removal effectiveness. There was no consistent toxicity to *Ceriodaphnia dubia* (one of the species tested), while the sea urchin test was influenced by the chlorinated water used to backflush the treatment screens at SMURRF.

The screening/settlement apparatus at the L.A. metal recycling yard was inconsistent in reducing most metals and TSS. This apparatus was effective at reducing concentrations of dissolved Cr, Cu, and Pb, although dissolved Cu was never reduced below the chronic criterion and dissolved Pb levels were reduced to below the chronic criterion only half of the time. This site had either no effect or an inconsistent reduction at best with other metals. TSS was reduced half of the time. The toxicity of the samples was often reduced after treatment, although the outflow samples were still highly toxic.

This study has produced new information regarding the effectiveness of various BMP types. Although this study was limited in scope and duration, several conclusions are evident:

- BMPs based on wetland systems (e.g., Wet CAT, SSF wetlands) were most effective in reducing the concentrations of toxic constituents to levels likely to protect aquatic life.
- Hydrodynamic devices (e.g., CDS units) are not effective for reducing concentrations of dissolved contaminants, which are the forms most likely to cause water column toxicity.

- The use of chemicals to maintain the BMP (e.g., filter cleaning) can increase toxicity to aquatic life; such procedures should be used with caution when the downstream environment contains aquatic life habitat.
- The effectiveness of many BMPs is variable, and changes in contaminant concentrations among sampling events complicate the assessment process. Comparison of both relative changes in concentration and ability to attain water quality objectives is needed to evaluate BMP effectiveness.

This study examined several BMP technologies that are in use in southern California, but it was not an exhaustive comparison. Most of the BMPs investigated were installed for purposes other than reducing toxicity and this study provides information regarding the effectiveness of these approaches for reducing toxic constituents. Further study is needed to evaluate BMP technologies that are more specific for toxics and have had limited use in southern California. In addition, an evaluation of the effectiveness of BMPs to reduce toxic impacts due to contaminants associated with particles is needed. Some of the BMPs examined in this study that were not effective in reducing water column toxicity are intended to remove particles, and they may have greater effectiveness in reducing particle-associated toxicity.

Acknowledgements

This study could not have been completed without the assistance of many organizations and individuals that provided access to the BMPs, samples, or data. The authors thank Suzanne Dallman (L.A. & San Gabriel Rivers Watershed Council) and Fereidoun Jahani (LADPW) for providing the chemistry data and samples for toxicity from the L.A. metal recycling yard and South Pasadena sites, respectively. The authors also thank Stephen Lyon (OCWD) for his collaboration on the SSF dosing experiment, Nancy Palmer (City of Laguna Niguel) for access and information to the Wet CAT site, and Angie Bera (Santa Monica Baykeeper) for access and sampling assistance at the BC120 site. We also thank Neal Shapiro, Jamie Malpede, and Louis Hernandez (City of Santa Monica) for access to and information regarding the Pico-Kenter and SMURRF sites. We also appreciate the dedication and ingenuity of the MACTEC group. Thanks to Bob Stearns (CalScience) for sample distribution of the L.A. metal recycling yard samples. We also wish to thank SCCWRP staff Darrin Greenstein, Diana Young, Brian Pauley, and Rebecca Hagstrom for their assistance with toxicity testing and quality assurance.

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Introduction

Urban and agricultural discharges have contributed to degraded water quality throughout southern California. For example, more than 150 sites are on the state's list of impaired waterbodies in southern California. As a result, runoff management agencies are implementing various Best Management Practices (BMPs) to reduce or eliminate these water quality impairments. The BMPs are extremely varied and may include public education, installation of treatment facilities/devices, the routing of runoff through grassy/wetland habitats, or diversion to sanitary sewers to reduce or remove constituents of concern such as trash, nutrients, or toxic constituents.

There are several issues that make evaluating BMP effectiveness challenging. One challenge is that BMP effectiveness must be differentiated from variability. This includes variability in discharge characteristics, sample collection, and analysis. Second, because BMPs tend to perform better with higher concentrations of contaminants in the inflow, the removal effectiveness can be under-estimated if the inflow concentrations are very low. Third, large reductions in contaminant levels do not necessarily imply effectiveness, if concentrations in the effluent are still above the levels of protection. Fourth, the approaches used to evaluate effectiveness are not consistent among studies. Common approaches have included calculating the percent reduction either between the study mean inflow and outflow concentrations, or the mean of individual event percent reductions, or between inflow and outflow mass. More recently, effectiveness has been estimated using hypothesis testing (e.g., ANOVA), probability plots, linear regression, and threshold approaches (e.g., compare effluent concentrations with water quality criteria). Each method can give a different measure of effectiveness.

Previous studies have examined the effectiveness of BMPs in southern California. The study conducted by Caltrans is one of the most comprehensive BMP evaluations (Caltrans 2004). Using the linear regression approach for evaluation, the Caltrans study determined that BMPs which use infiltration or sand filtration technologies were some of the most effective for reducing levels of TSS, total nutrients and total metals. Data from this and other studies from southern California have been included in the International Stormwater BMP Database (Strecker et al. 2004). This database contains inflow and outflow contaminant concentrations for a variety of BMPs in order for users to assess removal effectiveness, determine the achievable water quality values for effluents, and predict changes in mass loadings for the different BMP types. The data in the International Stormwater Database and the Caltrans study, however, do not include direct measures of BMP effectiveness regarding toxicity.

While information on chemical constituents is usually included in BMP effectiveness studies, information on changes in toxicity is comparatively lacking. Toxicity to aquatic life from urban runoff discharges is frequently detected. Aquatic toxicity has been measured in waterbodies such as Ballona Creek, Santa Monica Bay, Los Angeles River, Santa Ana River, San Diego Creek, Newport Bay, Chollas Creek, and San Diego Bay. Because of the many chemical constituents found in runoff, measuring a routine suite of chemicals alone does not give a complete assessment of changes made by the BMP. Including measures of toxicity can improve the evaluation of BMP effectiveness because toxicity tests help account for unmeasured contaminants, they incorporate the additive and antagonistic interactions of chemicals, and they are direct measures of effect.

The goal of this project was to assess the effectiveness of BMPs in southern California for improving water quality impacts related to toxicity. Collaborative monitoring programs were established with local research and stormwater management agencies that implement BMPs in the southern California coastal area. Samples of stormwater or dry weather flow from upstream and downstream of the BMPs were analyzed for toxicity to aquatic life and the concentration of contaminants associated with runoff toxicity.

Methods

Study Design

Seven BMP sites representing five BMP technologies were assessed for their effectiveness to reduce contaminant concentrations and toxicity (Figure 1). The five BMP technologies included wetlands, hydrodynamic devices [e.g., continuous deflection separation (CDS) units], microfiltration, UV treatment, and screening/settlement. Four to five sampling events were conducted at each site (Table 1). Samples were collected both before and after the BMP treatment process in order to evaluate the effectiveness of each BMP system. Paired inflow/outflow samples of dry weather or stormwater runoff were collected between 2/2/04 and 3/10/05. Two sites were sampled only during storm events, and three sites were sampled only during dry weather flow. One other site was sampled during both storm and dry weather events. Finally, one site was experimentally dosed with a mixture of Cu, Zn, and diazinon over a six week period. Time-weighted composite samples were collected at most BMP sites, with multiple grabs collected and composited at two of the sites.

Most of the data in this study were collected specifically for this investigation, however some of the data were obtained from other monitoring programs. Differences in the constituents analyzed among the various sites reflected differences in study design among the monitoring programs (Table 2). Samples from most sites were analyzed for metals, organophosphorus pesticides, pyrethroid pesticides, glyphosate (active ingredient in Roundup and Rodeo), and toxicity (echinoderm fertilization test, and *Ceriodaphnia dubia* survival and reproduction test).

<u>Wetlands</u>

Wet CAT (wetland)

The Wetland Capture and Treatment network (Wet CAT) was designed to treat low-flow urban runoff from a residential neighborhood in the Aliso Creek watershed. It was constructed as a mitigation wetland in 1991. Within one growing season after construction, the created and enhanced wetland was fully vegetated and colonized by native wetland plant species. In 2002 the wetland was enhanced with the addition of four shallow berms to spread and store water within a natural marsh habitat. While there are three distinct wetlands in the Wet CAT network, this study focused on the largest one, known as the West wetland.

The West wetland is a 1.4 acre, ½ mile long parcel of land on the west side of Alicia Parkway in Laguna Niguel. It is located on privately-owned common-area property, and maintained by the City of Laguna Niguel. The West wetland treats 317 acres of exclusively urban runoff. It is designed to treat flows of approximately 0.2 cfs, with measured flows at 0.15 cfs in the summer and 0.12 cfs in the fall of 2003. The hydraulic residence time is 3 days. Effluent from the West wetland leads to Sulphur Creek, then to Aliso Creek. Only dry weather runoff samples from the Wet CAT site were collected for this study. Samples were collected at the head of the wetland, and as the water left the wetland (Figure 2).

OCWD (sub-surface flow constructed wetland)

The other wetland BMP in this study was the Orange County Water Department's sub-surface flow (SSF) constructed wetlands, located next to OCWD's Field Research Laboratory near Anaheim Lake. These wetlands measure approximately 1 m tall x 2 m wide x 8 m long, and are constructed from concrete panels (Figure 3). Each wetland cell is filled with ¾" pea gravel. A monoculture of wetland plants (bulrushes, genus *Scirpus*) are planted in the gravel. The gravel provides an approximate thousand-fold increase in surface area for the growth of bacterial biofilms that increase the rate of contaminant degradation or removal. Within the gravel matrix there are distinct oxygen rich (aerobic) and oxygen free (anaerobic) zones where specific microbial processes take place. Water flows beneath the surface of the gravel matrix. The source water for the wetlands comes from Conrock Basin, which receives wet and dry weather flow from the Santa Ana River. The advantages of sub-surface flow wetlands are less land area required for a system, the elimination of vector problems and viable operation in winter. The wetland cells were constructed in 2002.

This was the only BMP in this study that was experimentally dosed with contaminants. Two replicate wetland cells were used in this study. Each cell was continuously dosed with a mixture of Cu, Zn, and diazinon and monitored over a six week period. The nominal concentrations flowing into each cell were 30 µg/L Cu, 60 µg/L Zn, and 0.4 µg/L diazinon. Concentrations of each contaminant were measured in the influent and effluent from each replicate system over five sampling periods. The samples were also analyzed for toxicity using the sea urchin fertilization test.

The flow rate for the source water from Conrock Basin was maintained at 4 L/min. Two stock solutions (one for Cu and Zn, and one for diazinon) were made up, and diluted to working solutions on a daily basis (Figure 4). The working solutions were added to each wetland cell on a continuous basis using peristaltic pumps. The flow rates for the working solutions were maintained at 5 mL/min. Filters made from montmorillonite clay and granular activated carbon were used to recover any remaining amounts of contaminants from the effluent that were not removed by the wetlands.

<u>Hydrodynamic devices (CDS units)</u>

Three of the BMP sites used a CDS Technologies Continuous Deflective Separation (CDS) hydrodynamic device. These devices use a vortex and screening process to remove solids from dry and wet weather runoff. The components of a CDS unit consist of a sump, separation chamber (which contains a stationary screen cylinder), and diversion weir (Figure 5). Treatment flows are introduced tangentially along the stainless steel screen by the CDS unit's intake structure located above the cylindrical screen. A balanced set of hydraulics is produced in the separation chamber. These balanced hydraulics provide washing flows across the stainless steel screen surface, which prevent any clogging of the apertures as well as establish the hydraulic regimen necessary to separate solids through deflective separation/swirl concentration/vortex separation. Vortex separation produces a low energy, quiescent zone in the middle of the swirl that enables effective settlement of fines through a much wider range of flowrates than could otherwise be achieved using a simple settling tank in the same footprint. Particles within the diverted treatment flow are retained by the deflective screen and are maintained in a circular motion, forcing them to the center of the separation chamber, creating an enhanced swirl concentration of solids (vortex separation), until they settle into the sump.

Pico-Kenter (hydrodynamic device)

This CDS unit is located at the end of Pico Blvd. near the beach in Santa Monica, and is operated by the City of Santa Monica (Figure 6). It receives a mix of runoff from approximately 4,200 acres of western Los Angeles County which includes commercial, residential, and transportation areas. The effluent from this CDS unit feeds into the Santa Monica Urban Runoff Recycling Facility (SMURRF) (see below). This unit has been operating since February 2001.

BC120 (hydrodynamic device)

This CDS unit is located near Ballona Creek in Culver City (Figure 7). It receives runoff from approximately 4,077 acres of Culver City, and drains into Ballona Creek at Overland Ave. This BMP was installed in January 2005.

South Pasadena (hydrodynamic device)

This CDS unit is located near the intersection of Orange Grove and El Centro in the City of South Pasadena, and is operated by the Los Angeles County Department of Public Works (LACDPW) (Figure 8). It receives runoff from 6 acres comprised of approximately 70% residential, 20% industrial, and 10% other. It has been operating since 2003.

<u>Screening/hydrodynamic device/microfiltration/UV treatment</u>

SMURRF (screening/hydrodynamic device/microfiltration/UV treatment)

The Santa Monica Urban Runoff Recycling Facility (SMURRF) is located at 1601 Appian Way, adjacent to the Santa Monica Pier (Figure 9). It receives runoff from approximately 5,100 acres of commercial, residential and transportation activities, which includes mostly the runoff from the Pico-Kenter CDS unit (see above), and to a smaller degree the Pier storm drain. This BMP treats dry weather flow using a combination of technologies, including 2 mm^2 screening, a hydrodynamic device to remove sand and grit, microfiltration to remove turbidity (effluent turbidity <2 ntu), and ultraviolet radiation to kill pathogens (Boyle Engineering Corp. 1999). Water from the facility is used for City landscaping and government toilets. This system is designed to treat up to 500,000 gallons of runoff per day. The facility is operated by the City of Santa Monica, and has been in service since May 2001.

<u>Screening/settlement</u>

L.A. metal recycling yard (screening/settlement)

The L.A. metal recycling yard BMP is located at a metal scrap facility near downtown Los Angeles (Figure 10). This BMP treats runoff that is exclusive to this site, and is monitored only during wet weather events. Approximately 0.85 acres of the scrap yard is treated by the BMP. Water from the site flows into a sump, where settlement of the heavier particles occurs. The water then flows through a screen mesh into an infiltration trench. This BMP is being monitored by the Los Angeles and San Gabriel Rivers Watershed Council as part of a Watershed Augmentation Study. It is currently owned and maintained by the Watershed Council and Geomatrix, but will be turned over to the L.A. metal recycling yard after the 2004-2005 monitoring season. This BMP has been in operation since October 2003.

Sampling Methods

<u>Wet CAT, Pico-Kenter, BC120, SMURRF</u>

The samples from the Wet CAT, Pico-Kenter, BC120 and SMURRF sites were collected by MACTEC Engineering and Consulting Inc. (San Diego). Samples from each of these sites were collected with American Sigma 900 Max Autosamplers, configured with 19 L borosilicate jars. Flow monitors (American Sigma 950 Area Velocity Bubbler Flowmeters) were used at each site, except for Pico-Kenter, where the flowmeters could not be installed due to the non-ideal configuration. The components of each monitoring system used were calibrated for time and sample aliquot volume prior to deployment. The autosamplers at these sites collected 200 mL aliquot inflow and outflow samples every 15 min for 24 h. Because the flow at the SMURRF site was intermittent (treatment occurred only when sufficient volume of runoff had accumulated), the autosamplers were triggered by the flowmeter only when the effluent was flowing. Most of these sites used paired autosamplers to collect the inflow and outflow samples simultaneously. At the Wet CAT wetland, however, sampling of the outflow was delayed by 24 h after starting the inflow collection, in order to account for the hydraulic residence time of the wetland. All sample containers were iced at the onset of sampling and refreshed with ice prior to transport to the chemical analysis laboratory. Hydrographs of each sampling event can be found in the Appendix.

The samples from the other sites in this study (OCWD SSF, South Pasadena, L.A. metal recycling yard) were each collected by different agencies, using different methods.

OCWD SSF

Five sampling events were sampled at the OCWD SSF wetlands. At approximately weekly intervals, OCWD personnel collected 2 L composite samples of the inflow and outflow samples from each wetland for chemical and toxicity analysis. Three manual grab samples were collected over 24 h and composited. The flow rate was monitored and adjusted by visual inspection of a sight glass flow meter.

South Pasadena

Five stormwater sampling events were captured at the South Pasadena site. Composite samples were collected by LADPW personnel. The samples for toxicity testing were collected every 20 min usually for 3 h during the initial part of each storm. The samples for chemical analysis were also collected every 20 min, but the sample duration was usually longer, lasting from 3 h up to 4 d. The hydrographs of each sampling event can be found in the Appendix.

L.A. metal recycling yard

Four stormwater sampling events were captured at the L.A. metal recycling yard. Multiple grab samples were collected and composited for the first two events (2/2/04, 2/18/04), while single grab samples were collected for the other two events (10/26/04, 2/11/05). The samples were collected by GeoMatrix.

Chemical Analysis

Because the samples in this study were analyzed by multiple agencies, more than one testing procedure was sometimes used (Table 3). The samples from the SMURRF, Pico-Kenter, WetCAT, and BC120 sites were analyzed for metals, organophosphate (OP) pesticides and pyrethroid pesticides by CRG Marine Laboratories (Torrance). The samples from the South Pasadena site were analyzed for metals and OP pesticides by the LADPW Environmental Toxicology Laboratory (South Gate), and the samples from the L.A. metal recycling yard were analyzed for metals by CalScience (Garden Grove). The OCWD SSF samples were analyzed for metals by CRG Marine Laboratories, and for diazinon by SCCWRP. All glyphosate analyses were made by MHW Laboratories (Monrovia).

All metals analyses at CRG were made using Inductively Coupled Plasma Mass Spectrometry (ICPMS), following EPA 200.8 (EPA 1996). The samples for trace metals were filtered in the laboratory immediately upon receipt using 0.45 µm Nalgene disposable cellulose nitrate filters. The dissolved fraction was then acidified to a pH <2 using Optima nitric acid and allowed to sit for a minimum of 16 hours. The samples were then analyzed using ICPMS by direct aspiration into the nebulizer.

All organics analyses at CRG were made using Gas Chromatography Mass Spectrometry (GCMS), following EPA 625 (EPA 1996). Samples for trace organics were first spiked with recovery surrogates, then extracted 3 times with methylene chloride using a separatory funnel. The combined solvent extract was dried using anhydrous sodium sulfate, concentrated by roto-evaporation, and cleaned up using alumina/silica gel chromatography. Internal standards were added to the cleaned extracts, which were then analyzed using GCMS.

The diazinon analyses at SCCWRP used Enzyme-Linked Immuno Sorbent Assay (ELISA). ELISA is an analytical method that uses antibodies to target specific pesticides, and a color changing reaction to quantify the amount of pesticide present in a sample. Pesticide analyses by ELISA were made using Strategic Diagnostics Inc. (Newark, DE) EnviroGard plate kits.

Toxicity Testing

Dry-weather and wet-weather samples were tested for toxicity using the 7-d *Ceriodaphnia dubia* survival and reproduction test (USEPA 1994). The samples were usually tested at three concentrations (100%, 50%, and 25% runoff concentrations). All toxicity tests were started within 2 d of sample collection. Ten replicates were included in each test. The test endpoints were percent of survival and the number of offspring. A concurrent copper reference toxicant test was conducted with each testing event. Each test included a laboratory control. Test solutions were changed on a daily basis, and the organisms were fed each day. Dissolved oxygen, conductivity, pH, and temperature were measured each day. Alkalinity, hardness, and total ammonia were measured at the beginning of each experiment. Water quality measurements during the test met the test recommended ranges.

The echinoderm fertilization test was also used (USEPA 1995). This test measures toxic effects on sea urchin or sand dollar sperm, as a reduction in their ability to fertilize eggs. Purple sea urchins (*Strongylocentrotus purpuratus*) were used in the majority of tests, while sand dollars (*Dendraster excentricus*) were used for the tests from November 2004. The tests consisted of a 20 minute exposure of sperm to samples of 25, 50, or 100% runoff sample diluted with hypersaline brine. Eggs were then added and given 20 minutes for fertilization to occur. The eggs were then preserved and examined later with a microscope to assess the percentage of successful fertilization. Toxic effects were expressed as a reduction in fertilization percentage. The tests were conducted in glass shell vials containing 10 mL of solution at a temperature of 15°C. Four replicates were tested for each sample. A seawater blank was included as negative control. A concurrent reference toxicity test with copper was conducted with each testing event.

Data Analysis

Chemistry

Tiered Approach to Evaluating Effectiveness

In many cases there was a difference between the inflow and outflow concentrations. Determining what constitutes a meaningful difference, however, is important when evaluating BMP effectiveness. With the limited number of sampling events in this study, the effectiveness could not be evaluated using a statistical approach. Therefore a tiered approach was used, which first examined the magnitude of the difference in concentrations between the inflow and outflow samples. If the difference was consistently greater than what would be expected from variability alone, then the data were compared to the appropriate chronic water quality criterion (Table 4). In this approach, the BMP had to have a meaningful difference between the inflow and outflow concentrations, even if the outflow concentration was meeting the water quality criterion. Two designations of effectiveness were assigned for each constituent at a BMP site; one designation for whether the BMP reduced the constituent, and a second designation (if the magnitude was great enough) for whether the water quality criteria was met due to reductions by the BMP.

One potential source of the differences between inflow and outflow concentrations that could confound the interpretation of BMP efficiency is analytical variability. This type of variability can be caused by such things as differences in sample preparation and instrument conditions. Fortunately, analytical variability can be estimated from the sample duplicates that were measured as part of the quality assurance objectives in this study. The relative percent difference (RPD) is a measure of variability between a pair of samples, with higher RPD values indicating greater variability between the data pairs. The RPD was calculated as:

$$\frac{|Influent - Effluent|}{Average} x(100)$$

In this study, there were 120 pairs of laboratory duplicate analyses for metals using field samples that were measured by CRG Marine Laboratories. Most of the pairs had RPD values <10% (Figure 11, Table 5), indicating that analytical variability was usually less than 10% for both dissolved and total metals. Therefore, differences of $\geq$10% for the inflow and outflow metals data are greater than what would be expected from analytical variability, and are probably meaningful. This was the first tier of the evaluation approach. While the duplicate measurements were only available for the analyses made by CRG Marine Laboratories, the concept that differences between the inflow and outflow concentrations had to be at least 10% to be meaningful was applied to the metals data from all three analytical laboratories. The 10% difference rule was also applied to TSS and pesticides, because these constituents did not have enough duplicate measurements made to determine a meaningful level of analytical variability.

The percent reduction between inflow and outflow contaminant concentrations was calculated for each BMP site as:

$$\frac{Influent - Effluent}{Influent} x(100)$$

Values calculated as the RPD are similar to values calculated using the percent reduction equation, when the percent reduction is low (<30%).

The second tier in evaluating BMP effectiveness was to compare the outflow concentrations to chronic water quality criteria. While the water quality criteria are not currently used to assess regulatory compliance of the runoff in this study, these criteria are useful for determining if concentrations in the inflow and outflow are at protective levels. For those samples that had a ≥10% reduction between inflow and outflow concentrations for at least 75% of the sampling events, the data were compared with the appropriate freshwater chronic water quality criterion. California Toxics Rule values were used for total Se, as well as for dissolved As, Cd, Cu, Ni, Pb, and Zn (Table 4). There are no chronic criteria for dissolved Ag, Al, Cr(3+6), Se or Sn. For total Al, chlorpyrifos and malathion, the national freshwater chronic water quality criteria were used, while for diazinon, the California Department of Fish and Game freshwater chronic criterion was used. In cases where at least two of the inflow samples exceeded the water quality criterion, the relationship of the outflow concentration to the water quality criterion was examined. If the outflow concentration was consistently below the criterion, the site was designated “yes/+” for that contaminant, where the first part of the designation refers to the BMP’s ability to reduce concentrations by at least 10%, and the second part of the designation refers to the ability to attain a specific water quality criterion. If the outflow concentrations never met the criterion, the designation would be “yes/–”. For cases where the outflow met the criterion inconsistently, the site was designated “yes/?”. If the inflow concentrations were consistently below a criterion, then the ability to attain the criteria could not be determined, and the site was designated “yes/U” for that contaminant (U for undetermined). For those contaminants that did not have a ≥10% reduction between the inflow and outflow samples, the site was designated “no/U”, for no meaningful reduction by the BMP.

Toxicity

Data from the echinoderm and *C. dubia* tests were evaluated for significant reductions in fertilization, survival or reproduction using analysis of variance (ANOVA) with Dunnett’s test, or with Steel’s Many-One rank test when assumptions of normality or homoscedasticity were not met. Comparisons were made against the seawater control for the echinoderm fertilization test, and against the laboratory dilution water control for the *C. dubia* test. Using this approach, the highest concentration of runoff that did not cause significant toxicity (the no effect concentration, NOEC) was estimated for each of the inflow and outflow samples.

The median-effect concentrations (LC50 or EC50) were also calculated. These are the concentrations of runoff that caused a 50% reduction in survival (LC50), or reproduction or fertilization (EC50). Toxicity units were then calculated to compare the magnitude of response. Toxic units (TU) were derived as 100/LC50 or 100/EC50. A TU > 1 indicates a strong toxic response. Because the highest concentration of runoff sample tested with the echinoderm fertilization test was 50%, the lowest TU that could be calculated was 2. Therefore, having no toxicity in the 50% sample would be associated with TU <2. The lowest concentration of runoff in the fertilization test was 12.5%. Therefore in cases with extreme toxicity where the EC50<12.5%, the associated TU would be >8.

Data Quality Evaluation

The data were evaluated for deviations in sampling strategies, sediment holding time, and chemistry and toxicity testing methods. The chemistry data were assessed for accuracy, precision, and negative control response. The toxicity test results were assessed for negative control response, and positive control response. Exceedance of a data quality objective did not automatically invalidate the data.

Sampling

There were a few deviations from the original sampling strategy. The planned number of sampling events described in the QAPP (up to eight events) was not feasible from both a cost- and time-basis. Instead of reducing the number of constituents analyzed to fit within the budget, it was decided to reduce the number of sampling events to four. This allowed us to maintain the diverse group of constituents that were likely to be found in urban runoff. Delays in installation at the BC120 site was another reason for the reduced sampling. Only two dry weather and two wet weather sampling events were captured from the BC120 site, instead of the planned four dry and wet weather sampling events each. Installation of the CDS unit at this site was not completed until mid-January. The QAPP also called for a minimum dry weather antecedent period of 10 days before collecting the dry weather samples. However, with the frequency and unpredictability of the storm events during the 2004-2005 storm season, this desired antecedent period was rarely met (Table 1). Finally, because of the non-ideal conditions of the upstream pipe configuration, flowmeters were not installed at the Pico-Kenter site, and therefore no flow data were obtained from this site.

There were differences in sampling methods both among and within sites. Stormwater samples were collected as flow-weighted composites at BC120, and time-weighted composites at South Pasadena because the South Pasadena samples were collected as part of another study. At the L.A. metal recycling yard, automated composite samples were collected during the February 2004 sampling events, while grab samples were collected during the October 2004 and February 2005 sampling events.

There were some problems with the dosing rates of the OCWD sub-surface wetland cells during the first two weeks. The flow rate for the diazinon stock solution to replicate cell #1 was about one-tenth the desired flow rate. The diazinon stock flow rate to replicate cell #2 was about one-quarter the desired flow rate only during the second week of the study. The flow rate for the metals stock solution to replicate cell #2 was about half the desired rate during the first two weeks. While the flow rates were low, useful data on the removal efficiencies of Cu, Zn and diazinon were obtained.

Finally, the inflow and outflow samples from the Wet CAT site were not matched exactly. The sampling of the outflow was delayed for 24 h from the start of the inflow sampling in order to account for the hydraulic residence time of the wetland. However, after further investigation it was found that the hydraulic residence time for this site is three days, not one. Therefore while we saw a consistent reduction in the concentrations of certain contaminants over the four sampling events, the outflow sample did not exactly match the inflow sample.

Chemistry

The majority of the data quality objectives specified in the QAPP were met. Most analyses were completed within the specified sampling holding times. The matrix spike/matrix spike duplicate and lab spikes were within acceptable ranges, indicating the data had good accuracy and precision. The method detection limits were met or exceeded for chemistry measurements.

Sample holding times were exceeded for analysis of general constituents (e.g., pH, conductivity) for the BC120 samples from 1/19, 1/26, and 2/11/05, and from the Wet CAT, Pico-Kenter and SMURRF samples from 12/16/04 and 1/20/05. However, the pH and conductivity measurements of the Wet CAT and SMURRF samples reported by the chemistry analytical lab were consistent with those made by the toxicity testing lab, which measured pH and conductivity upon sample arrival. The pH and conductivity for the Pico-Kenter samples from December are also consistent between the two labs, however the comparability of the January samples from the BC120 and Pico-Kenter samples could not be assessed because these samples had been temporarily lost during shipment, and therefore were not analyzed by the toxicology lab. Both pH (inflow pH=6.5 CRG, inflow pH=7.4 Nautilus) and conductivity measurements (inflow = 59,500 µS CRG, 63 µS Nautilus) varied among the labs for the BC120 samples from 2/11/05.

The variability quality assurance objective was exceeded for As and Se in the December dry weather samples from Pico-Kenter, Wet CAT and SMURRF. The variability objective was also exceeded for Cd in the March sample from Wet CAT. For the overall study, however, the average relative percent difference (RPD) was met for the dissolved and total fraction of each metal (Table 5).

There were no metal or pesticide MS/MSD data for the dry weather samples from November, December, or March. There also are no metals MS/MSD data for the February wet weather samples from BC120. For the data that were available, the highest RPD for metals was 9%, indicating excellent precision.

The method detection limit (MDL) for total and dissolved As, Cd, Cr, Cu, Pb, Ni, Zn (0.1 µg/L) was lower than the value specified in the QAPP (0.5 µg/L). The MDL was also lower for chlorpyrifos, diazinon, malathion, dimethoate (0.005 µg/L) than the value in the QAPP (0.01 µg/L).

There were some differences in the list of pesticides measured, compared to the list in the QAPP. The organophosphorus pesticides cuomaphos and guthion were not analyzed in this study, however the remaining 19 OP pesticides listed in the QAPP were measured. The pyrethroid pesticides fenpropathrin and pyrethrin were not analyzed, but demitol (not listed in the QAPP) was included.

The chemistry data from the L.A. metal recycling yard, South Pasadena and NASSCO sites were obtained from on-going studies, and therefore the chemistry quality assurance objectives in this study were not applied to these data.

Toxicity

The BC120 and Pico-Kenter subsamples for the *C. dubia* toxicity testing from January were temporarily lost by the overnight delivery company. These samples were eventually found, but were not tested for toxicity because the holding time had expired. The samples for chemistry analysis and echinoderm toxicity testing from this sampling event were not compromised.

While the majority of samples tested for toxicity with *C. dubia* (14 inflow/outflow pairs) used the 7 d chronic method (which assess both survival and reproduction), there were eight inflow/outflow pairs that were tested with the 4 d acute method (which assesses only survival). The reasons for using the shorter test varied. The Pico-Kenter, SMURRF, and Wet CAT samples collected in November and December used the shorter test because of conflicts with the Thanksgiving and Christmas holidays, respectively. The SMURRF and Wet CAT samples from January were assessed only for survival because the controls had poor reproduction. While survival was reported after 4 d with the SMURRF and Wet CAT samples from January, the tests were initiated as 7 d tests, which used 10 replicates with one animal each, instead of four replicates with 10 animals each in the 4 d test.

No useful data were obtained from the *C. dubia* test with the BC120 stormwater samples from January 26. Survival and reproduction in the controls were poor, and the test was not repeated because the sample holding time had expired. Useful data were obtained, however, from the concurrent sea urchin fertilization test.

Results

Wet CAT (wetland)

Chemistry

There was a consistent reduction in the concentrations of TSS, total Cd, Ni, and Zn, and dissolved Al, Cd, Ni, Zn between inflow and outflow samples from the Wet CAT site (Figure 12 and13, Table 6). The reduction in dissolved Cd varied from a 65% reduction in November (from 2.6 µg/L in the inflow to 0.9 µg/L in the outflow), up to a 99% reduction in March (from 37.1 µg/L in the inflow to 0.2 µg/L in the outflow). Reductions in dissolved Zn ranged from 43% - 82%. The concentrations of dissolved Cu were relatively low in both the inflow and outflow samples during all four sampling events.

Diazinon and malathion were the only pesticides detected in any of the Wet CAT samples (Figure 14). Diazinon was detected in the inflow sample from November, and in both the inflow and outflow samples from December. Concentrations of diazinon were reduced between the inflow and outflow samples by a factor of >3 in November and by a factor of 2 in December. Malathion was reduced by a factor of >7 in November, the only sampling event with detectable malathion.

Outflow concentrations of dissolved As, Cd, Cu, Ni, Zn, and diazinon were consistently below their respective criteria. Concentrations of dissolved As, Cu, Zn and diazinon were also consistently below the criteria in the inflow samples, however the inflow concentrations of dissolved Cd were above the criterion during three out of the four sampling events, and half of the inflow samples exceeded the Ni criterion (Figure 13). Wet CAT outflow sample concentrations were consistently above the water quality criterion for total Se by at least a factor of six (Figure 12).

Toxicity

The Wet CAT samples were inconsistently toxic to sea urchin fertilization (Figure 15). When toxicity was present, however, it was greater in the inflow samples. Toxicity to sea urchin fertilization was reduced from 3.1 toxic units in the January inflow sample to <2 TU in the outflow sample, and from >8 TU in the March inflow sample to 2.2 TU in the outflow sample. There was no measurable toxicity in the November or December samples.

All four sampling events had low *C. dubia* survival in the 100% sample. However, comparing the survival in the field samples to the survival in the accompanying salt control indicated that the toxicity could have been caused by the high salt content of the samples. The conductivity values (a measure of the dissolved salt content) of the Wet CAT samples ranged from 5.8 – 7.2 mS, which were greater than the values for any other site in this study (Table 6). For example, the conductivity values ranged from 0.8 – 1.9 mS at Pico-Kenter, and from 0.2 – 0.9 mS at BC120. A salt blank that matched the conductivity of the sample was analyzed for toxicity concurrently with the field samples. Toxicity in the salt blank was also consistently high, ranging from 0% survival in March to 30% survival in November. The November Wet CAT inflow sample was the only sample where the toxicity could be resolved from interferences from dissolved salts (Figure 15, Table 7). While the salt content was relatively high in the inflow sample, the toxicity was significantly greater than that found in the salt control. This sample had a TU value = 2.4.

The only sample evaluated for impairment to *C. dubia* reproduction was the March sample. While this sample had low reproduction, it was not significantly different from the salt control. Therefore toxicity from other contaminants could not be resolved from the effect of the high salt content.

OCWD (sub-surface flow wetlands)

Chemistry

Concentrations of total and dissolved Cu and Zn were consistently reduced by at least a factor of two between the inflow and outflow samples (Figure 16 and 17, Table 6). Reductions of dissolved Cu ranged from a 53% reduction in the 2/3/05 sample from replicate cell #2, up to a 93% reduction in the 2/3/05 sample from replicate cell #1. Reductions of dissolved Zn ranged from a 75% reduction in the 3/10/05 sample in replicate cell #1, up to a 100% reduction in the 3/3/05 sample from replicate cell #2. Because the wetlands were dosed with a stock solution of metals, the total and dissolved metals concentrations were similar, and only the results of the dissolved fraction are reported here.

There was some indication that the metal binding capacity of the sub-surface flow gravel matrix in replicate cell #1 had been diminished after six weeks of continuous dosing. The removal efficiencies for both Cu and Zn were lowest during the fifth sampling event (week 6), from an average of 87% removal of dissolved Cu and 97% removal of dissolved Zn during the first five weeks to 64% removal of dissolved Cu and 75% removal of dissolved Zn at week 6. In contrast, there did not appear to be a “breakthrough” in metal binding capacity with replicate cell #2. The average % removal of dissolved Cu and Zn during the first five weeks (70% and 92%, respectively), were similar to the removal in week 6 (75% removal for dissolved Cu, and 98% removal for dissolved Zn).

Overall, diazinon removal by the OCWD wetlands was less effective than metal removal (Figure 18). Diazinon was removed from the wetlands by less than a factor of two during the last four sampling events. In the first sampling event, however, diazinon was reduced by a factor of >12 in replicate cell #2, going from 0.36 µg/L in the inflow to <0.03 µg/L in the outflow sample. Diazinon was also reduced in replicate cell #1, however due to dosing technical difficulties, the concentration in the inflow (0.04 µg/L) was close to the reporting level (0.03 µg/L).

The wetlands reduced the concentration of dissolved Cu to levels below the chronic criterion during all five sampling events in replicate cell #1 (Figure 17). For replicate cell #2, the concentration of dissolved Cu in the inflow was above the criterion during two of the five sampling events. In both cases, dissolved Cu concentrations were reduced to levels below the criterion. Concentrations of dissolved Zn in the inflow and outflow samples were consistently below the criterion during all sampling events in both replicate wetland cells. Concentrations of diazinon were reduced to levels below the chronic criterion in the first sampling event, but were above the chronic criterion for each of the last four sampling events in both replicate cells.

Toxicity

The toxicity to sea urchin fertilization, when present, was reduced after treatment by the SSF wetland (Table 8). The replicate cell #1 samples from 2/3/05 went from 60% fertilization success in the inflow to 92% in the outflow, and the samples from 3/10/05 went from 86% fertilization success in the inflow to 95% in the outflow. None of the samples reduced fertilization by 50%, and therefore the TU was <2 for all samples (Figure 19). There was no toxicity in the inflow or outflow samples from either replicate cell from 2/10, 2/24, or 3/3.

Pico-Kenter (hydrodynamic device)

Chemistry

The Pico-Kenter CDS unit did not appear to be effective at removing total or dissolved metal concentrations, or TSS (Figure 20 and 21, Table 6). Concentrations were usually similar between inflow and outflow. In the March samples, however, there was an increase in the concentrations of four total metals between the inflow and outflow samples, and a reduction in one other. Specifically, total Al decreased by 62% between the inflow and outflow samples in March, but the concentration of total Cu increased by 84%, total Zn increased by 375%, total Ni increased by 344%, total Pb increased by 1161%. The dissolved fraction of Al, Cu, Ni, Pb and Zn in March, however, was more consistent between inflow and outflow samples, with differences ranging from 2% for dissolved Cu to 17% for dissolved Zn. There was also a large reduction (95%) in total As during the December sampling event, while dissolved As concentrations were consistent between the inflow and outflow samples. The removal effectiveness for total and dissolved Ag, Cd and Sn could not be determined, because these constituents were usually below the reporting level.

Chlorpyrifos was the only pesticide detected in any of the samples (Figure 22). This pesticide was found only in the outflow sample from March, at a concentration of 0.12 µg/L.

Concentrations of total Al were consistently above the chronic criterion, while total Se was below the chronic criterion for three of the four sampling events. All of the dissolved metals with chronic criteria (As, Cd, Cu, Ni, Pb and Zn) had inflow and outflow concentrations at or below their respective criteria. The single measured chlorpyrifos concentration at Pico-Kenter was 3 times the chronic criterion.

Toxicity

Over half of the samples were toxic to sea urchin fertilization (Figure 23, Table 9). The only samples that were not toxic to sea urchin fertilization were the inflow and outflow samples from November. For the December and January inflow and outflow samples, the highest concentration tested (50% dilution) was toxic. For the March samples, the inflow sample had greater toxicity than the outflow sample; the inflow sample was toxic at the lowest dilution tested (12.5% inflow), while the outflow sample was toxic at the 25% sample concentration. The toxicity of the January inflow samples, and the November and March inflow and outflow samples was not great enough to produce a median-effect response (i.e., none of these samples reduced fertilization by 50%), hence an EC50 and TU value could not be calculated.

Samples from three collection events were tested for *C. dubia* survival (11/18/04, 12/16/04, 3/10/05), while one event was tested for reproduction impairment (3/10/05). None of the Pico-Kenter samples tested were toxic to survival or reproduction (Figure 23).

BC120 Dry weather (hydrodynamic device)

<u>Chemistry</u>

There was a difference in removal efficiencies between the total and dissolved metal fractions for certain metals (i.e., Al, Cu, Pb, Zn) for at least one of the two dry weather sampling events at BC120 (Figures 24 and 25, Table 6). For example, total Al was reduced by 34% between the inflow and outflow samples in January, and by 52% in March, while the dissolved fraction of Al increased by 25% and 55%, respectively, between the inflow and outflow in these same samples. The concentration of total Cu was reduced by 26% in the January outflow, but dissolved Cu concentrations were similar between the inflow and outflow samples. Both total Pb and total Zn were reduced 32% and 24%, respectively, between the inflow and outflow samples from January, but virtually unchanged in the dissolved fraction. This difference was not apparent between total and dissolved Pb or Zn from March; both metals showed a reduction between inflow and outflow in both the total and dissolved fractions.

There was a 73% reduction in TSS in the January sample, and a 50% reduction in the March sample.

Diazinon and bifenthrin were the only pesticides found in the dry weather samples from BC120 (Figure 26). Diazinon was detected in both the inflow and outflow samples from March, while bifenthrin was detected in both the inflow and outflow samples from January. The concentration of each pesticide in the outflow samples were similar to the inflow concentration.

A reduction in contaminant concentration did not necessarily lead to values being below the water quality criteria, and vice versa. While concentrations of total Al were reduced between the inflow and outflow samples from January and March, the outflow concentrations were above the chronic criterion for both sampling events. And, while concentrations of total Se, dissolved As, and dissolved Ni were virtually unchanged between the inflow and outflow samples, the outflow concentrations of these metals were consistently below their respective chronic criteria. Dissolved Cu concentrations, similarly unchanged between inflow and outflow samples, were consistently above the chronic criterion. Both dissolved Pb and dissolved Zn were above the criteria in January (when inflow and outflow concentrations were similar), and below the criteria in March (when there was a slight reduction in concentration between the inflow and outflow samples). Both the inflow and outflow concentrations of diazinon were below the chronic criterion.

<u>Toxicity</u>

Both the inflow and outflow samples from January were toxic to sea urchin fertilization (Figure 27, Table 10). The inflow sample was toxic at the 50% dilution, and the outflow sample (with greater toxicity) was toxic at the 25% sample concentration. The toxicity increased between the inflow and outflow samples from March. While the inflow sample from March showed no toxicity at the highest dilution tested (50% dilution), the outflow sample was toxic even at the lowest dilution tested (12.5% sample)

Only the samples from March were tested for impairment to *C. dubia* survival or reproduction. Neither the inflow nor outflow samples were toxic to *C. dubia* (Figure 27).

BC120 Wet weather (hydrodynamic device)

Chemistry

The concentrations of most total and dissolved metals increased between the inflow and outflow samples from January (Figure 28 and 29, Table 6). Concentrations of total Al, As, Cd, Cr, Cu, Pb, Ni and Zn increased by at least 26% in the January samples, while dissolved concentrations of Al, As, Cr, Cu, Pb, Ni and Zn increased by at least 35% in January. The concentrations of most total metals also increased in the February samples, although not by as much.

Concentrations of TSS were similar between the inflow (TSS = 204 mg/L) and outflow (TSS = 217 mg/L) samples from January. However for the February samples, the level of TSS increased by 67% between inflow (84 mg/L) and outflow (140 mg/L) (Figure 28).

Diazinon was the only pesticide found in either of the wet weather sampling events at BC120 (Figure 30). This pesticide was detected in the February samples, where there was a 50% reduction between the inflow and outflow samples, from 0.08 µg/L to 0.04 µg/L.

Concentrations of total Al, dissolved Cu, and dissolved Zn exceeded the chronic criteria during both wet weather sampling events at BC120. Concentration of dissolved Pb were exceeded in the February sample. The diazinon concentration in the outflow sample was below the chronic criterion.

Toxicity

Samples from both the January and February wet weather sampling events were toxic to sea urchin fertilization (Table 11). In the January samples, the lowest concentration of inflow and outflow sample tested (12.5% sample) was toxic. Because the level of toxicity was so strong in these samples, it was not possible to detect differences between the inflow and outflow samples. The samples from February had lower toxicity. Both the inflow and outflow samples were only toxic at the 50% dilution. These samples had comparable TU values (inflow sample TU=2.6, outflow TU = 2.9) (Figure 31).

Only the samples from February were tested for impairment to *C. dubia* survival or reproduction. Neither the inflow nor outflow samples were toxic to *C. dubia* (Figure 31).

South Pasadena (hydrodynamic device)

Chemistry

There was greater variability in total and dissolved metals among sampling events than there was between inflow and outflow concentrations from a single sampling event (Figure 32 and 33, Table 6). For example, total Cu concentrations in the inflow samples from the South Pasadena site varied by up to a factor of 5.1 and the outflow samples varied by a factor of 3.8, while the largest difference between inflow and outflow concentrations for a single event was by a factor of 1.4. For dissolved Cu, the inflow concentrations varied by a factor of 3.8 and the outflow concentrations varied by a factor of 3.2, while the largest difference between inflow and outflow samples from a single event was by a factor of 1.6. This pattern was consistent for each metal that was detected.

Differences in TSS concentrations between inflow and outflow samples were variable among the five sampling events. Concentrations increased by over 50% in the samples from 12/5/04 and 1/26/05, but decreased by 97% in the samples from 1/2/05 (Figure 32).

The OP pesticides chlorpyrifos and diazinon were the only pesticides detected in any of the South Pasadena samples. Chlorpyrifos was detected in the inflow and outflow samples from 1/7 and 1/26/05, while diazinon was detected in the inflow and outflow samples from 12/5/04 (Figure 34). Concentrations of chlorpyrifos were similar between the inflow and outflow samples from 1/7/05, but there was a 67% increase in chlorpyrifos between the inflow and outflow samples from 1/26/05. The diazinon inflow and outflow concentrations from 12/5/04 were similar.

While there were some metal concentrations in the outflow samples below their respective chronic water quality criteria, none of the metals were below the criteria because of a reduction from the inflow concentration. Total Se, and dissolved Cd were consistently below the criteria and also consistently below the reporting limit. Dissolved Cu was consistently above the chronic criterion, while dissolved Pb and Zn had some values above and some below their criteria. The chronic water quality criterion for total Al is only valid for sample pH 6.5 – 9.0. Only one outflow sample was within this pH range (the sample from 1/26/05), and the concentration of total Al in this sample exceeded the criterion. The two detectable concentrations of chlorpyrifos in the outflow samples were both above the chronic water quality criteria. The detected concentration of diazinon was equal to the criterion.

Toxicity

Samples from all five sampling events were highly toxic to sea urchin fertilization, and this toxicity was not reduced by the CDS unit (Figure 35, Table 12). The toxic units were comparable between the inflow and outflow samples for most sampling events. For the samples collected from the 1/7 and 1/26/05 storm events, the toxicity was too great to tell if there was a difference between the inflow and outflow samples. Among sites, TUs ranged from 3.3 and 3.6 in the inflow and outflow samples, respectively, from 12/5/04, to TU >8 in the inflow and outflow samples from 1/7 and 1/26/05.

None of the samples were toxic to *C. dubia* survival or reproduction (Figure 35).

SMURRF (screening/hydrodynamic device/microfiltration/UV treatment)

Chemistry

For TSS and most of the total metals constituents (Al, Cr, Cu, Pb, Ni, Zn), there was a consistent reduction in concentrations between the inflow and outflow samples (Figure 36, Table 6). Concentrations of TSS were reduced below the reporting level for three of the four sampling events, reducing TSS by ≥93%. The one sampling event that had measurable TSS in the outflow had a 99% removal rate. The reduction in total Cu varied from 47% to 59%, while the reduction in total Zn varied from 52% to 68%.

A strong and consistent reduction between the inflow and outflow concentrations was less apparent for the dissolved metals (Figure 37). Only dissolved Al and Zn showed a consistent removal, with efficiencies ranging from 11-65% for dissolved Al and from 10-34% for dissolved Zn.

The concentration of residual chlorine increased between the inflow and outflow samples during each of the four sampling events. The smallest increase was from 0.05 mg/L to 0.08 mg/L in March, while the largest increase was from 0.05 mg/L to 0.66 mg/L in the November sample (Table 6). The most likely source of the chlorine is from the use of this chemical to backflush the screens at SMURRF (Louis Hernandez, personal communication).

Malathion was the only pesticide detected in any of the samples from SMURRF (Figure 38). This pesticide was detected in the March samples, where the concentrations were 0.05 µg/L in the inflow and 0.03 µg/L in the outflow sample.

The reduction in total Al consistently brought the concentrations down below the chronic criterion. Total Se concentrations, which were not reduced by the treatment at SMURRF, were above the chronic criterion only in the March outflow sample. The concentrations of dissolved metals (As, Cd, Cu, Pb, Ni, Zn) were consistently below the respective criteria prior to treatment at SMURRF, and remained below the criteria after treatment. The concentrations of malathion were likewise below the chronic criterion both before and after treatment.

Toxicity

Toxicity to sea urchin fertilization increased in three of the four outflow samples from SMURRF (Figure 39, Table 13). This increase in toxicity corresponded with an increase in residual chlorine concentrations between the inflow and outflow samples. For example, the November sample went from TU <2 in the inflow sample (0.05 mg/L chlorine) to TU = 8.7 in the outflow sample (0.66 mg/L chlorine). Similarly, the December samples went from TU = 2.5 (0.07 mg/L chlorine) to TU >8 (0.23 mg/L chlorine), and the January samples went from TU = 1.2 (0.17 mg/L chlorine) to TU >8 (0.35 mg/L chlorine). The inflow and outflow samples from March were toxic at the 50% dilution, but the toxicity was not great enough to calculate a median effect concentration, therefore TU values could not be estimated. Chlorine concentrations in these samples were relatively low, with residual chlorine in the outflow sample (0.08 mg/L) being similar to the inflow sample (0.05 mg/L).

The only sample that was toxic to *C. dubia* survival was the outflow sample from November. This sample had 0% survival in the 100% sample, and a TU value = 1.4. This was also the sample with the highest residual chlorine concentration (0.66 mg/L). All other samples, including the November inflow sample had TU values <1. The only samples tested for impairment to *C. dubia* reproduction (the March inflow and outflow samples) were not toxic.

L.A. metal recycling yard (screening/settlement)

Chemistry

There were no consistent differences between inflow and outflow samples for total metals, but there were patterns among certain dissolved metals (Figure 40 and 41, Table 6). For example, dissolved Cr concentrations were reduced for each of the four sampling events, ranging from a

36% – 79% reduction between the inflow and outflow samples. Concentrations of dissolved Pb were reduced during three of the events, ranging from a 48% – 87% reduction between inflow and outflow concentrations. For the fourth sampling event, however, dissolved Pb increased by 54% in the outflow. There was a consistent increase in dissolved Zn, ranging from a 57% – 2009% increase between inflow and outflow concentrations. Most of the sampling events also showed a strong increase in dissolved Cd concentrations, ranging from a 262% – 601% increase. The fourth sampling event, however, had a 55% reduction in dissolved Cd in the outflow sample.

The chronic criteria for both total Al and Se were exceeded (Figure 40). Only two of the outflow samples were within the appropriate pH range (6.5 – 9.0) to compare against the total Al criterion, but both of these samples exceeded the criterion. All four of the outflow samples exceeded the criterion for total Se. The reductions in dissolved Pb resulted in outflow concentrations that were below the criterion for two of the sampling events, but not for a third event (Figure 41). The increases in dissolved Zn concentrations resulted in exceedances of the chronic criterion for three of the four sampling events. Dissolved Ni, which had inconsistent differences between inflow and outflow concentrations, exceeded the chronic criterion once, during the sampling event with the largest reduction in dissolved Ni.

Pesticides were not analyzed in the samples from the L.A. metal recycling yard.

<u>Toxicity</u>

The toxicity of the samples to sea urchin fertilization decreased between inflow and outflow for two of the events, but the toxicity was too high to detect any changes between inflow and outflow during the other two events (Figure 42, Table 14). In the samples from 2/18/04, the toxicity was reduced from TU >8 to TU = 5.4, while in for the samples from 10/26/04, the toxicity went from TU = 2.5 to TU <2. The inflow and outflow samples from 2/2/04 and 2/11/05 each had TU values >8, and therefore differences could not be determined.

The toxicity to *C. dubia* survival was also inconsistent among the four sampling events (Figure 42). During the event on 2/2/04, the toxicity was too great to differentiate the inflow and outflow samples (TU > 4; the lowest concentration tested was 25% sample). However, toxicity increased in the samples from 2/18/04, from TU <1 in the inflow to TU = 2.1 in the outflow. Toxicity was reduced between the inflow and outflow samples during the last two events, from TU = 16 in the inflow (6.25% sample was the lowest concentration tested) to TU = 8.3 in the outflow from 10/26/04, and from TU = 2.2 to TU 1.4 in the samples from 2/11/05.

Reproductive impairment was reduced between the inflow and outflow samples during three of the sampling events. The largest reduction in toxicity was in the samples from 2/18/04, where toxicity dropped from TU = 9.4 to 5.2. There were slight reductions in toxicity in the samples from 10/26/04 (inflow TU = 7, outflow TU = 5.7), and 2/11/05 (inflow TU = 6.7, outflow TU = 5.9). The samples from 2/2/04 had toxicity that was too great to differentiate the inflow and outflow samples (TU >4 for both samples).

Discussion

This study expands our understanding of BMP effectiveness under field conditions in southern California, adding new information for sites that have not been examined previously, and assessing additional constituents of concern for aquatic life protection (e.g., toxicity, OP pesticides) at sites that have been studied before. The assessment of treatment effectiveness described in this study is intended to provide information regarding the technologies examined and to aid in the selection of BMPs for future installations, not to evaluate the suitability of a specific BMP at the study sites. The BMPs included in this study were installed for purposes other than removal of aquatic life toxicity and the results are therefore not intended to assess the overall effectiveness of the specific BMP for its intended purpose. For example, the effluents from the SMURRF and L.A. metal recycling yard treatment systems do not enter urban creeks or channels, but are used as reclaimed water (SMURRF) or for ground water infiltration. The Wet CAT and CDS systems were installed for the treatment of constituents other than toxicity, such as bacteria (Wet CAT) and trash.

Effectiveness of Metals Removal

The wetland BMP systems (Wet CAT and OCWD sub-surface flow) both showed great potential to effectively reduce concentrations of dissolved Zn. Concentrations of dissolved Zn were consistently reduced by more than 10% in the outflow samples from both sites, however the concentrations in the inflow samples did not exceed the chronic criterion (Table 15-17). Therefore the ability to attain the water quality criterion for dissolved Zn could not be evaluated for these sites. For dissolved Cu, the wetlands showed different responses. The SSF wetlands consistently reduced concentrations of dissolved Cu by more than 10% and reduced outflow concentrations to levels below the chronic criterion, but the Wet CAT wetland was unable to produce a meaningful reduction. Concentrations at the Wet CAT site, however, were quite low in the inflow samples ($\leq$11 µg/L), and therefore it may not be realistic to expect large reductions in the outflow. Other metal constituents with water quality criteria were only analyzed in the samples from the Wet CAT site. The Wet CAT wetland was very effective at reducing concentrations of dissolved Cd and Ni to levels below the chronic criteria. This wetland was also effective at reducing concentrations of total Al and Se by >10%, although total Al was not always reduced to levels below the chronic criterion, and total Se was never reduced below the criterion. There were several metals without chronic criteria that were consistently reduced by >10% between the inflow and outflow at the Wet CAT site (Table 15). This included total Cd, Cr, Cu, Ni, and Zn. Total Cu and Zn were also reduced by >10% in the OCWD SSF samples.

The BMPs using hydrodynamic devices (CDS units) were generally ineffective at reducing metal concentrations by $\geq$10%, for metals with chronic water quality criteria (Table 15). There was one exception; concentrations of total Al were reduced by >10% in both of the dry weather outflow samples at the BC120 site. This reduction was only partially effective, however, since the outflow concentrations were never reduced below the chronic criterion (Table 16). One constituent, dissolved Cd, was below the reporting level for most sampling events at each of the CDS BMP sites, and could not be evaluated for consistent reductions. Most of the metals that were consistently reduced by $\geq$10% in the dry weather samples from BC120 do not have chronic criteria. Total Cu, Pb and Zn were reduced by >10% between inflow and outflow during both dry weather sampling events at this site (Table 15). In general, CDS units are designed to remove particulate material, which would be a substantial benefit for reducing the total load of metals. However, the majority of metals chronic criteria are for the dissolved phase.

The SMURRF site was effective at reducing two of the metals with chronic criteria by ≥10%. The treatment process at SMURRF consistently reduced concentrations of total Al and dissolved Zn by ≥10%, with total Al reduced to levels below the chronic criterion (Table 17). Dissolved Zn concentrations, however, were consistently below the chronic criterion in the inflow, and therefore the ability to attain this water quality criterion could not be assessed. The majority of metal constituents that were consistently reduced by ≥10% do not have chronic criteria (Table 15); concentrations of total Cr, Cu, Ni, Pb, and Zn, and dissolved Al were consistently reduced between the inflow and outflow samples at SMURRF. Similar to the CDS units, the microfiltration process at SMURRF works better on particulate metals, rather than dissolved metals.

The screening/settlement apparatus at the L.A. metal recycling yard was usually effective at reducing concentrations of dissolved Cu and Pb by ≥10% (Table 15). Dissolved Pb was reduced to levels below the chronic criterion half of the time, while dissolved Cu was never reduced below the criterion. This BMP was not effective for reducing any of the other metals with chronic criteria (Table 16). Only one metal constituent without a chronic criterion (dissolved Cr) was consistently reduced by ≥10% (Table 15).

Effectiveness of Pesticides Removal

Only three BMP sites had at least two sampling events with detected amounts of pesticide, and could be evaluated for removal effectiveness (Table 15). Diazinon was measured in the inflow from the Wet CAT and OCWD SSF wetlands, while chlorpyrifos was detected in the inflow from the South Pasadena CDS site. Both wetland BMPs were able to reduce diazinon by ≥10%. However, the OCWD SSF wetlands were inconsistent over time in their ability to reduce concentrations below the chronic criterion, and the inflow concentrations at the Wet CAT site were not high enough to evaluate attainment of the water quality criterion (Table 16). The OCWD sub-surface flow wetlands appeared to completely remove diazinon during the first week, but were less effective during the other four sampling events. It is unclear why the effectiveness of diazinon removal was reduced after the first event, however the most likely explanation is that because there were inconsistencies with the dosing of the wetlands during the first week, the lack of diazinon in the outflow sample was because the diazinon had not mixed throughout the system. The dosing of the metals solution at OCWD, which used a different delivery system, was not affected. At the South Pasadena site, the concentrations of chlorpyrifos were not consistently reduced by ≥10%, hence this BMP was not effective at removing this OP pesticide.

Effectiveness of TSS Removal

Numerical water quality criteria do not exist for TSS, so the BMPs were only evaluated for their ability to reduce the concentrations of TSS by at least 10% (Table 15). The Wet CAT wetland was able to reduce TSS during all sampling events captured, presumably because of the long residence time which allowed for sedimentation processes to occur. A previous study found an average TSS reduction of 23% at the Wet CAT site (CH2MHill 2004), which is less than the 74% average reduction found in this study.

There were mixed results for the CDS units. TSS was reduced in both of the dry weather samples from BC120, but was not reduced in the wet weather samples from BC120, and was inconsistently reduced in the samples from Pico-Kenter and South Pasadena.

The microfiltration process used at SMURRF consistently reduced the levels of TSS by more than 10%. The screening/settlement process used at the L.A. metal recycling yard, however, was not able to consistently reduce TSS levels.

Reduction in TSS is not a parameter of direct relevance to water column toxicity, as contaminants usually need to be in the dissolved form to produce effects on organisms under laboratory exposure conditions. However, TSS removal does correspond to reductions in particle-associated contaminants, which could have a beneficial impact on sediment toxicity or bioaccumulation from feeding. The study design and analytical methods used in this study were not sufficient to assess potential impacts on sediment toxicity. Different procedures for sample collection and testing are needed to the toxicity associated with runoff particles.

Changes in Toxicity

Toxicity, when present, was reduced by the two wetland BMPs. Both the Wet CAT wetland, and the OCWD SSF wetland reduced the toxicity in two of the sampling events, while the other sampling events at these sites did not have sufficient toxicity to evaluate removal. While there was a consistent reduction for many of the metal contaminants in the events with the non-toxic samples, the inflow concentrations were not great enough to have caused toxicity.

The toxicity to *C. dubia* survival and reproduction in the samples from the Wet CAT site was influenced by dissolved salts. While survival and reproduction were consistently low in these samples, the toxicity was usually equivalent to the salt blank that was tested concurrently with the Wet CAT samples. In a previously study, concentrations of dissolved salts associated with conductivity values greater than 1.8-2.8 mS caused impairment to *C. dubia* reproduction (Brown and Bay 2003). In the present study, the conductivity values in all of the Wet CAT samples exceeded this threshold range by at least a factor of two. Toxicity due to other contaminants could only be resolved in the November inflow sample. While the conductivity value was relatively high in this sample, the survival was significantly lower than that found in the salt control. The high salt content did not cause interference with the echinoderm fertilization test, since hypersaline brine was added to the samples to bring the conductivity level up to approximately 54 mS.

In general, the CDS units had no effect on the toxicity. This is not surprising, since the CDS units were designed to remove solids from runoff, yet the fraction usually associated with toxicity is the dissolved phase, and the CDS units had little effect on the dissolved metals in this study (Table 15).

The toxicity data for the samples from the SMURRF site could not be used to evaluate toxicity removal effectiveness. While the inflow samples from two of the events were toxic to echinoderm fertilization, reductions in toxicity could not be assessed because of the influence of added chlorine. As part of the treatment process at SMURRF, chlorinated water is used to backflush the screens. This chlorination step results in increased residual chlorine in the outflow samples. Previous studies have shown that the echinoderm test is sensitive to chlorine, with an approximate median effect threshold of 0.02 mg/L (Dinnel et al. 1981). In the present study, the residual chlorine concentrations in the outflow samples from SMURRF were 12-33 times this value in the samples from November, December and January. The increased toxicity was not due to other contaminants, since the other dissolved contaminants analyzed at SMURRF either remained fairly constant, or were reduced between the inflow and outflow samples. There was no consistent toxicity to *C. dubia.*

Toxicity at the L.A. metal recycling yard was usually reduced after treatment, according to the *C. dubia* reproduction test. While the toxicity was usually reduced in the outflow samples, the toxicity was still quite high after treatment. The toxicity was often too high in both the inflow and outflow samples in the sea urchin fertilization test to determine if a consistent reduction had occurred. The pattern of reduced toxicity in the *C. dubia* reproductive test was similar to the pattern found for dissolved Cr and Cu, but strikingly different from the patterns for dissolved Zn and Cd, where concentrations tended to increase substantially. While dissolved Cu tended to decrease after treatment, the concentrations were still consistently above the chronic criterion.

Comparison to the International Stormwater Database

The data were compared with the International Stormwater BMP Database in order to determine if the removal effectiveness was comparable with other technologies and studies. The stormwater database contains inflow and outflow data for metals and TSS that has been collected over the past decade from several types of BMPs (Strecker et al. 2004). The database is sponsored by several agencies, including the US EPA and the American Society of Civil Engineers. For analysis of the data, the upper and lower 95% prediction limits from log transformed paired inflow and outflow data from biofiltration BMPs in the stormwater database were calculated and compared with the data for each of the BMPs in the present study. Biofiltration BMPs (which include grass strips and swales) are believed to be one of the most effective types of BMPs currently in use (E. Strecker, personal communication). Analyses were made for dissolved Cu, Zn and TSS. For dissolved Cu, most of the data from the present study fell within the prediction limits from the international stormwater database (Figure 43). The data were also compared to the one-to-one reference line (which represents no change between inflow and outflow). This comparison showed that while most of the data for the biofiltration BMPs were below this line (indicating a general net reduction in dissolved Cu between inflow and outflow), there were only two BMP sites in the present study that were consistently below this line. The OCWD SSF wetland and L.A. metal recycling yard were the only sites that had consistent reductions in dissolved Cu, with median reductions of 85% for OCWD replicate cell #1, 75% for replicate cell #2, and 28% for the metal recycling yard, compared to a 22% median reduction by the biofilter BMPs.

The reductions in the present study were usually within the biofilter prediction levels for dissolved Zn, except for the OCWD SSF wetland and the L.A. metal recycling yard (Figure 44). For the OCWD SSF wetland, the data were below the lower prediction limit of the biofiltration BMPs for dissolved Zn, indicating a greater reduction by the SSF wetland than the biofilter BMPs. The dissolved Zn data from the L.A. metal recycling yard, however, were usually above the biofiltration upper prediction limit. The data at the L.A. recycling yard were also above the one-to-one reference line, indicating a net gain in dissolved Zn. Other than the OCWD SSF wetland, the only other sites that were consistently below the one-to-one line were the Wet CAT wetland, and SMURRF. The median reductions in dissolved Zn at the OCWD (95% for replicate cell#1, 98% for replicate #2), and Wet CAT sites (72%) were greater than the median reduction from the biofiltration BMPs (45%), while the median reduction at SMURRF (20%) was lower.

For TSS, only the data from SMURRF and Wet CAT were below the lower biofilter prediction limit. (Figure 45). The median reductions in TSS at SMURRF (>98%) and the Wet CAT wetland (88%), and the reductions in the two dry weather samples from BC120 (73%, 50%) were all greater than the median reduction for the biofiltration BMPs in the stormwater database (18%). Data from the other sites in this study were usually within the prediction limits for TSS, except for the wet weather flow from BC120, which consistently exceeded the upper prediction limit.

The data from the CDS units in this study were also compared with the data from the hydrodynamic devices in the stormwater database. All of the data from the CDS units fell within the 95% prediction limits of the hydrodynamic devices for dissolved Cu (Figure 46) The reductions in dissolved Cu were more variable with the database. However, the median reduction from the database (2%) was similar to the median reduction from Pico-Kenter (3%), the two dry weather events from BC120 (-1%, 0%), and the January wet weather event from BC120 (-5%). The median reduction in dissolved Cu in the database was lower than the median reduction from South Pasadena (9%). The reduction in the February wet weather event from BC120 was negative (-82%).

For dissolved Zn, the reductions from the current study fell within the prediction limits of the hydrodynamic devices in the stormwater database (Figure 47). The results of the current study appear to coincide to the one-to-one reference line better than the data from the stormwater database for dissolved Zn. However, the median reduction in dissolved Zn from the database (0%) was lower than the median reduction from Pico-Kenter (8%), and South Pasadena (12%), and the March dry weather event from BC120 (29%), and the January wet weather event from BC120 (18%). The median reduction of the January dry weather event and February wet weather event from BC120 were negative (-10% and -42%, respectively).

There was also a greater range in reduction of TSS for data from the stormwater database than the current study (Figure 48). Overall, the median reduction in TSS from the database (48%) was greater than the median reduction for Pico-Kenter (5%), and South Pasadena (15%), or the two wet weather samples from BC120 (-6%, -67%). The TSS reduction in the database was not as great, however, as for the two dry weather samples from BC120 (73%, 50% removal).

Research Needs

While this study adds to the knowledge base, there were some limitations to this study. First, this study had a limited number of sampling events from each site and was conducted over a relatively short time frame. This study was restricted to a maximum of five sampling events due to the resources available and the short time-line of the project. Because of this, the among-event variability measured at each site may not be representative of other times of the year (for the dry weather samples), or additional years (particularly for wet weather, since the 2004-2005 rain season had double the normal amount of rainfall).

Second, while analytical variability was incorporated into the two-tiered approach, there are other potential sources of variability that were not. This includes sampling variability (inconsistencies in the composition of the flow), and variability from sample handling (conditions that change the concentrations between the time of sample collection and analysis). Inconsistencies in the composition of the flow can lead to erroneous conclusions about differences between the inflow and outflow sample if there were spikes in contaminant concentrations that were picked up by one of the autosamplers and not the other. For example, the large increases in several of the total metals (Cd, Cr, Cu, Ni, Pb, Zn) and chlorpyrifos in the March 2005 samples from Pico-Kenter probably did not originate from the CDS unit itself, but were more likely due to inconsistencies in the flow composition. Differences in how samples are handled (e.g. temperature, time until analysis) can also lead to variability between samples.

Third, there were instances where the apparent removal effectiveness was low, because the inflow concentrations were too low to expect large reductions. For example, only one of the four sampling events at the Wet CAT site had concentrations of dissolved Cu that were reduced by $\geq$10%. However, the concentration of dissolved Cu in the inflow for these events was probably too low to expect large reductions in the outflow. The overall evaluation in the two-tiered approach did not distinguish between situations where the inflow was probably too low to evaluate removal by the BMP, and situations where the BMP failed to reduce high concentrations of contaminants.

Finally, there are other types of BMPs in use in southern California that were not represented in this study, including detention basins and media filters. A previous study by Caltrans (2004) indicated these BMPs are among the most effective technologies for improving water quality, but did not examine reductions in toxicity or pesticides. Media filtration has been shown to substantially reduce toxicity in runoff from the National Steel and Shipbuilding Company (NASSCO) (H. Bermudez, personal communication).

Future investigations would benefit by increasing the number of sampling events and the duration of the study. Increasing the number of sampling events would allow additional statistical approaches to be used to evaluate the data. Future studies would also benefit by including additional BMP types, in order to characterize the wide variety of the BMPs being used in southern California.

The assessment of BMP effectiveness regarding sediment toxicity is another issue in need of investigation. Sediment toxicity is frequently encountered in receiving waters near the mouths of urban rivers and creeks, and runoff discharge is a likely contributor to this situation. Just as the effectiveness of a particular BMP for a constituent such as trash may have little relevance to reducing water column toxicity, the characteristics of BMPs that are important for reducing water column toxicity may differ from those needed to be effective in reducing sediment toxicity.

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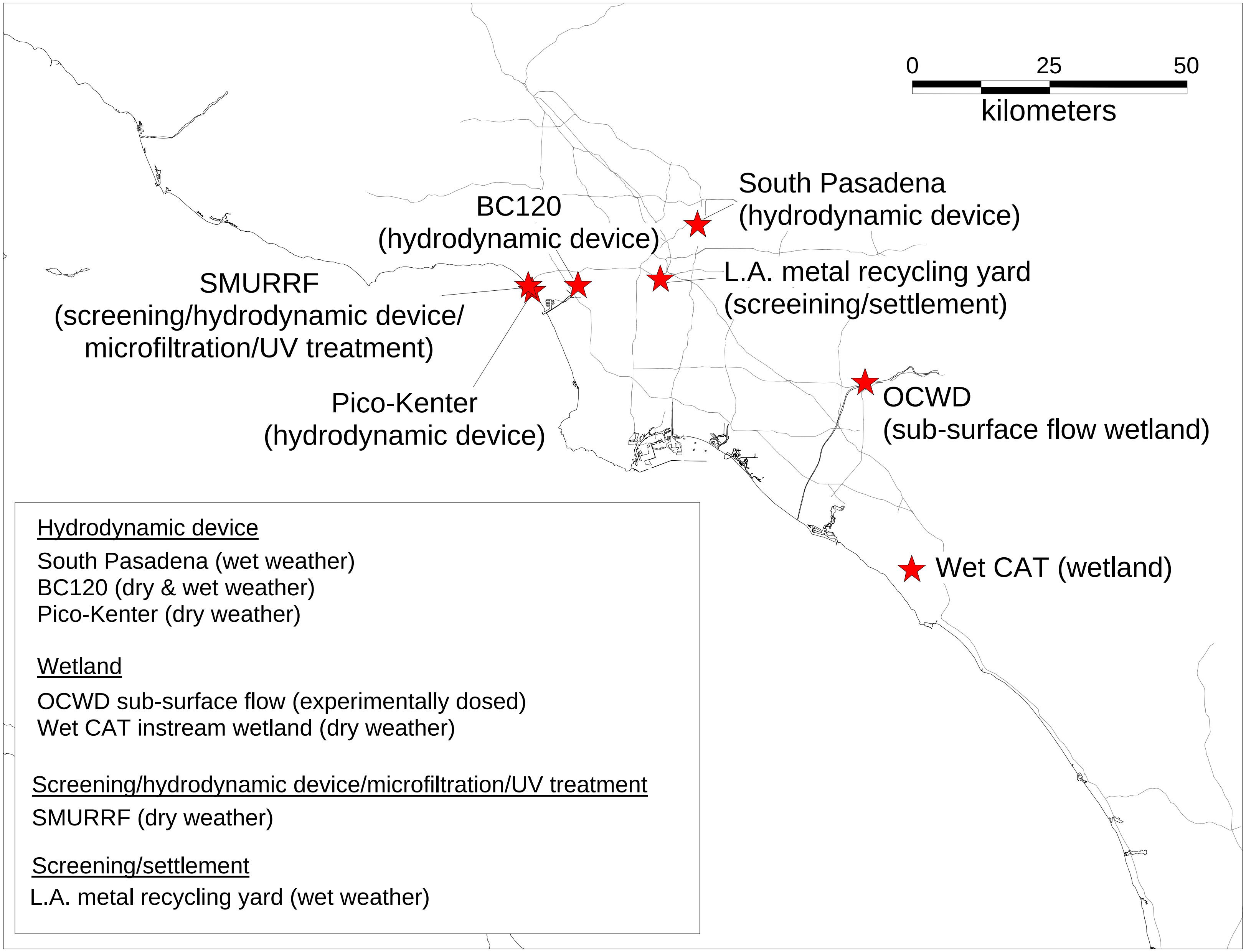


Figure 1. BMP sampling locations. The type of sample collected for this study (dry or wet weather) is indicated in the text box. The freeways in Los Angeles and Orange Counties have been added for reference.

Figure 2. Wet CAT upstream (top photo) and downstream (bottom photo) locations. The sites are separated by about half a mile of wetland. Water from the wetland flows down a slope as it leaves the wetland. The arrow in the bottom photo indicates the slope where the outflow was taken. The concrete structure on the left part of the photo contains ground water flow.

Figure 3. Orange County Water District's sub-surface flow wetlands. These wetlands are constructed from concrete panels, and measure approximately 1 m tall x 2 m wide x 8 m long. Each wetland cell is filled with a gravel matrix composed of pea gravel. A monoculture of wetland plants (bulrushes, genus *Scirpus*) are planted in the gravel. The gravel provides an approximate thousand-fold increase in surface area for the growth of bacterial biofilms that increase the rate of contaminant degradation or removal. Within the gravel matrix there are distinct oxygen rich (aerobic) and oxygen free (anaerobic) zones where specific microbial processes take place. Water flows beneath the surface of the gravel matrix.

A.

B.

Figure 4. A. Dosing setup for the sub-surface flow wetlands at OCWD. Diazinon, Cu and Zn were added to the wetlands by peristaltic pumps. The metals stock solution is separate from the diazinon stock solution. B. Outflow from the two replicate cells.

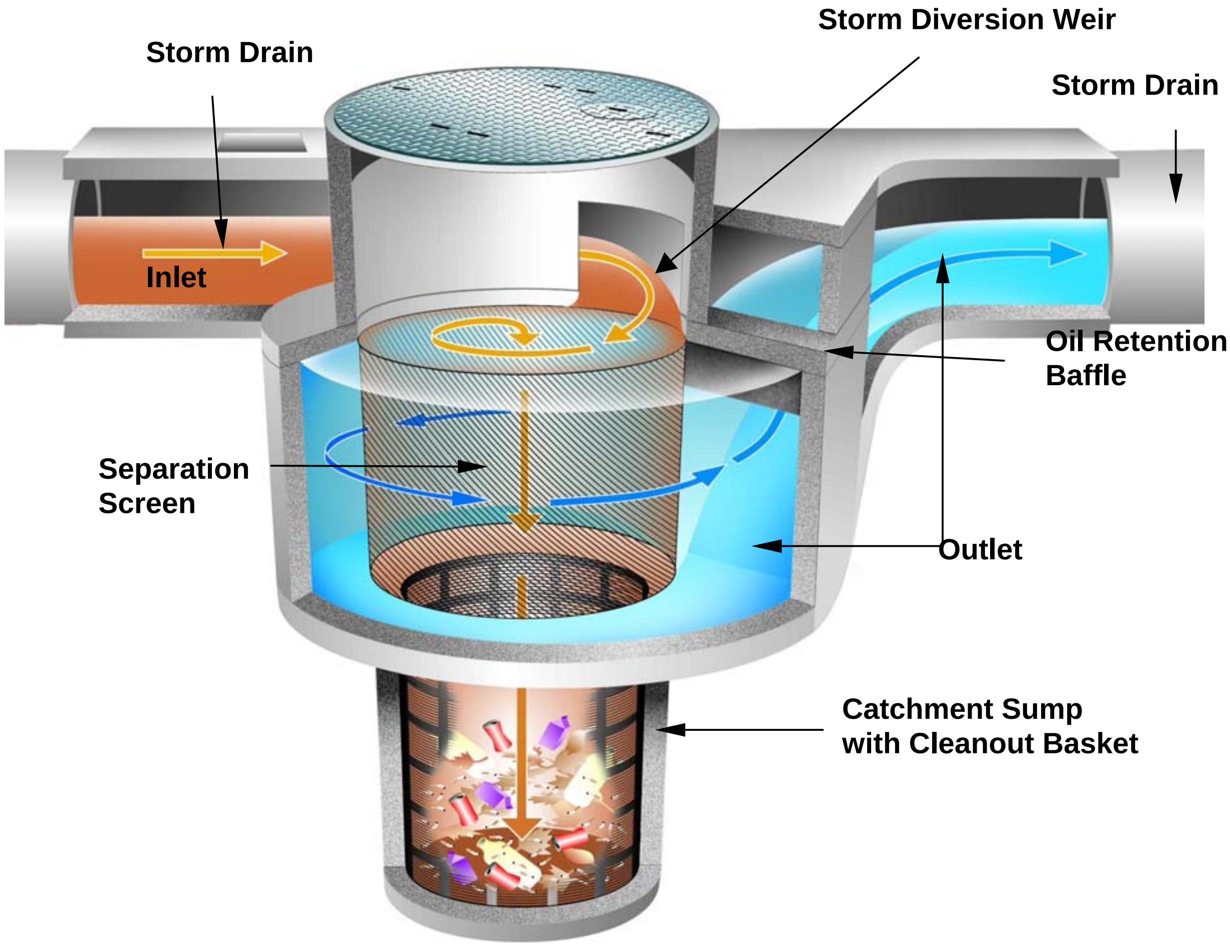


Figure 5. Schematic of a hydrodynamic device (CDS unit from CDS Technologies). The manhole cover on top is the only part of the unit visible from street level.


A.


B.

Figure 6. A. CDS unit at the Pico-Kenter site. B. Influent and effluent autosamplers in a pit adjacent to the Pico-Kenter CDS unit.


A.


B.

Figure 7. The CDS unit housing at the BC120 site, near Ballona Creek and Overland Ave. in Culver City.


A.


B.

Figure 8. A. Autosampler contained within green housing box at the South Pasadena site. B. Housing containing the autosampler located next to the manhole cover of the CDS unit.

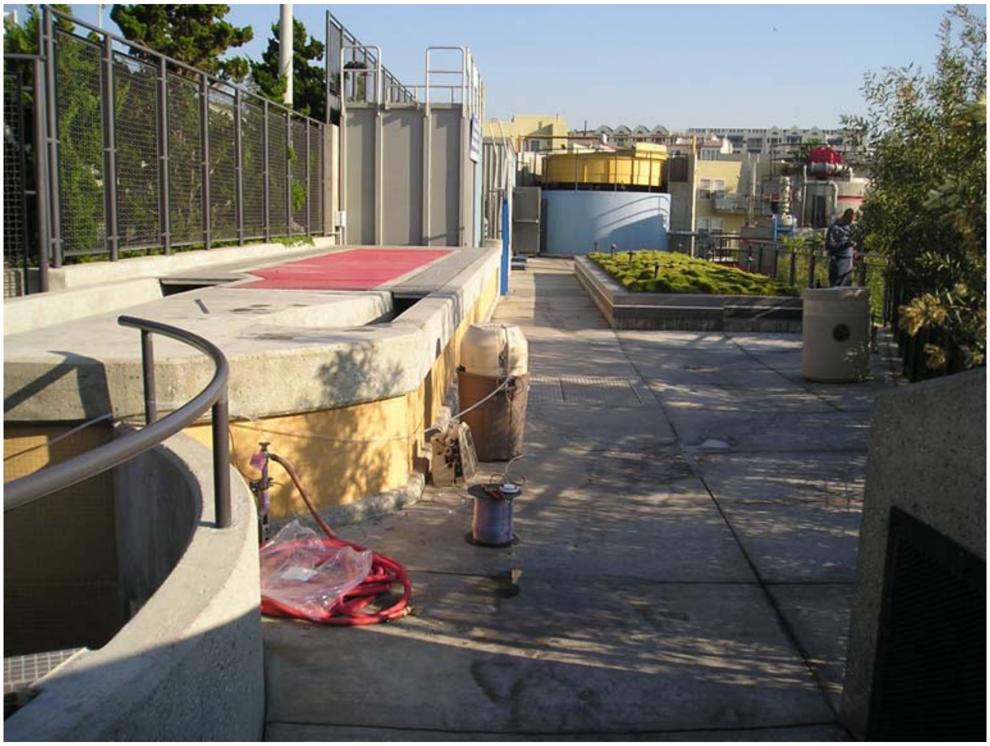


Figure 9. Santa Monica Urban Runoff Recycling Facility (SMURRF). The autosampler in the center of this picture is collecting the post-treatment effluent water.

Figure 10. L.A. metal recycling yard BMP. Water flows through the grating of the metal top hat, into an infiltration trench.

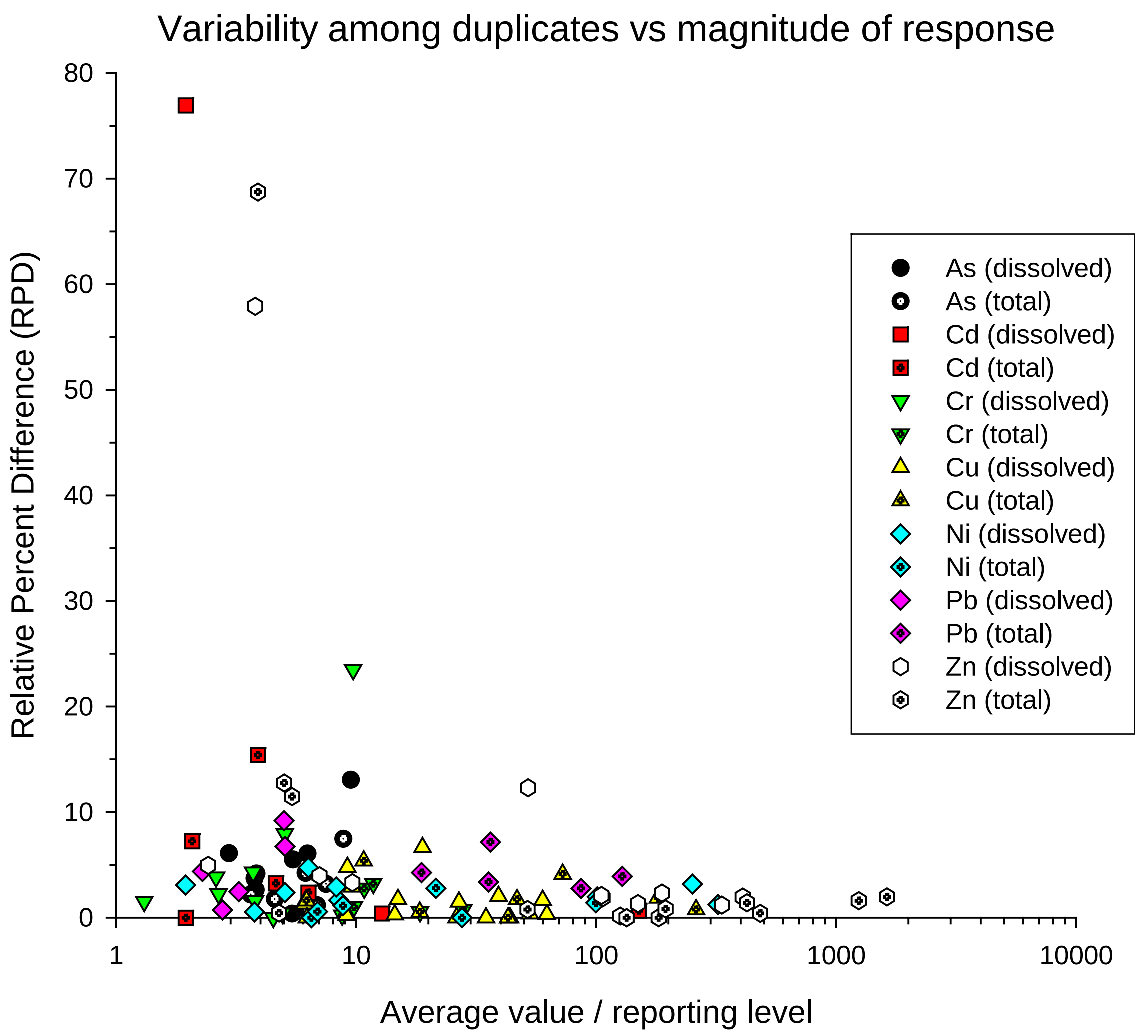


Figure 11. Variability among lab duplicates of field samples vs magnitude of response. Most duplicates had relative percent difference (RPD) values <10%, and were more than twice the reporting level. These data represent analyses only from CRG Marine Laboratories.

Table 1. Sampling event descriptions for each of the BMPs in this study.

Site	Sampling event	Sample Date	Type of sample	Antecedent dry weather period (days)	Flow volume sampled (gallons)
Wet CAT wetland (dry)	1 Inflow	11/17/04	Composite (time weighted)	8	203,773
	1 Outflow	11/18/04	Composite (time weighted)	9	208,167
	2 Inflow	12/15/04	Composite (time weighted)	6	163,815
	2 Outflow	12/16/04	Composite (time weighted)	7	169,486
	3 Inflow	1/19/05	Composite (time weighted)	7	51,534
	3 Outflow	1/20/05	Composite (time weighted)	8	50,673
	4 Inflow	3/9/05	Composite (time weighted)	5	65,559
	4 Outflow	3/10/05	Composite (time weighted)	6	64,347
OCWD sub-surface wetland (Experimental dosing)	1	2/3/05	Composite (multiple grabs)	5	Approx. 1,440
	2	2/10/05	Composite (multiple grabs)	12	Approx. 1,440
	3	2/24/05	Composite (multiple grabs)	0	Approx. 1,440
	4	3/3/05	Composite (multiple grabs)	7	Approx. 1,440
	5	3/10/05	Composite (multiple grabs)	6	Approx. 1,440
Pico-Kenter hydrodynamic device (dry)	1	11/18/04	Composite (time weighted)	9	Not measured
	2	12/16/04	Composite (time weighted)	7	Not measured
	3	1/20/05	Composite (time weighted)	8	Not measured
	4	3/10/05	Composite (time weighted)	6	Not measured
BC120 hydrodynamic device (dry)	1	1/19/05	Composite (time weighted)	7	11,176
	2	3/10/05	Composite (time weighted)	6	3,217
BC120 hydrodynamic device (storm)	1	1/26/05	Composite (flow weighted)	14	284,257
	2	2/11/05	Composite (flow weighted)	13	4,911,939
South Pasadena hydrodynamic device (storm)	1	12/5/04	Composite (time weighted)	5	55,475
	2	1/2/05	Composite (time weighted)	1	30,954 (toxicity); 163,113 (chemistry)
	3	1/7/05	Composite (time weighted)	1	20,332 (toxicity); 1,307,639 (chemistry)
	4	1/26/05	Composite (time weighted)	14	12,066 (toxicity); 13,884 (chemistry)
	5	2/11/05	Composite (time weighted)	12	39,677 (toxicity); 304,322 (chemistry)
SMURRF UV/filtration/ hydrodynamic device (dry)	1	11/18/04	Composite (time weighted)	9	201,907
	2	12/16/04	Composite (time weighted)	7	25,900
	3	1/20/05	Composite (time weighted)	8	333,043
	4	3/10/05	Composite (time weighted)	6	234,788
L.A. metal recycling yard screening/settlement (storm)	1	2/2/04	Composite (multiple grabs)	14	4,309
	2	2/18/04	Composite (multiple grabs)	15	27,460
	3	10/26/04	Grab	5	Not measured
	4	2/11/05	Grab	13	Not measured

Table 2. Constituents analyzed for each BMP site. Differences in the constituents among sites reflect differences in study design among the monitoring programs contributing data. OP pesticides = organophosphorus pesticides.

			Chemistry				Toxicity	
Site	Sampling event	Sample Date	Metals (dissolved & total)	OP pesticides	Pyrethroid pesticides	Glyphosate	*Ceriodaphnia dubia* chronic test	Sea urchin fertilization test
Wet CAT wetland (dry)	1 Inflow	11/17/04	✓	✓	✓	✓	Acute test	✓
	1 Outflow	11/18/04	✓	✓	✓	✓	Acute test	✓
	2 Inflow	12/15/04	✓	✓	✓	✓	Acute test	✓
	2 Outflow	12/16/04	✓	✓	✓	✓	Acute test	✓
	3 Inflow	1/19/05	✓	✓	✓	✓	Acute test	✓
	3 Outflow	1/20/05	✓	✓	✓	✓	Acute test	✓
	4 Inflow	3/9/05	✓	✓	✓	✓	✓	✓
	4 Outflow	3/10/05	✓	✓	✓	✓	✓	✓
OCWD sub-surface wetland (dry)	1	2/3/05	✓	✓				✓
	2	2/10/05	✓	✓				✓
	3	2/24/05	✓	✓				✓
	4	3/3/05	✓	✓				✓
	5	3/10/05	✓	✓				✓
Pico-Kenter hydrodynamic device (dry)	1	11/18/04	✓	✓	✓	✓	Acute test	✓
	2	12/16/04	✓	✓	✓	✓	Acute test	✓
	3	1/20/05	✓	✓	✓	✓		✓
	4	3/10/05	✓	✓	✓	✓	✓	✓
BC120 hydrodynamic device (dry)	1	1/19/05	✓	✓	✓	✓		✓
	2	3/10/05	✓	✓	✓	✓	✓	✓
BC120 hydrodynamic device (storm)	1	1/26/05	✓	✓	✓	✓		✓
	2	2/11/05	✓	✓	✓	✓	✓	✓
South Pasadena hydrodynamic device (storm)	1	12/5/04	✓	✓			✓	✓
	2	1/2/05	✓	✓			✓	✓
	3	1/7/05	✓	✓			✓	✓
	4	1/26/05	✓	✓			✓	✓
	5	2/11/05	✓	✓			✓	✓
SMURRF UV/filtration/ hydrodynamic device (dry)	1	11/18/04	✓	✓	✓	✓	Acute test	✓
	2	12/16/04	✓	✓	✓	✓	Acute test	✓
	3	1/20/05	✓	✓	✓	✓	Acute test	✓
	4	3/10/05	✓	✓	✓	✓	✓	✓
L.A. metal recycling yard screening/settlement (storm)	1	2/2/04	✓				✓	✓
	2	2/18/04	✓				✓	✓
	3	10/26/04	✓				✓	✓
	4	2/11/05	✓				✓	✓

Table 3. Constituent methods and reporting levels used to analyze the runoff samples. Differences reflect the multiple agencies involved, and the analytical laboratories that conducted the chemical analyses.

	SMURRF, Pico-Kenter, Wet CAT, BC120		L.A. metal recycling yard		South Pasadena	
Analyte	**Reporting Level**	**Method**	**Reporting Level**	**Method**	**Reporting Level**	**Method**
General						
Hardness (mg/L)	5	SM 2340 B	2	EPA 130.2	2	EPA 130.2
Dissolved Organic Carbon (mg/L)	0.5	EPA 415.1	0.5	EPA 415.1	Not analyzed	
Ammonia (mg/L)	0.05	SM 4500 NH3	0.10	EPA 350.2	0.1	EPA 350.3
pH	Not applicable	EPA 150.1	Not applicable	EPA 150.1	Not applicable	EPA 150.1
Conductivity (µmhos/cm)	0.2	SM 2510	1.0	EPA 120.1	Not analyzed	
Total dissolved solids (mg/L)	0.2	SM 2540 C	1.0	EPA 160.1	Not analyzed	
Total suspended solids (mg/L)	0.5	SM 2540 D	2.0	EPA 160.2	2	160.2
Metals (total and dissolved, µg/L)						
As	0.5	EPA 200.8	0.5	EPA 200.8	1.0	EPA 200.8
Cd	0.2	EPA 200.8	0.2	EPA 200.8	0.25	EPA 200.8
Cr	0.5	EPA 200.8	1.0	EPA 200.8	0.5	EPA 200.8
Cu	0.5	EPA 200.8	1.0	EPA 200.8	0.5	EPA 200.8
Fe	5.0	EPA 200.8	100	EPA 200.7	100	EPA 236.1
Pb	0.5	EPA 200.8	0.5	EPA 200.8	0.5	EPA 200.8
Hg	0.1	EPA 200.8	0.1	EPA 7470A	0.2	EPA 245.1
Ni	0.5	EPA 200.8	1.0	EPA 200.8	1.0	EPA 200.8
Se	0.5	EPA 200.8	1.0	EPA 200.8	1.0	EPA 200.8
Zn	0.5	EPA 200.8	5	EPA 200.8	1.0	EPA 200.8
Organics (µg/L)						
Organophosphate Pesticides[1]	0.01-0.02	EPA 625	Not analyzed		0.01-2.00	EPA 507
Pyrethroids[2]	0.01-0.025	EPA 625	Not analyzed		Not analyzed	
Glyphosate	6	EPA 547	Not analyzed		Not analyzed	

[1] OP pesticides include: Bolstar (Sulprofos), Chlorpyrifos, Coumaphos, Demeton, Diazinon, Dichlorvos, Dimethoate, Disulfoton, Ethoprop (Ethoprofos), Fenchlorophos (Ronnel), Fensulfothion, Fenthion, Guthion, Malathion, Merphos, Mevinphos (Phosdrin), Parathion-methyl, Phorate, Tetrachlorovinphos (Stirophos), Tokuthion, and Trichloronate.
[2] Pyrethroid pesticides include: Allethrin, Permethrin, Bifenthrin, Cyfluthrin, Cypermethrin, Deltamethrin, Fenpropathrin, Lamda Cyhalothrin, Prallethrin, and Pyrethrins.

Table 4. Freshwater chronic criteria used to compare the effluent data. For samples with a hardness >400 mg/L $CaCO_3$, a hardness of 400 mg/L is used in the calculations.

Constituent	Freshwater Chronic Criteria (µg/L)	Criterion Source
Metals (total)		
Al	87 for pH 6.5-9.0	Nat'l Criteria, EPA 2002
Se	5.0	Cal Toxics Rule, EPA 2000
Metals (dissolved)		
As	150	Cal Toxics Rule, EPA 2000
Cd	[1.101672 – ln(*hardness*) x 0.041838] x exp[0.7852 x ln(*hardness*) – 2.715]	Cal Toxics Rule, EPA 2000
Cu	0.96 x exp[0.8545 x ln(*hardness*) – 1.702]	Cal Toxics Rule, EPA 2000
Ni	0.997 x exp[0.846 x ln(*hardness*) + 0.0584]	Cal Toxics Rule, EPA 2000
Pb	[1.46203 – ln(*hardness*) x 0.145712] x exp[1.273 x ln(*hardness*) – 4.705]	Cal Toxics Rule, EPA 2000
Zn	0.986 x exp[0.8473 x ln(*hardness*) + 0.884]	Cal Toxics Rule, EPA 2000
OP pesticides		
Chlorpyrifos	0.041	Nat'l Criteria, EPA 2002
Diazinon	0.05	Cal Fish & Game, Siepmann and Finlayson 2000
Malathion	0.1	Nat'l Criteria, EPA 2002

Table 5. Average relative percent differences for duplicate lab measurements of field samples analyzed by CRG.

Constituent	Pairs of data (n)	Average RPD	Median RPD
Total metals			
As	7	2.9	2.2
Cd	6	4.8	2.8
Cr	7	0.5	0.5
Cu	12	1.6	1.2
Ni	7	1.0	1.1
Pb	7	5.8	4.3
Zn	12	8.4	1.1
Dissolved metals			
As	8	5.2	4.8
Cd	6	17.5	3.4
Cr	8	5.6	3.0
Cu	13	1.7	1.5
Ni	8	2.6	2.6
Pb	6	6.9	5.5
Zn	13	7.2	2.1

Table 6. Chemistry and toxicity measurements in pre- and post-BMP samples. The dates indicate when sampling was terminated. Non-detects were replaced with < reporting level. NA = not analyzed.

	11/18/04		12/16/04		1/20/05		3/9/05	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Wet CAT (instream wetland)								
General Constituents								
Ammonia (mg/L)	0.41	<0.05	0.43	<0.05	0.14	<0.05	0.06	<0.05
Conductivity (mS)	5.8	6.12	6.1	6.1	7.24	7.022	7.25	6.88
pH	7.67	8.14	7.7	8.2	7.5	8.0	7.6	8.1
Residual Chlorine (mg/L)	0.06	0.04	0.1	0.04	0.15	0.05	0.04	0.04
Total Dissolved Solids (mg/L)	463	488	5,060	5,170	6,300	6,240	5560	5610
Dissolved Organic Carbon (mg/L)	8.6	8.2	12	12	15	14	6.6	6.3
Total Hardness as $CaCO_3$ (mg/L)	1,690	2,050	2,290	2,440	2,950	3,230	2440	2550
Total Suspended Solids (mg/L)	14.8	2.0	14.6	1.6	23.8	2.4	15.2	10.5
Metals (µg/L)								
Ag (dissolved)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al (dissolved)	65.4	3.21	78.9	3.42	106	3.61	113	2.42
As (dissolved)	2.8	2.88	3.11	2.95	3.05	3.05	3.84	5.06
Cd (dissolved)	2.56	0.89	9.58	0.76	8.55	1.32	37.1	0.24
Cr (dissolved)	2.62	3.77	3.71	3.07	4.62	3.71	5.05	5.43
Cu (dissolved)	7.26	9.24	8.95	9.54	10.7	10	10.2	9.13
Hg (dissolved)	<0.1	<0.1	<0.1	<0.1	0.07	<0.1	<0.1	<0.1
Ni (dissolved)	128	30.9	146	31.5	387	57.5	308	51
Pb (dissolved)	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	0.05	0.05
Se (dissolved)	29.5	28.4	36.6	31.3	44	40.3	47.3	47.06
Sn (dissolved)	<0.5	<0.5	0.7	0.69	<0.5	<0.5	<0.5	<0.5
Zn (dissolved)	53.1	30.5	66.3	22.4	136	30.9	135	24.4
Ag (total)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al (total)	1,150	1,170	617	3.6	3,470	12.6	2110	84.3
As (total)	3.45	3.02	3.95	4.41	4.1	4.13	4.28	4.26
Cd (total)	30.1	0.88	33.4	0.75	77.5	0.98	69.9	0.72
Cr (total)	5.33	4.51	5.14	4.93	5.51	4.12	5.9	4.92
Cu (total)	13.1	10	11	8.84	14	10	13	9.18
Hg (total)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ni (total)	162	33.5	146	36.4	323	53.2	281	50.2
Pb (total)	0.43	0.66	<0.5	<0.5	0.23	<0.5	0.1	0.13
Se (total)	36.6	29.9	43.9	39.4	52	44.6	52.4	42.7
Sn (total)	<0.5	<0.5	0.69	0.69	<0.5	<0.5	<0.5	<0.5
Zn (total)	97	34.8	84.1	21	208	19.6	170	25.8
Organophosphorus pesticides (µg/L)[1]								
Diazinon	0.03	<0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.01
Malathion	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Other OP pesticides	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrethroid pesticides (µg/L)[2]	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Glyphosate (µg/L)	<6	<6	<6	<6	<6	<6	<6	<6
Toxicity								
C. dubia % survival (100% sample)	0	35	5	55	0	20	0	0
C. dubia reproduction, % control (100% sample)	NA	NA	NA	NA	NA	NA	0	0
Echinoderm fertilization (50% sample)	69	85	91	98	27	74	11	39

[1] OP pesticides include: Bolstar (Sulprofos), Chlorpyrifos, Coumaphos, Demeton, Diazinon, Dichlorvos, Dimethoate, Disulfoton, Ethoprop (Ethoprofos), Fenchlorophos (Ronnel), Fensulfothion, Fenthion, Guthion, Malathion, Merphos, Mevinphos (Phosdrin), Parathion-methyl, Phorate, Tetrachlorovinphos (Stirophos), Tokuthion, and Trichloronate.

[2] Pyrethroid pesticides include: Allethrin, Permethrin, Bifenthrin, Cyfluthrin, Cypermethrin, Deltamethrin, Fenpropathrin, Lamda Cyhalothrin, Prallethrin, and Pyrethrins.

Table 6 continued

	2/3/05		2/10/05		2/24/05		3/3/05		3/10/05	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
OCWD Replicate #1 (sub-surface flow wetland)										
Metals (µg/L)										
Cu (dissolved)	43.3	3.11	26.6	3.16	25.7	3.97	25.3	4.35	21.4	7.6
Zn (dissolved)	120	5.99	69.4	3.32	63.6	0.63	54.2	0.41	58.7	14.8
Cu (total)	52.4	3.15	29.7	3.34	36.6	2.25	31.2	5.54	24.77	8.86
Zn (total)	128	3.02	66.4	2.47	67.3	4.26	61.3	2.41	64.67	16.3
Organophosphorus pesticides (µg/L)										
Diazinon	0.04	<0.03	0.07	0.08	0.23	0.19	0.33	0.29	0.43	0.31
Toxicity										
Echinoderm fertilization (50% sample)	60	92	93	98	99	100	90	96	86	95
OCWD Replicate #2 (subsurface flow wetland)										
Metals (µg/L)										
Cu (dissolved)	6.61	3.11	9.24	3.07	22.5	4.49	21.9	4.28	18.5	4.56
Zn (dissolved)	27.8	4.74	30.6	3.59	64.2	1.18	63.1	0.12	54.8	1.35
Cu (total)	10.7	3.08	12.9	3.12	23.2	4.88	23.2	4.75	20.8	5.52
Zn (total)	36.6	2.35	33.8	2.39	67.3	2.86	66.9	1.99	61.9	2.62
Organophosphorus pesticides (µg/L)										
Diazinon	0.36	<0.03	0.11	0.08	0.28	0.23	0.32	0.22	0.46	0.29
Toxicity										
Echinoderm fertilization (50% sample)	99	99	98	98	99	99	81	96	90	98

Table 6 continued

	11/18/04		12/16/04		1/20/05		3/10/05	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Pico-Kenter (CDS)								
General Constituents								
Ammonia (mg/L)	<0.05	<0.05	0.05	0.03	0.05	0.04	<0.05	0.08
Conductivity (mS)	0.931	0.923	1	1	0.824	0.825	1.86	1.76
pH	8.05	7.97	8.3	8.3	8.1	8.1	8.4	8.3
Residual Chlorine (mg/L)	0.07	0.07	0.08	0.07	0.19	0.16	0.05	0.36
Total Dissolved Solids (mg/L)	35	41	750	630	1,120	1,100	940	790
Dissolved Organic Carbon (mg/L)	11	11	12	11	6	5	5	5
Total Hardness as CaCO3 (mg/L)	173	169	223	224	207	210	417	389
Total Suspended Solids (mg/L)	11.4	9.2	0.9	3.6	19.8	17.0	26.5	27.5
Metals (µg/L)								
Ag (dissolved)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.02
Al (dissolved)	10.2	14.5	14.4	11.2	7.63	5.67	4.84	5.51
As (dissolved)	2.82	2.83	3.23	3.06	1.48	1.5	2.59	2.71
Cd (dissolved)	0.11	<0.2	0.14	0.14	0.18	<0.2	<0.2	<0.2
Cr (dissolved)	1.06	1.14	1.9	1.95	0.94	0.82	2.09	1.87
Cu (dissolved)	11.5	11.8	19.8	17.7	4.37	4.16	7.95	7.83
Hg (dissolved)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ni (dissolved)	2.22	2.27	2.49	2.4	1.51	1.39	2.75	2.68
Pb (dissolved)	0.26	0.26	<0.5	<0.5	<0.5	<0.5	0.16	0.14
Se (dissolved)	1.29	1.46	2.05	1.62	2.25	2.61	5.97	5.3
Sn (dissolved)	<0.5	<0.5	0.82	0.83	<0.5	<0.5	<0.5	<0.5
Zn (dissolved)	28.9	30.5	52.7	48.4	7.52	6.89	17.6	14.6
Ag (total)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al (total)	167	168	84.5	102	256	284	2240	840
As (total)	2.96	2.90	62.10	3.36	1.87	1.87	2.58	4.23
Cd (total)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.01
Cr (total)	1.62	1.65	2.48	2.56	1.65	1.68	5.59	10.7
Cu (total)	20.7	21.6	19	19.9	8.28	8.01	27.9	51.4
Hg (total)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ni (total)	2.84	2.77	3.76	3.71	2.29	2.24	7.9	35.1
Pb (total)	3.35	3.21	2.87	3.6	2.32	1.92	4.71	45.4
Se (total)	1.35	1.24	2.56	2.66	2.95	3.036	5.4	5.97
Sn (total)	<0.5	<0.5	0.82	0.83	<0.5	<0.5	<0.5	<0.5
Zn (total)	55.7	58.2	56.2	59.3	18.2	17.1	97.9	465
Organophosphorus pesticides (µg/L)[1]								
Chlorpyrifos	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12
Other OP pesticides	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrethroid pesticides (µg/L)[2]	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Glyphosate (µg/L)	<6	<6	<6	<6	<6	<6	<6	<6
Toxicity								
C. dubia % survival (100% sample)	90	95	100	100	NA[3]	NA[3]	100	100
C. dubia reproduction, % control (100% sample)	NA	NA	NA	NA	NA	NA	124	117
Echinoderm fertilization (50% sample)	83	70	59	43	84	5	68	59

[3] FedEx temporarily lost this sample. The holding time had expired before the sample was found.

Table 6 continued

	1/19/05 (dry)		1/26/05 (wet)		2/11/05 (wet)		3/10/05 (dry)	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
BC120 (CDS)								
General Constituents								
Ammonia (mg/L)	0.02	0.03	0.45	0.45	0.33	0.55	0.01	0.01
Conductivity (mS)	0.709	0.707	0.176	0.186	0.063	0.090	0.65	0.67
pH	7.4	7.1	7.4	7.4	6.5	6.5	7.7	7.8
Residual Chlorine (mg/L)	0.18	0.19	0.04	0.04	0.2	0.27	0.11	0.09
Total Dissolved Solids (mg/L)	1,040	1,110	810	770	<0.2	<0.2	1,050	290
Dissolved Organic Carbon (mg/L)	14	14	28	29	7	13	10	9
Total Hardness as $CaCO_3$ (mg/L)	144	140	29.8	29.5	10	16.4	103	106
Total Suspended Solids (mg/L)	51	14	204	217	84	140	17	8
Metals (µg/L)								
Ag (dissolved)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.12	<0.2
Al (dissolved)	7.91	9.9	47.7	51.9	51.8	73.4	18.8	29.1
As (dissolved)	2.7	2.7	1.85	1.88	1.43	1.93	4.05	4.09
Cd (dissolved)	0.24	0.17	0.16	0.12	<0.2	<0.2	<0.2	<0.2
Cr (dissolved)	2.04	1.91	1.33	1.32	0.65	2.26	1.35	1.32
Cu (dissolved)	17.3	17.4	29.7	31.2	7.4	13.5	23.3	23.2
Hg (dissolved)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ni (dissolved)	3.07	3.24	4.07	4.2	0.96	1.89	2.44	2.42
Pb (dissolved)	1.34	1.38	2.61	2.62	1.17	1.64	2.37	2.01
Se (dissolved)	1.27	1.26	1.04	0.85	<0.5	<0.5	2.36	2.52
Sn (dissolved)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zn (dissolved)	67.5	74.2	202	166	66.9	95	88.1	62.8
Ag (total)	<0.2	<0.2	<0.2	0.16	<0.2	<0.2	0.16	0.16
Al (total)	461	305	3,140	4,880	885	948	370	176
As (total)	3.02	3.14	3.15	3.81	1.84	2.31	4.31	4.29
Cd (total)	<0.2	<0.2	0.91	1.28	0.39	0.4	<0.2	<0.2
Cr (total)	2.71	2.47	9.25	13.9	4.38	5.8	1.85	1.59
Cu (total)	29.2	21.5	89.5	131	26.4	35.5	35.2	30.6
Hg (total)	0.07	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ni (total)	4.09	3.44	10.6	13.8	3.26	4.43	2.97	2.69
Pb (total)	14	9.57	42.7	65.5	17.5	18.8	14.5	9.67
Se (total)	2.04	2.16	1.59	1.66	<0.5	<0.5	2.11	2.21
Sn (total)	<0.5	<0.5	0.35	0.38	0.2	0.18	0.1	0.1
Zn (total)	120	91.1	616	806	211	241	111	74.7
Organophosphorus pesticides (µg/L)[1]								
Diazinon	<0.01	<0.01	<0.01	<0.01	0.08	0.04	0.04	0.04
Other OP pesticides	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrethroid pesticides (µg/L)[2]								
Bifenthrin	0.13	0.14	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Other pyrethroid pesticides	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Glyphosate (µg/L)	<6	<6	<6	<6	<6	<6	<6	<6
Toxicity								
C. dubia % survival (100% sample)	NA[3]	NA[3]	NA[4]	NA[4]	100	100	100	100
C. dubia reproduction, % control (100% sample)	NA	NA	NA	NA	92	108	122	119
Echinoderm fertilization (50% sample)	1	20	27	1	10	10	76	67

[3] FedEx temporarily lost this sample. The holding time had expired before the sample was found.

[4] This test had poor control survival, and no usable data were obtained.

Table 6 continued

	12/5/04		1/2/05		1/7/05		1/26/05		2/11/05	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
South Pasadena (CDS)										
General Constituents										
Ammonia (mg/L)	0.512	0.56	0.354	0.464	0.236	0.304	0.566	0.603	0.11	<0.1
Conductivity (mS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	6.07	6.05	6.1	5.95	6.06	5.89	6.48	6.08	6.23	6.27
Residual Chlorine (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L)	4	6	36	188	22	22	46	32	6	2
Dissolved Organic Carbon (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Hardness as CaCO3 (mg/L)	18.0	20.0	20.0	60.0	12.0	20.0	34	36	12	14
Total Suspended Solids (mg/L)	9.0	14.0	868.1	26.0	33.0	26.0	75	118	126	107
Metals (µg/L)										
Ag (dissolved)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Al (dissolved)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
As (dissolved)	<1	<1	<1	<1	<1	<1	1.80	1.53	<1	<1
Cd (dissolved)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<.25
Cr (dissolved)	<0.5	0.51	0.49	0.61	0.65	1	1.37	1.7	0.83	0.79
Cu (dissolved)	10.1	11.5	6.23	9.99	5.85	6.62	21.3	17.2	5.63	5.44
Hg (dissolved)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ni (dissolved)	1.24	1.19	1.17	1.4	<1	<1	3.11	2.93	<1	<1
Pb (dissolved)	0.67	1.01	1.25	1.14	0.59	ND	0.65	0.90	<0.5	<0.5
Se (dissolved)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zn (dissolved)	61.5	81.9	39.5	44.8	17.4	21.7	135	141	47.6	52.3
Ag (total)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.26	<0.25
Al (total)	590	294	383	<100	<100	<100	245	448	3,610	11,000
As (total)	<1	<1	<1	<1	1.42	1.3	2.56	1.87	1.32	<1
Cd (total)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.29	0.25	0.48	0.32
Cr (total)	1.97	2.15	2.06	0.92	1.04	1.11	1.56	2.19	6.71	5.59
Cu (total)	31.7	28.7	20.6	15.2	7.43	7.79	23.8	25.2	37.7	29.5
Hg (total)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ni (total)	4.28	4.64	2.27	1.89	1.02	1.37	3.81	3.49	6.4	4.47
Pb (total)	8.37	7.94	10.4	2.12	4.59	1.96	3.71	5.53	25.2	21.3
Se (total)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zn (total)	116	102	74.2	59.8	78.4	78.4	117	147	173	125
Organophosphorus pesticides (µg/L)[1]										
Chlorpyrifos	<0.05	<0.05	<0.05	<0.05	0.16	0.13	0.62	1.04	<0.05	<0.05
Diazinon	0.06	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrethroid pesticides (µg/L)[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Glyphosate (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxicity										
C. dubia % survival (100% sample)	100	100	100	100	100	100	80	80	100	100
C. dubia reproduction, % control (100% sample)	135	139	133	152	100	96	91	83	96	121
Echinoderm fertilization (50% sample)	7	6	22	11	3	3	2	1	1	1

Table 6 continued

	11/18/04		12/16/04		1/20/05		3/10/05	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
SMURRF (UV with pretreatment)								
General Constituents								
Ammonia (mg/L)	0.14	0.05	0.05	0.1	0.06	<0.05	<0.05	0.02
Conductivity (mS)	0.98	0.981	1	1	0.799	0.804	1.52	1.49
pH	7.98	8.27	8.1	8.4	8	8.2	8.3	8.4
Residual Chlorine (mg/L)	0.05	0.66	0.07	0.23	0.17	0.35	0.05	0.08
Total Dissolved Solids (mg/L)	40	40	750	740	1,190	1,040	720	760
Dissolved Organic Carbon (mg/L)	12	11	10	9	6	6	5.3	4.9
Total Hardness as CaCO3 (mg/L)	173	167	217	219	194	197	355	346
Total Suspended Solids (mg/L)	8	<0.5	21.2	0.2	21.6	<0.5	44	<0.5
Metals (µg/L)								
Ag (dissolved)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al (dissolved)	11.2	9.96	15.3	8.65	6.88	3.65	4.57	1.6
As (dissolved)	2.91	2.82	3.39	3.44	1.59	1.59	2.79	2.67
Cd (dissolved)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cr (dissolved)	1.17	1.09	1.54	1.78	0.85	0.82	1.23	1.4
Cu (dissolved)	11.5	10.8	9.45	12.4	4.59	4.36	4.9	6.74
Hg (dissolved)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ni (dissolved)	2.54	2.25	2.98	3.01	1.4	1.29	3.41	3.28
Pb (dissolved)	0.24	0.22	<0.5	<0.5	<0.5	<0.5	0.17	0.12
Se (dissolved)	1.33	1.48	2.63	2.95	2.42	2.7	6.1	6.01
Sn (dissolved)	<0.5	<0.5	0.78	0.8	<0.5	<0.5	<0.5	<0.5
Zn (dissolved)	28.8	23.7	35.7	32.1	11	8.52	21.3	14
Ag (total)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al (total)	148	11.4	217	9.58	267	<5	308	<5
As (total)	3.01	2.83	3.35	3.59	1.98	1.92	3	2.64
Cd (total)	<0.2	<0.2	0.21	0.14	<0.2	<0.2	<0.2	<0.2
Cr (total)	1.95	1.15	2.56	2.11	1.63	0.97	2.41	1.67
Cu (total)	22	11	31.2	13.9	7.98	4.26	16.2	6.7
Hg (total)	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	<0.1	<0.1
Ni (total)	3.04	2.15	3.5	1.2	2.18	1.46	4.14	3.16
Pb (total)	2.47	0.52	5.88	0.32	2.06	0.11	3.4	0.09
Se (total)	1.39	1.5	1.2	2.5	3.11	3.79	6.12	6.26
Sn (total)	<0.5	<0.5	0.77	0.82	<0.5	<0.5	<0.5	<0.5
Zn (total)	50.4	24.1	85.8	38.5	18	8.59	39.8	12.8
Organophosphorus pesticides (µg/L)[1]								
Malathion	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.03
Other OP pesticides	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrethroid pesticides (µg/L)[2]	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Glyphosate (µg/L)	<6	<6	<6	<6	<6	<6	<6	<6
Toxicity								
C. dubia % survival (100% sample)	95	0	100	100	80	80	100	100
C. dubia reproduction, % control (100% sample)	NA	NA	NA	NA	NA	NA	114	100
Echinoderm fertilization (50% sample)	82	0	20	0	56	0	76	75

Table 6 continued

	2/2/04		2/18/04		10/26/04		2/11/05	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
L.A. metal recycling yard (grit removal)								
General Constituents								
Ammonia (mg/L)	0.84	0.91	1.3	1.1	1.2	1.1	NA	NA
Conductivity (mS)	0.76	0.95	0.93	1.50	1.30	1.50	1.37	1.17
pH	8.01	5.63	8.80	7.14	8.93	7.14	11.15	11.6
Residual Chlorine (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L)	520	670	700	1,200	1,100	1,200	1,400	1,400
Dissolved Organic Carbon (mg/L)	110	97	110	200	130	200	130	440
Total Hardness as CaCO3 (mg/L)	200	320	330	520	620	520	540	640
Total Suspended Solids (mg/L)	61	170	440	240	320	240	1,200	1,200
Metals (µg/L)								
Ag (dissolved)	<1	<1	<1	<1	<1	<1	1	1
Al (dissolved)	<50	<50	<50	<50	76.5	<50	248	379
As (dissolved)	<0.5	<0.5	1.22	<0.5	2.96	<0.5	2.03	2.94
Cd (dissolved)	2.48	14.1	0.737	5.17	3.26	5.17	0.627	0.285
Cr (dissolved)	16.7	3.53	12.7	2.99	8.95	2.99	75.5	48.3
Cu (dissolved)	116	58.4	87.2	47	59.7	47	97.3	87.4
Hg (dissolved)	0.219	0.180	0.235	0.279	0.175	0.279	0.1	0.1
Ni (dissolved)	425	226	46.5	68.4	38	68.4	32	21
Pb (dissolved)	11.8	6.16	27.9	3.69	47.1	3.69	120	185
Se (dissolved)	<1	2.76	10.8	15.7	5.14	15.7	7.36	7.02
Sn (dissolved)	<1	<1	<1	<1	1.42	<1	3.54	2.29
Zn (dissolved)	244	1550	33	696	230	696	16.9	26.6
Ag (total)	<1	<1	1.7	1.2	<1	1.2	5.43	6.14
Al (total)	434	868	8,360	3,410	2,380	3,410	5,930	5,620
As (total)	1.72	5.4	11.9	6.18	6.9	6.18	9.35	10.3
Cd (total)	9.1	19.1	17.5	12.5	15.1	12.5	24.1	46.4
Cr (total)	56.9	59.8	76.1	36.7	22.7	36.7	144	111
Cu (total)	192	223	792	330	148	330	293	303
Hg (total)	1.48	3.48	8.19	3.92	1.97	3.92	4.3	3.9
Ni (total)	496	273	120	89.5	61	89.5	94	85
Pb (total)	292	486	3,020	1,560	834	1,560	1,430	1,500
Se (total)	<1	6.95	13.7	14.2	6.52	14.2	7.12	7.31
Sn (total)	4.44	4.9	30	23.5	16.2	23.5	20.5	21
Zn (total)	1,090	2,790	2,110	1,410	2,110	1,410	3,220	2,690
Organophosphorus pesticides (µg/L)[1]	NA	NA	NA	NA	NA	NA	NA	NA
Pyrethroid pesticides (µg/L)[2]	NA	NA	NA	NA	NA	NA	NA	NA
Glyphosate (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Toxicity								
C. dubia % survival (100% sample)	0	0	60	0	0	0	0	0
C. dubia reproduction, % control (100% sample)	0	0	0	0	0	0	0	0
Echinoderm fertilization (50% sample)	0	0	0	1	34	86	0	0

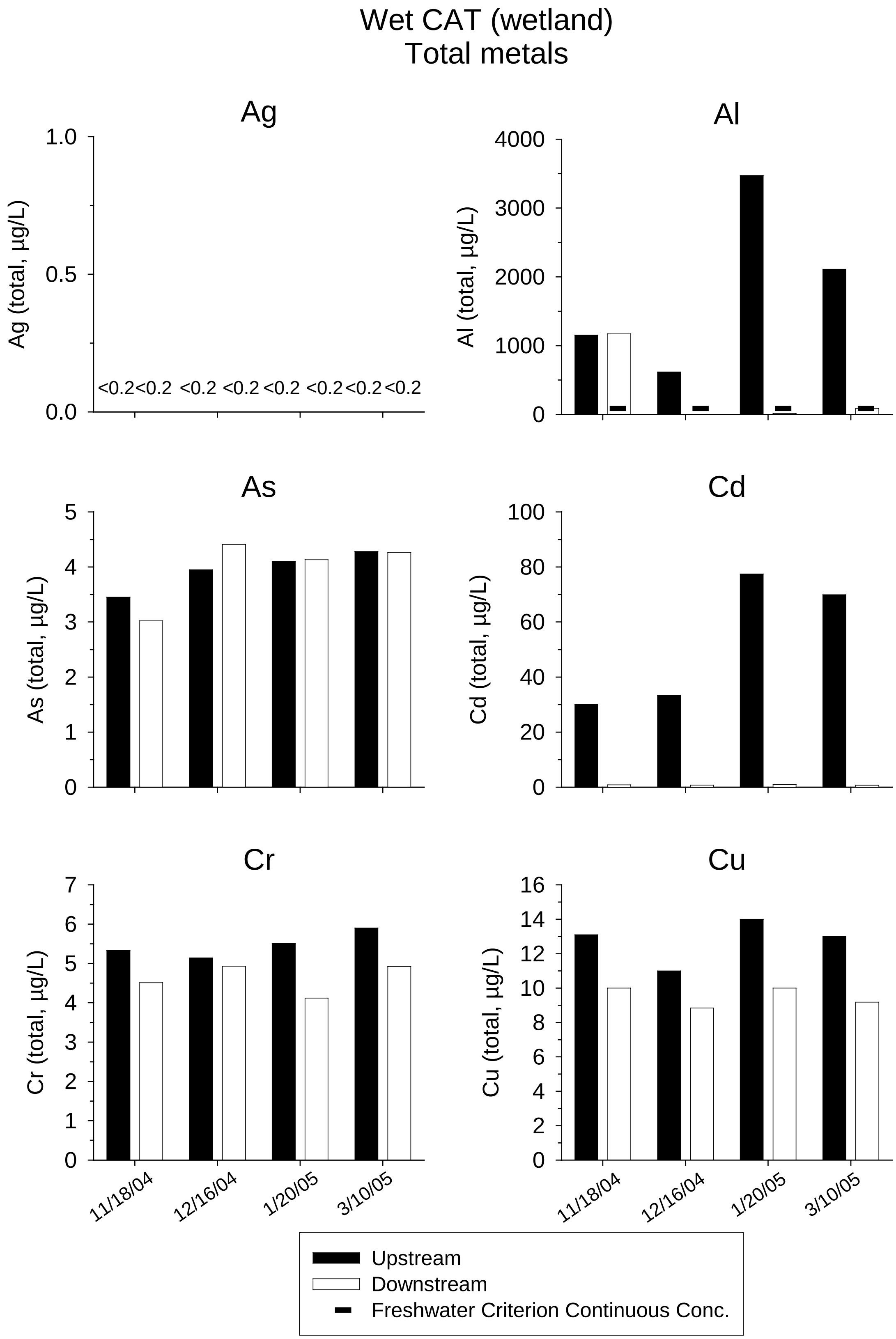


Figure 12. Concentrations of total metals and total suspended solids (TSS) at the Wet CAT site over four sampling events.

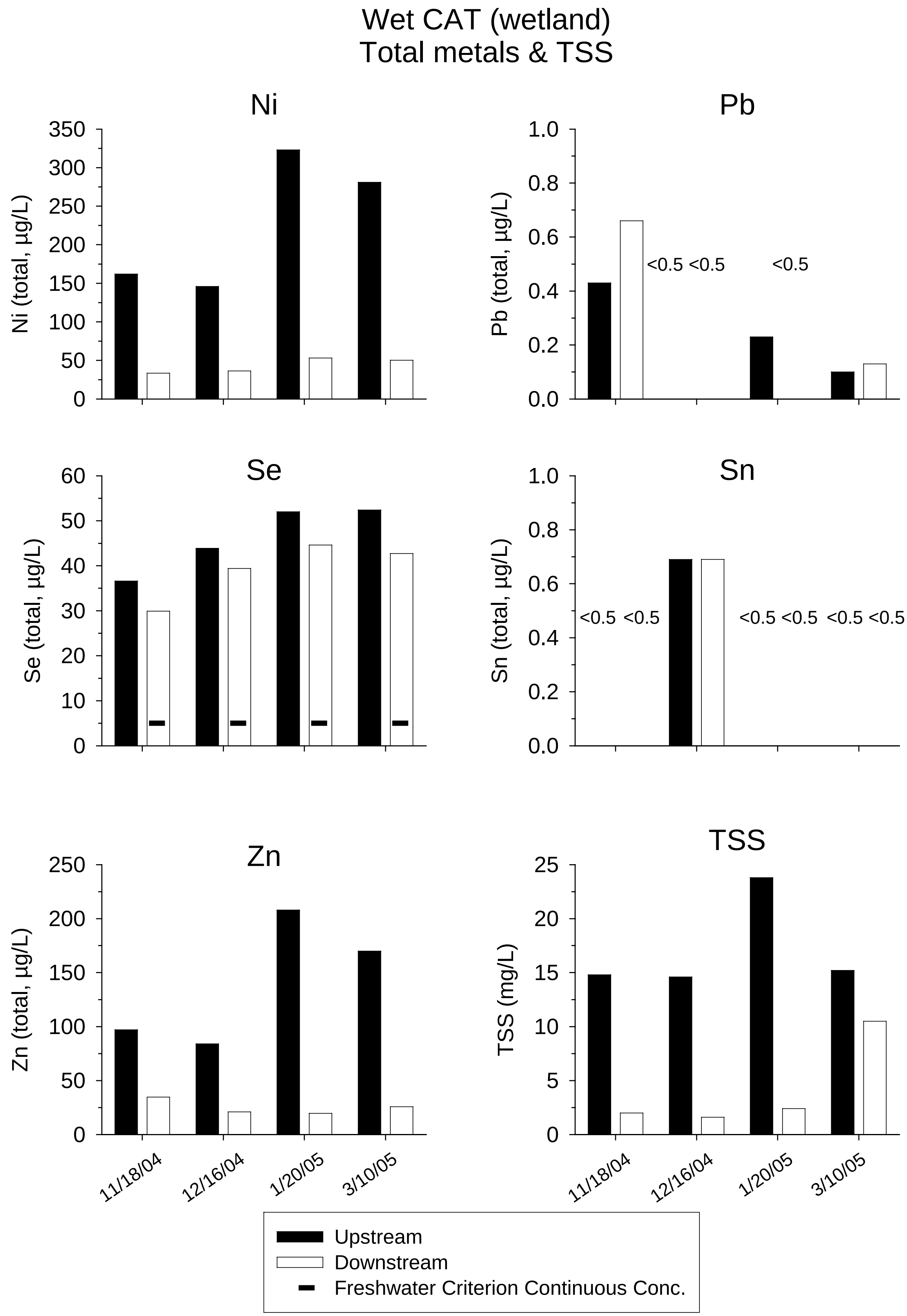


Figure 12 continued.

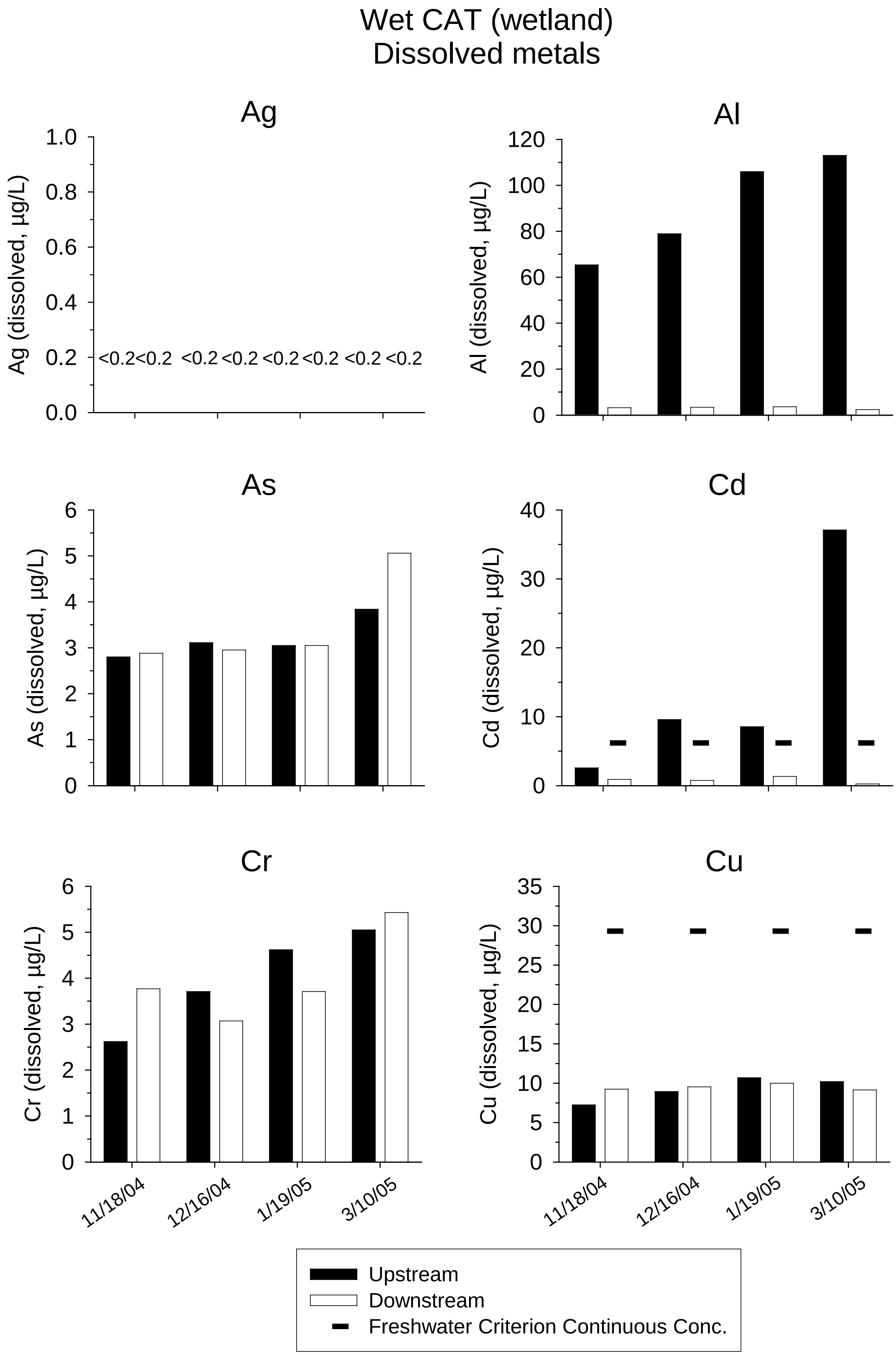


Figure 13. Concentrations of dissolved metals at the Wet CAT site over four sampling events. The chronic criteria for dissolved As (150 µg/L) and Pb (10.9 µg/L) are not shown.

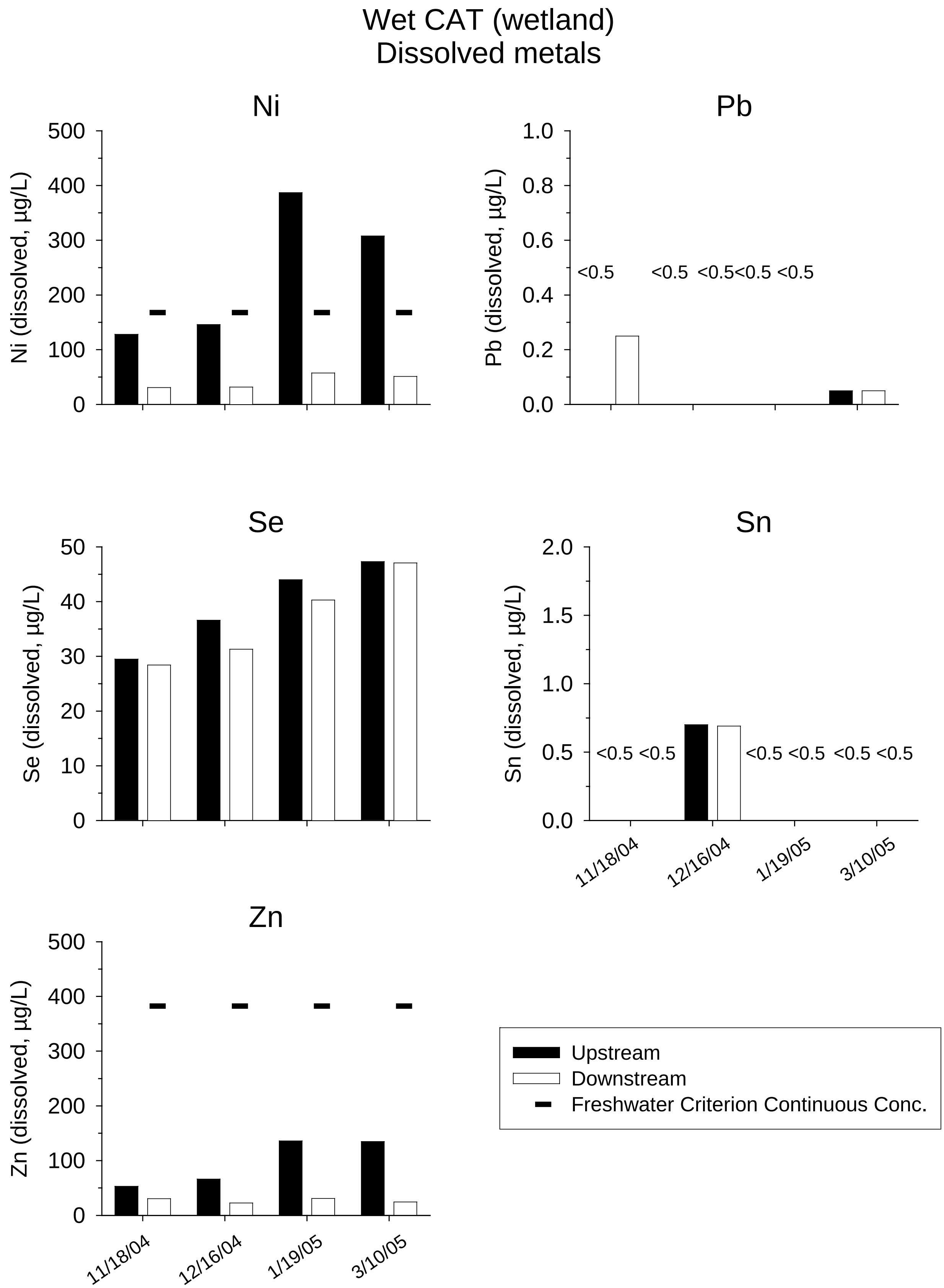


Figure 13 continued.

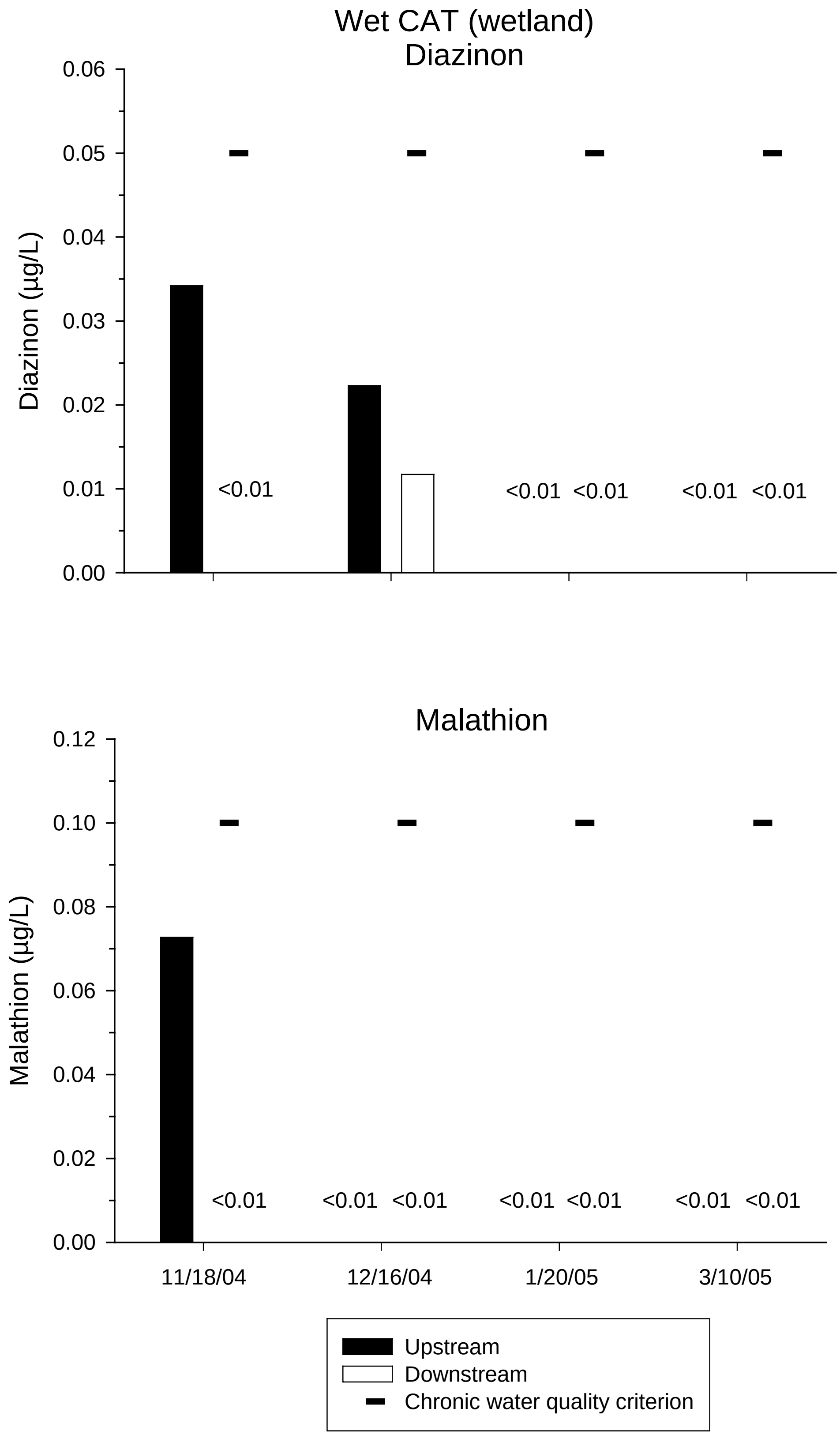


Figure 14. Concentrations of diazinon and malathion at the Wet CAT site.

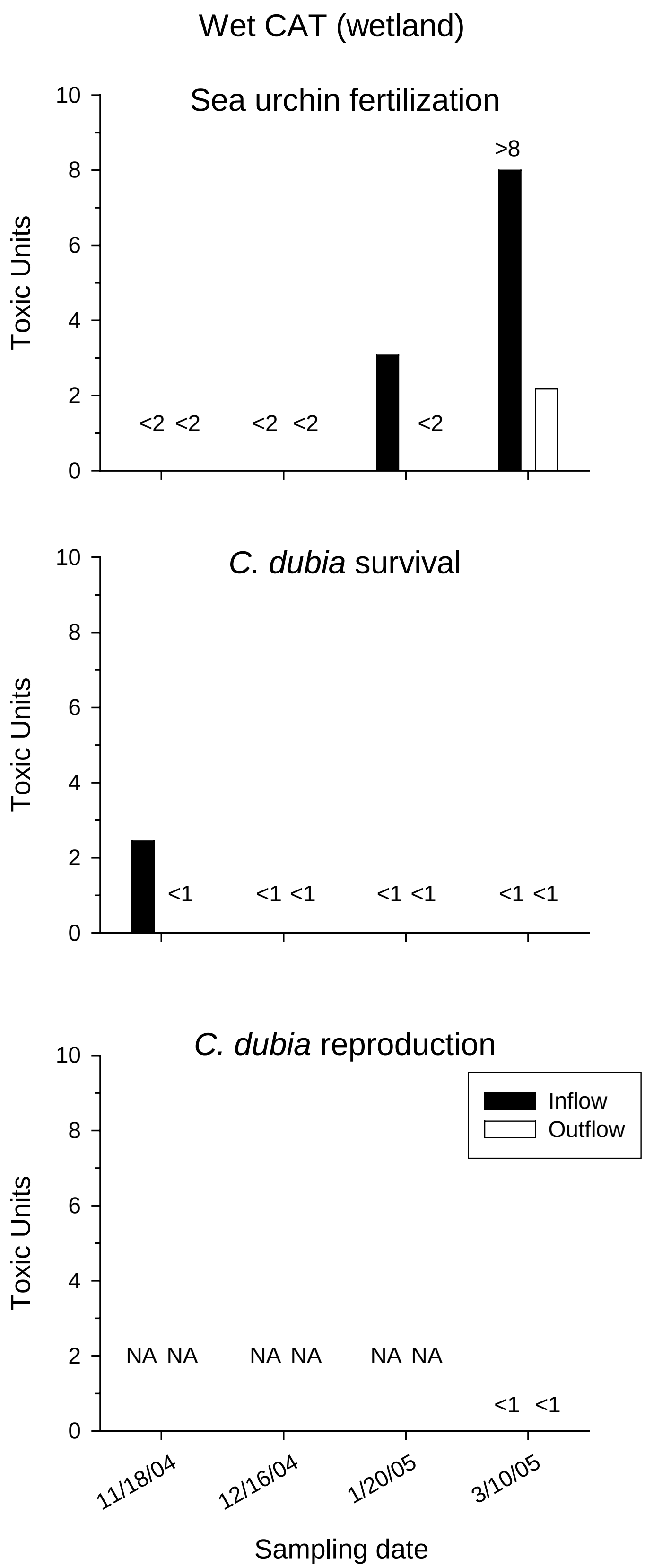


Figure 15. Toxicity in the Wet CAT samples. NA = not analyzed.

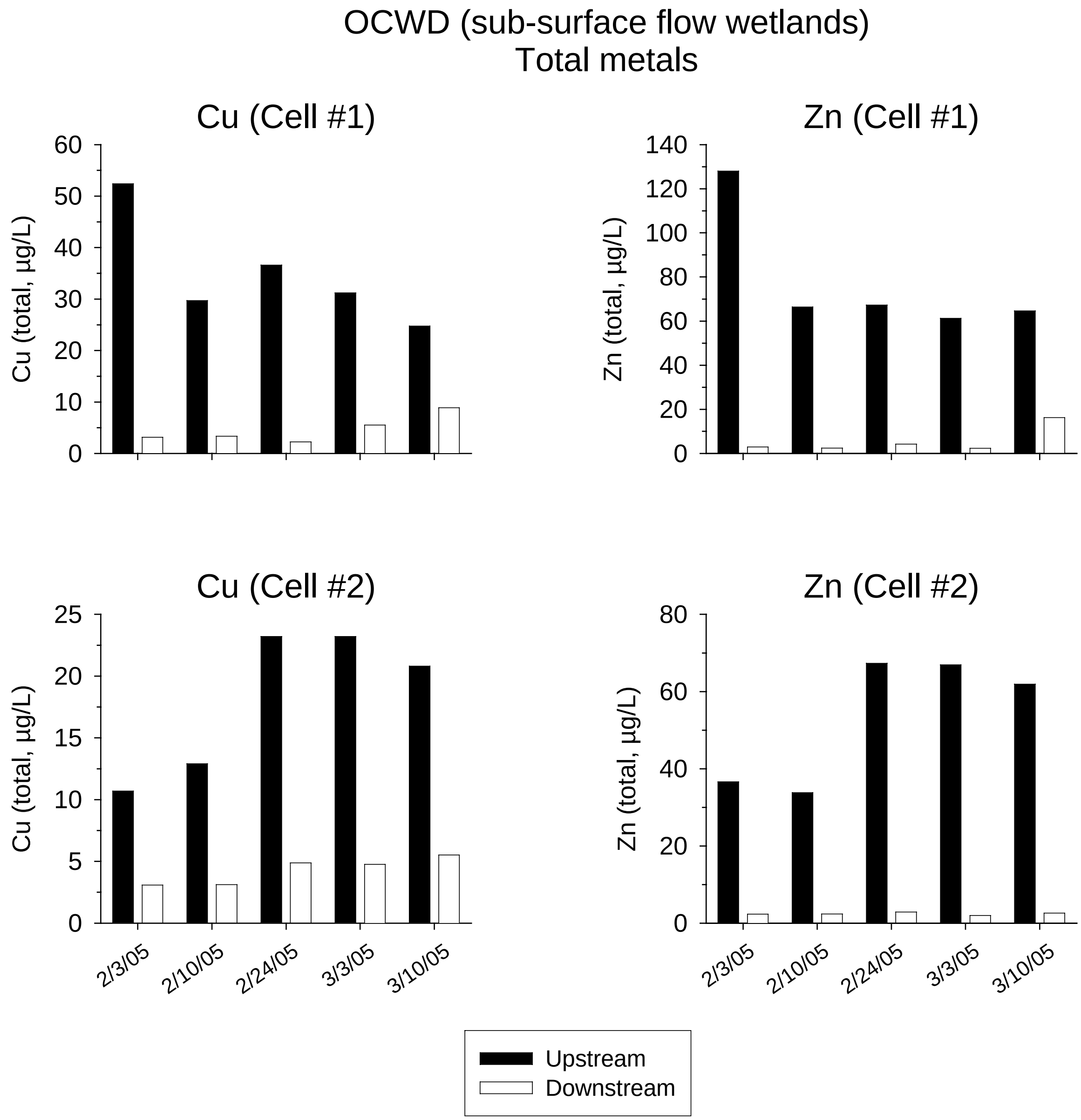


Figure 16. Concentrations of total metals at the OCWD sub-surface flow wetland site over five sampling events.

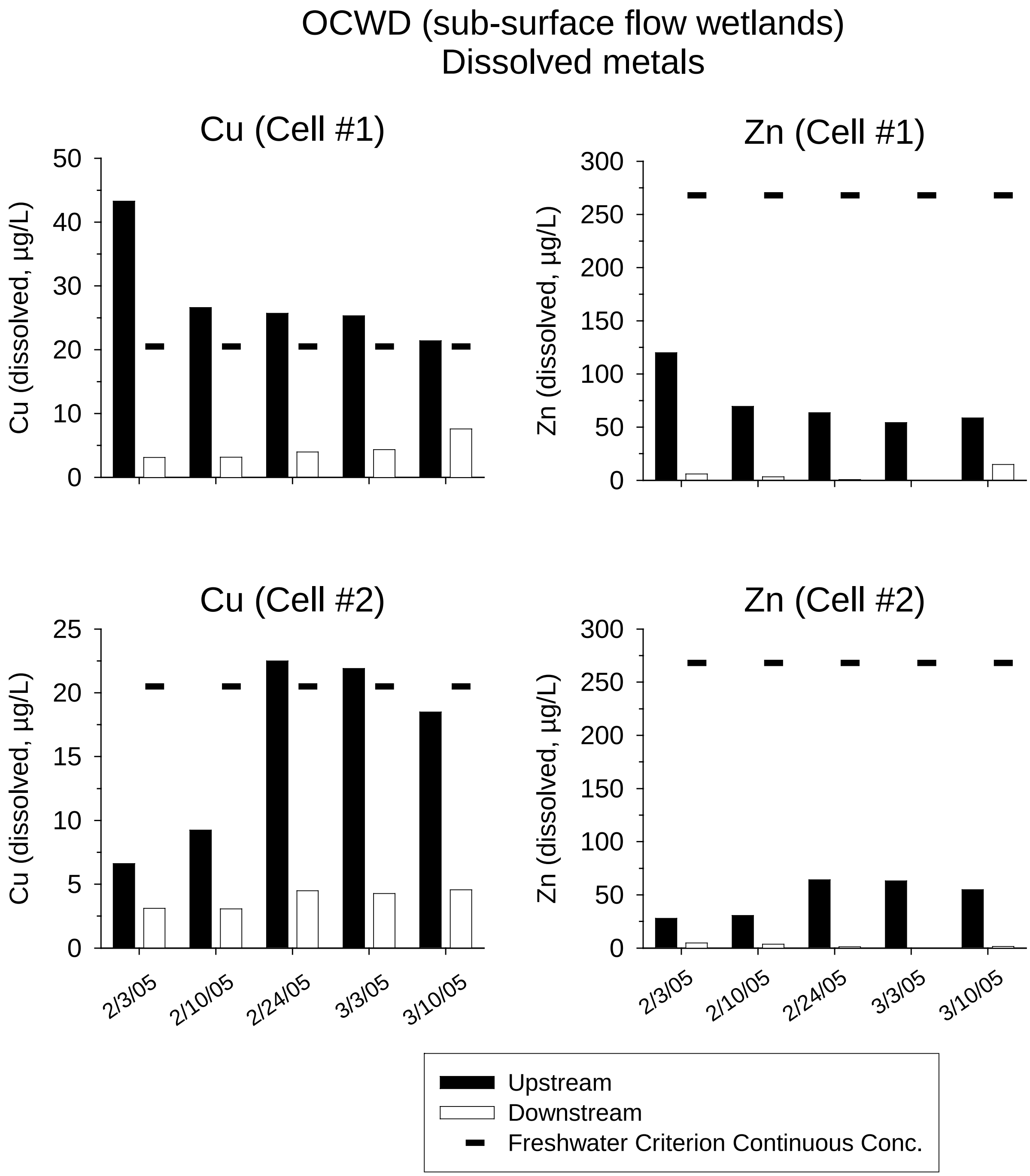
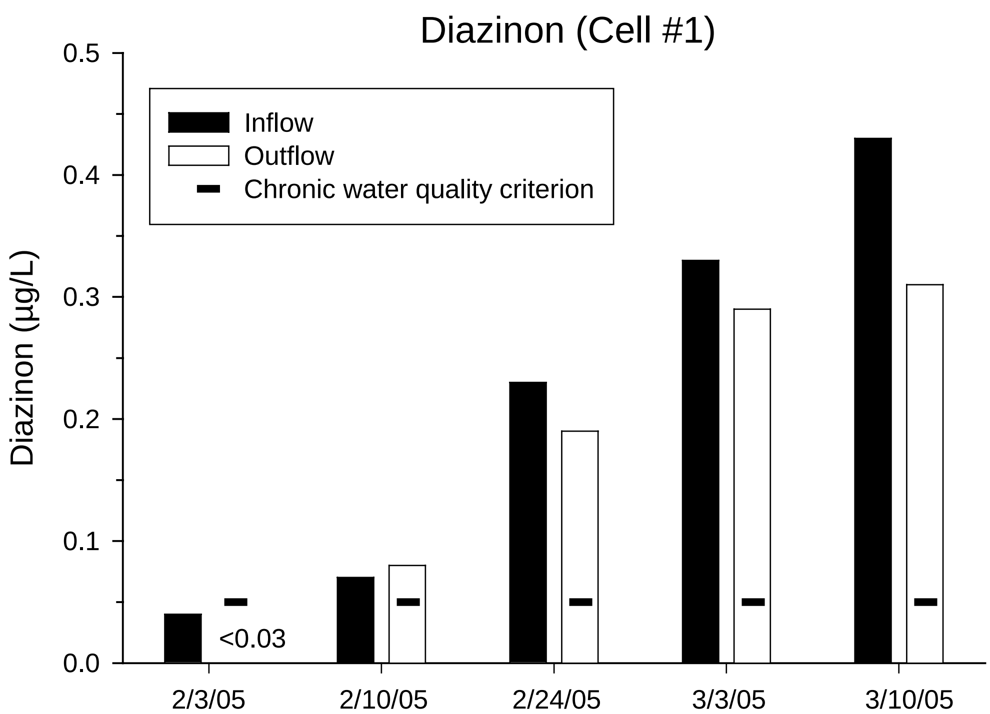


Figure 17. Concentrations of dissolved metals at the OCWD sub-surface flow wetland site over five sampling events.

OCWD (sub-surface flow wetlands)



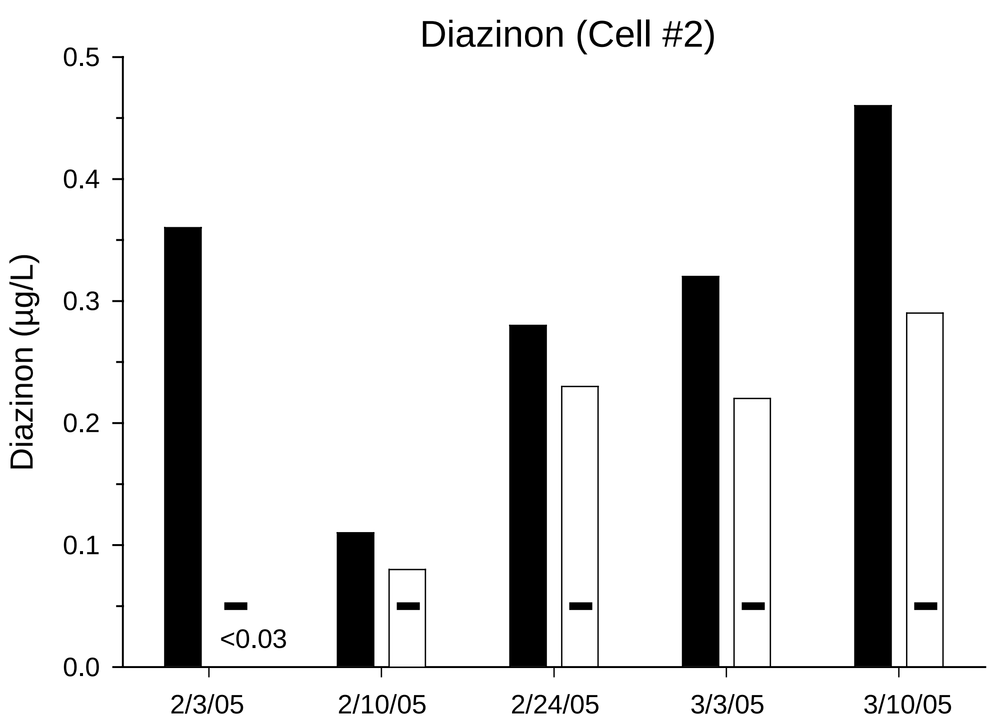


Figure 18. Concentrations of diazinon at the OCWD sub-surface flow wetland site over five sampling events.

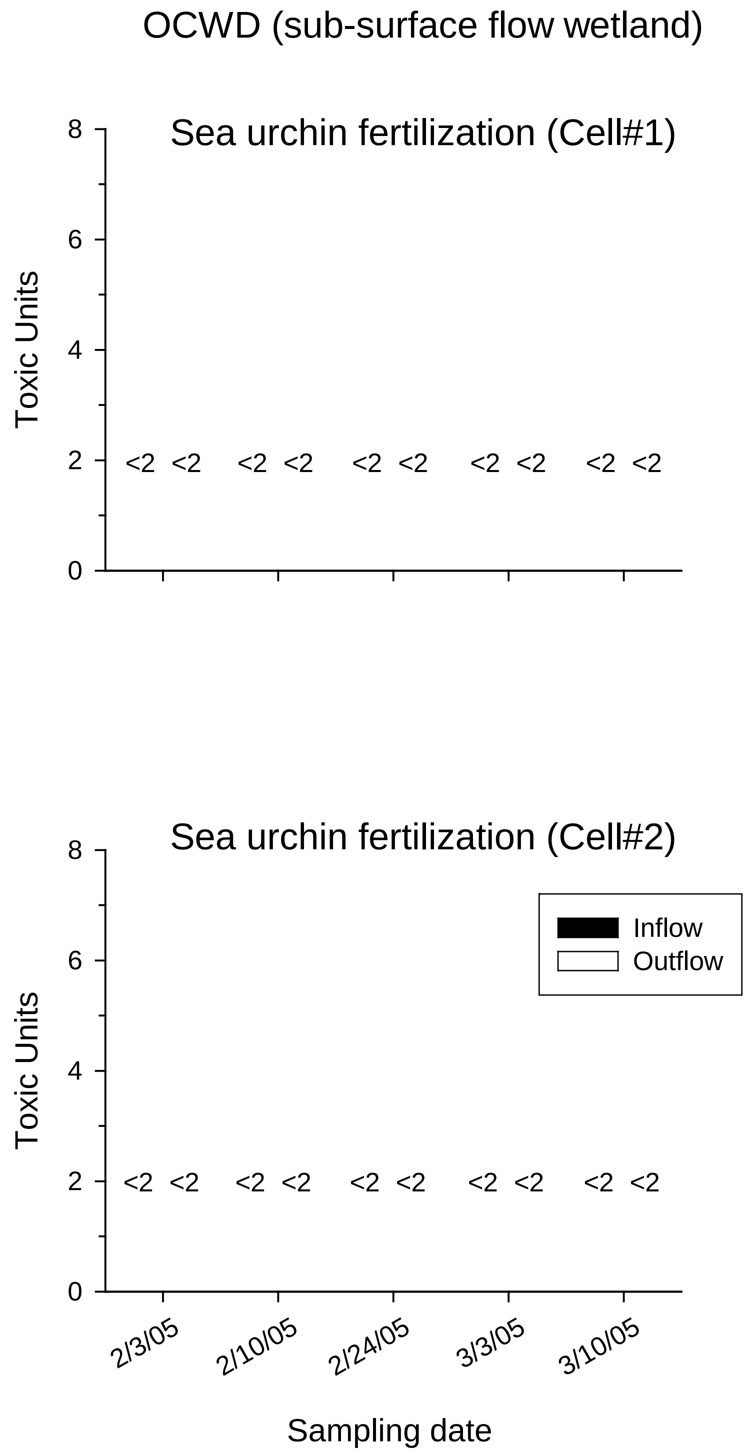


Figure 19. Toxicity in the OCWD samples. None of the samples tested reduced sea urchin fertilization by half.

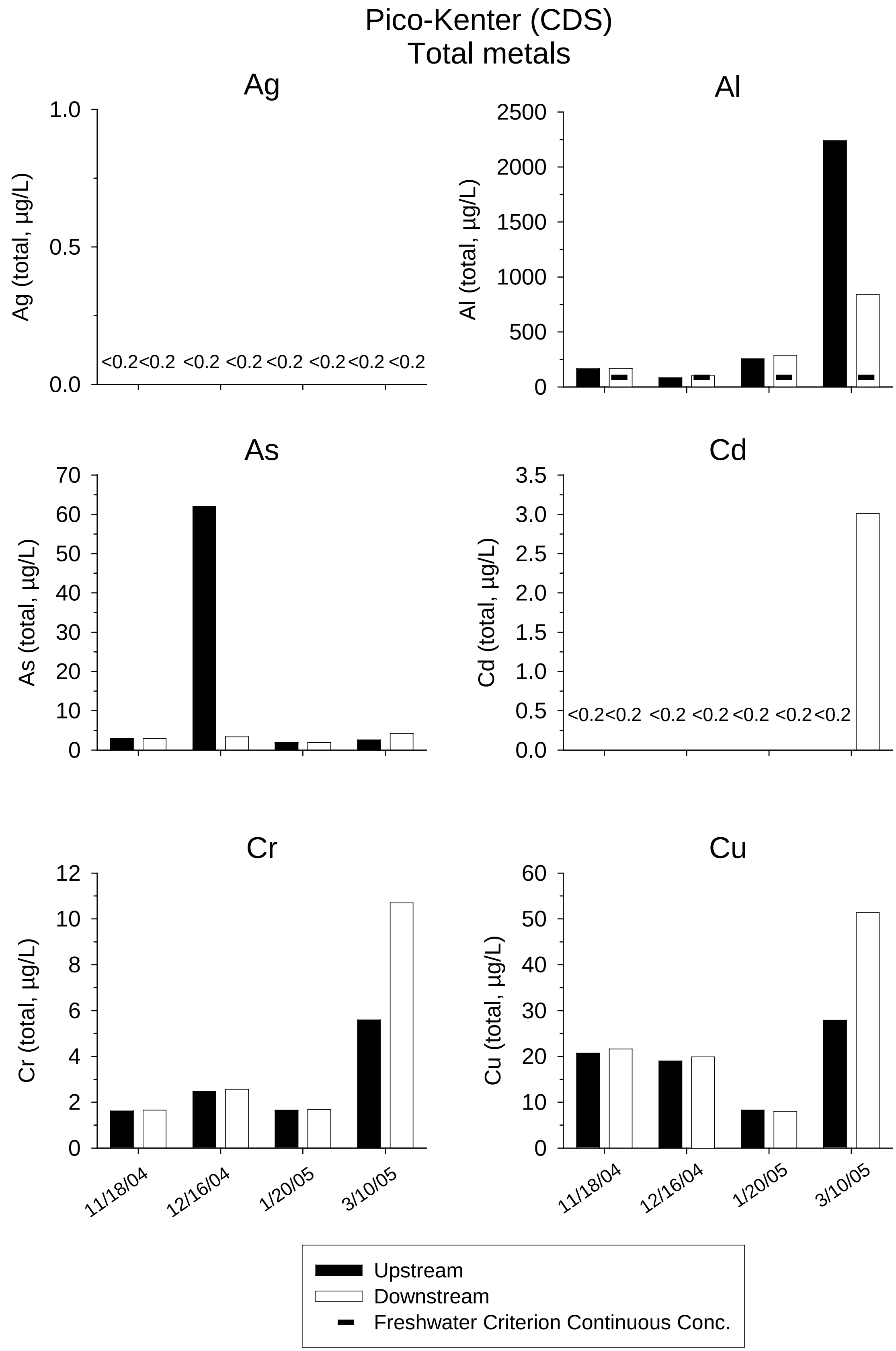


Figure 20. Concentrations of total metals and total suspended solids (TSS) at the Pico-Kenter CDS site over four sampling events.

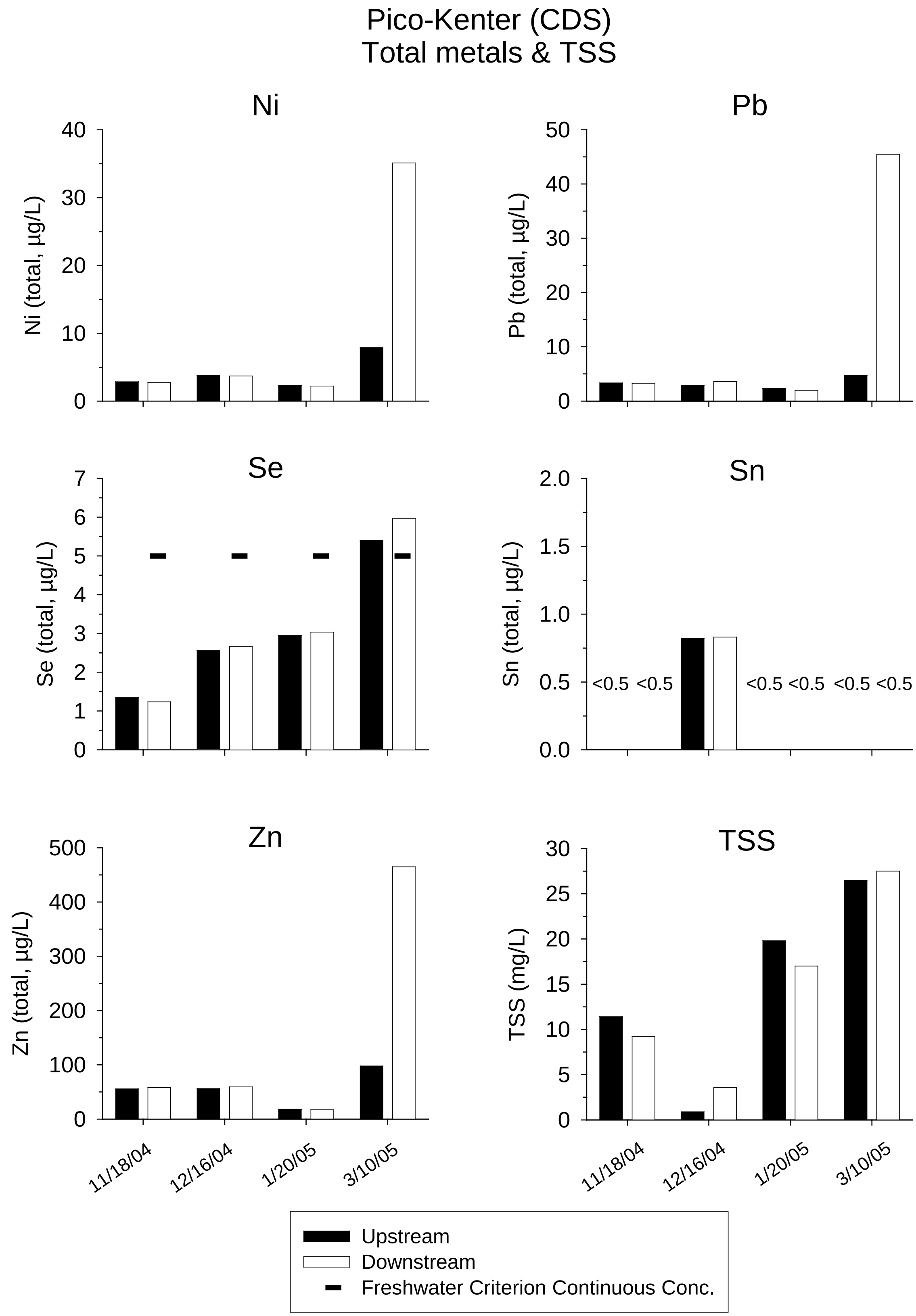


Figure 20 continued.

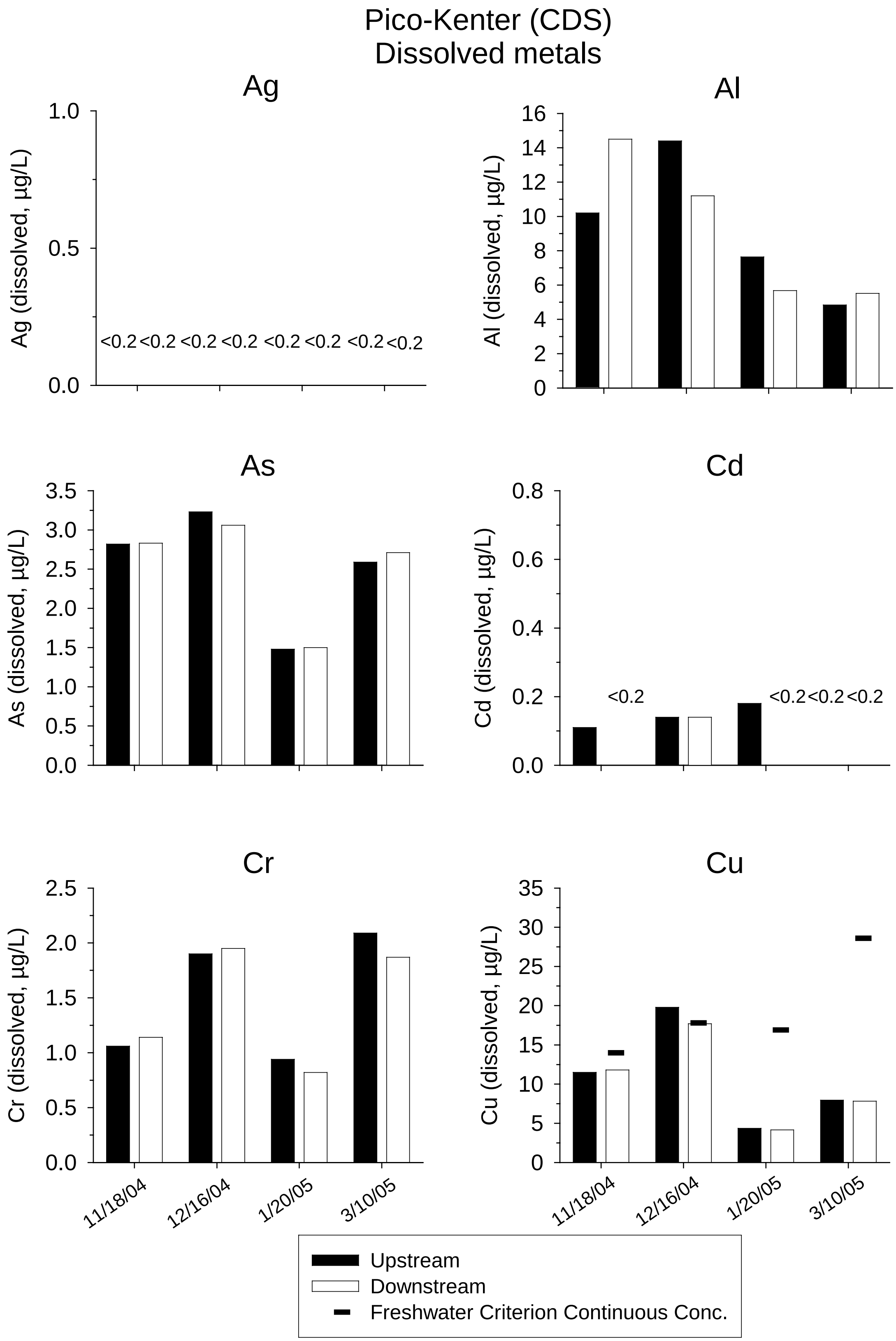


Figure 21. Concentrations of dissolved metals at the Pico-Kenter CDS site over four sampling events. The chronic criteria for dissolved As, Cd, Ni, Pb and Zn (not shown) are greater than the measured concentrations.

Pico-Kenter (CDS)
Dissolved metals

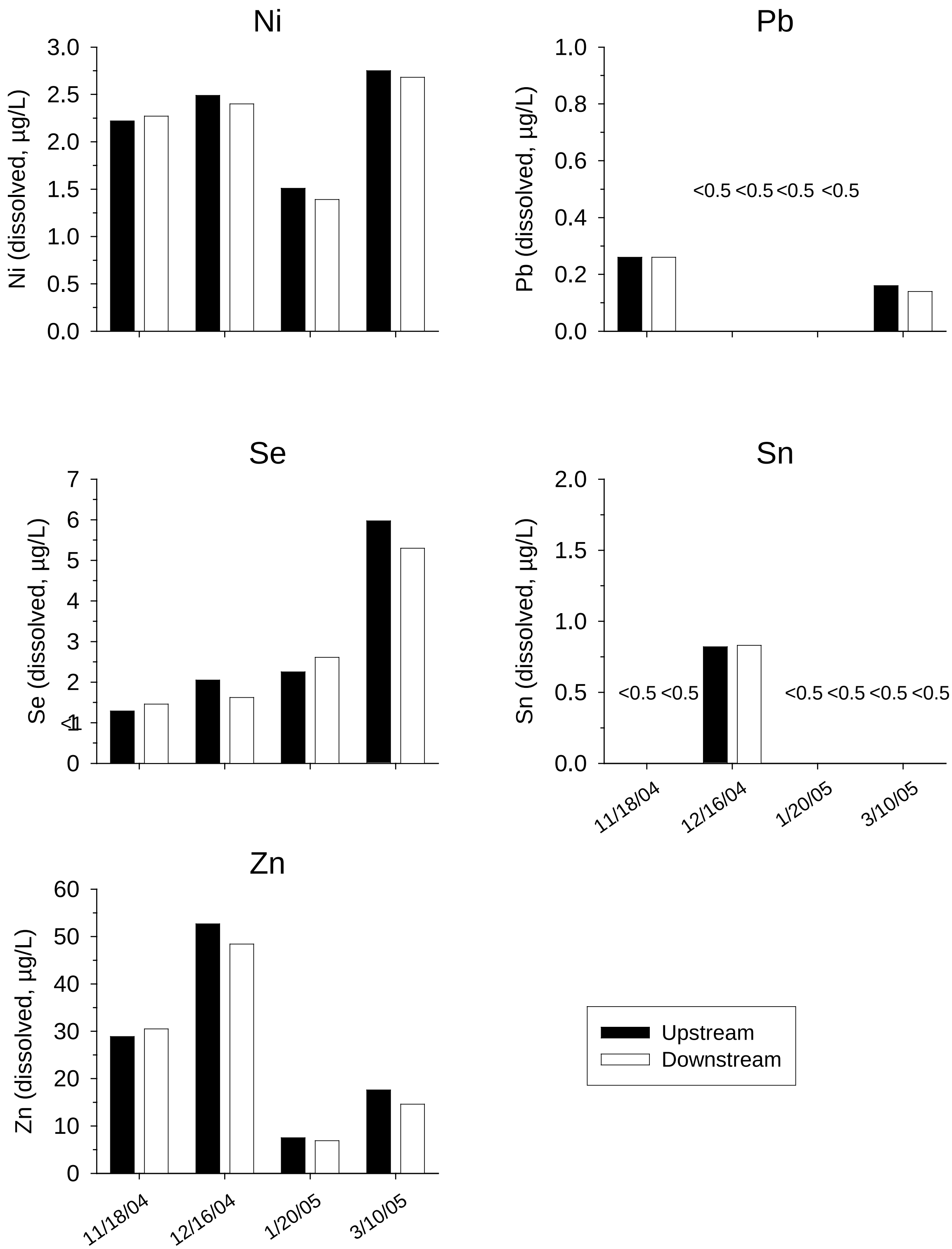


Figure 21 continued.

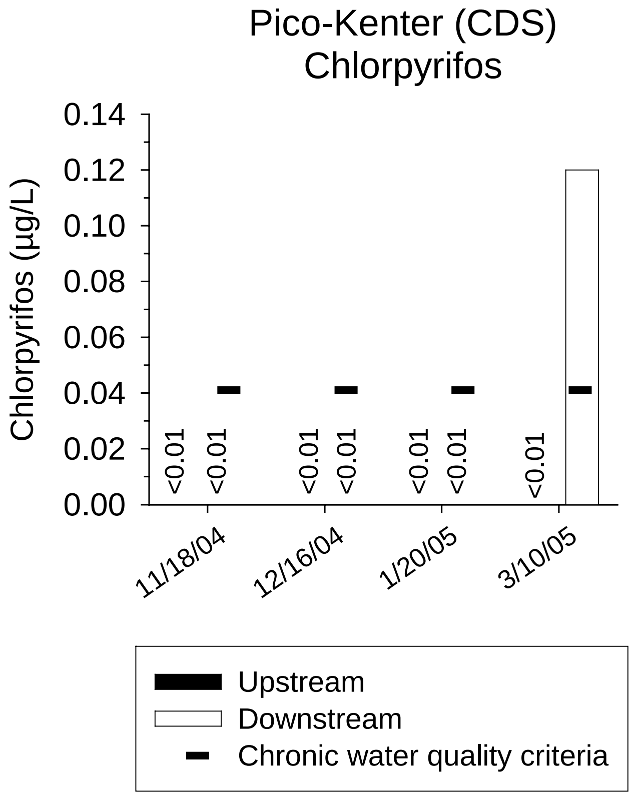


Figure 22. Concentrations of chlorpyrifos at the Pico-Kenter CDS site over four sampling events.

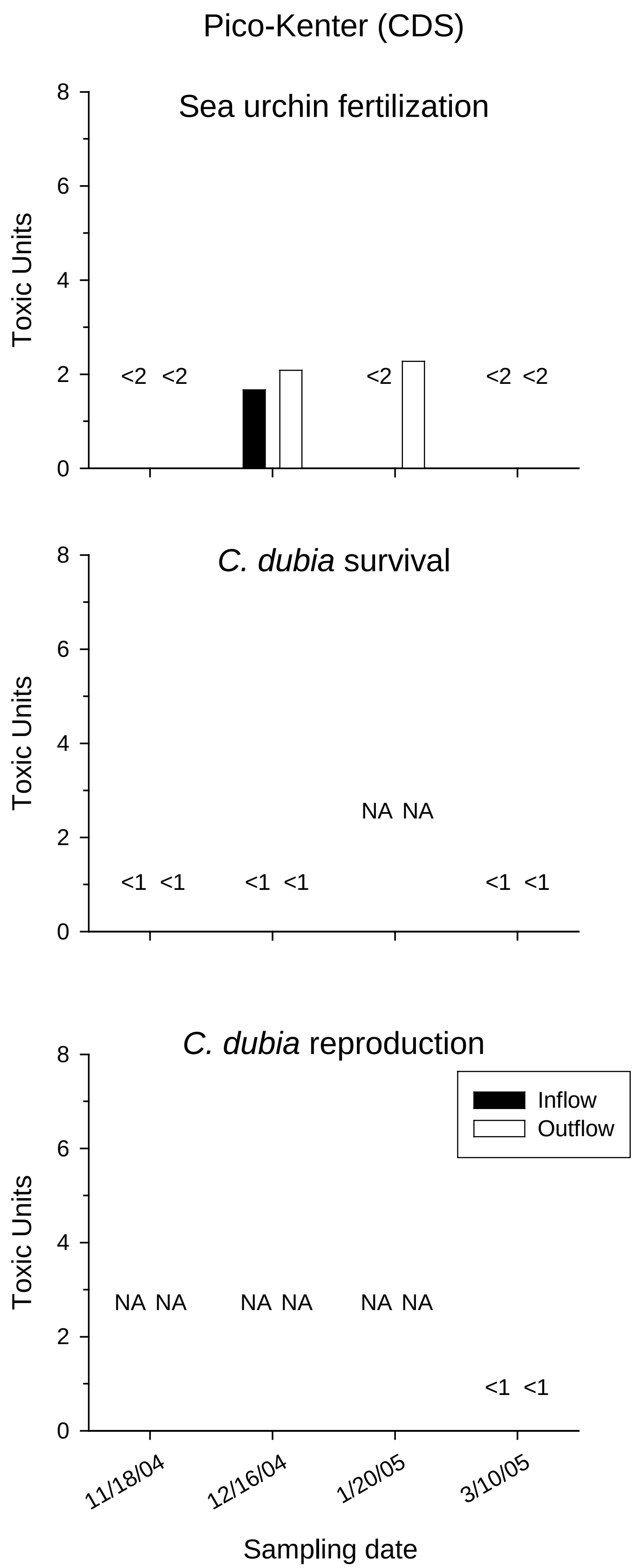


Figure 23. Toxicity in the Pico-Kenter samples. NA = not analyzed.

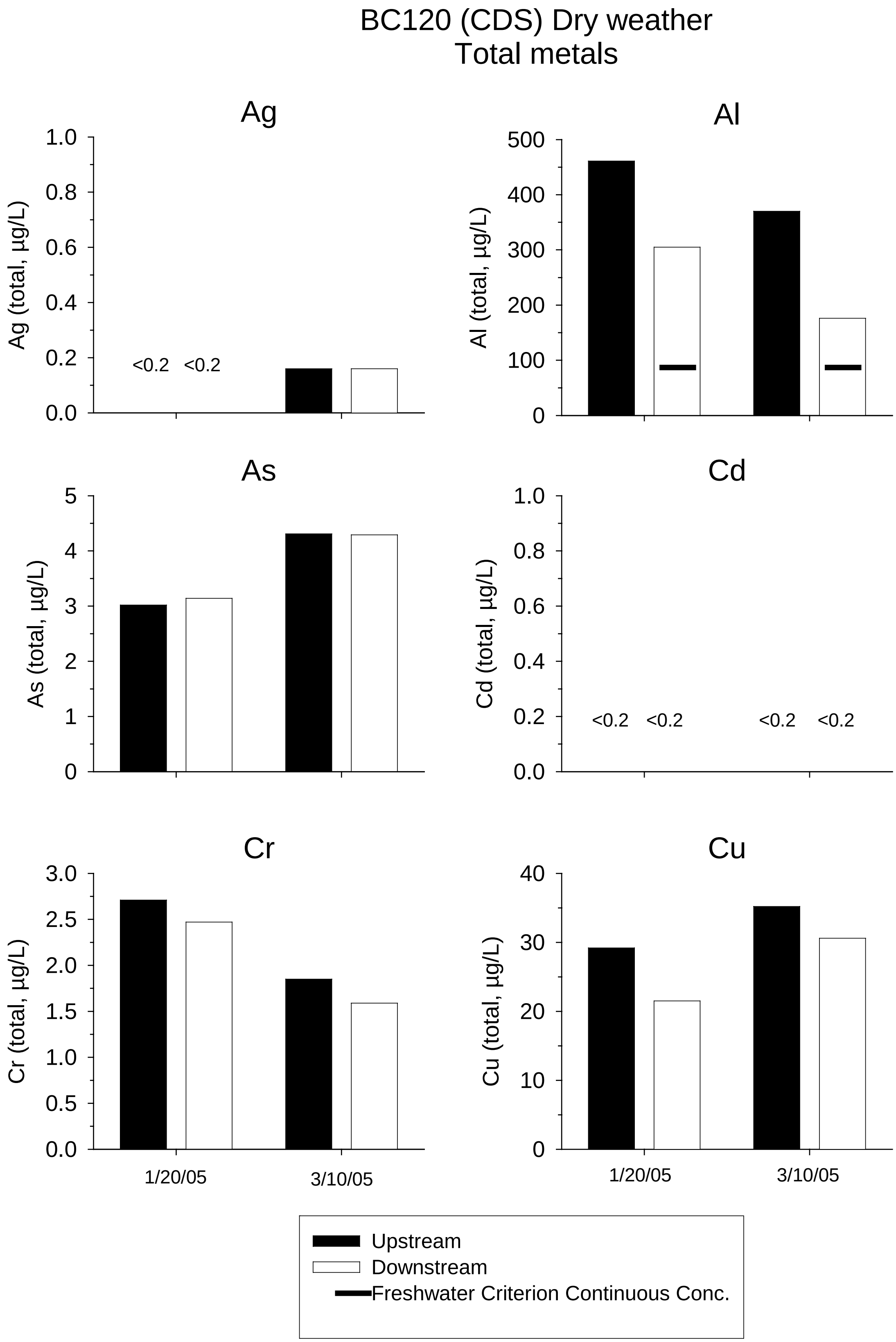


Figure 24. Concentrations of total metals and total suspended solids (TSS) at the BC120 CDS site over two dry weather sampling events.

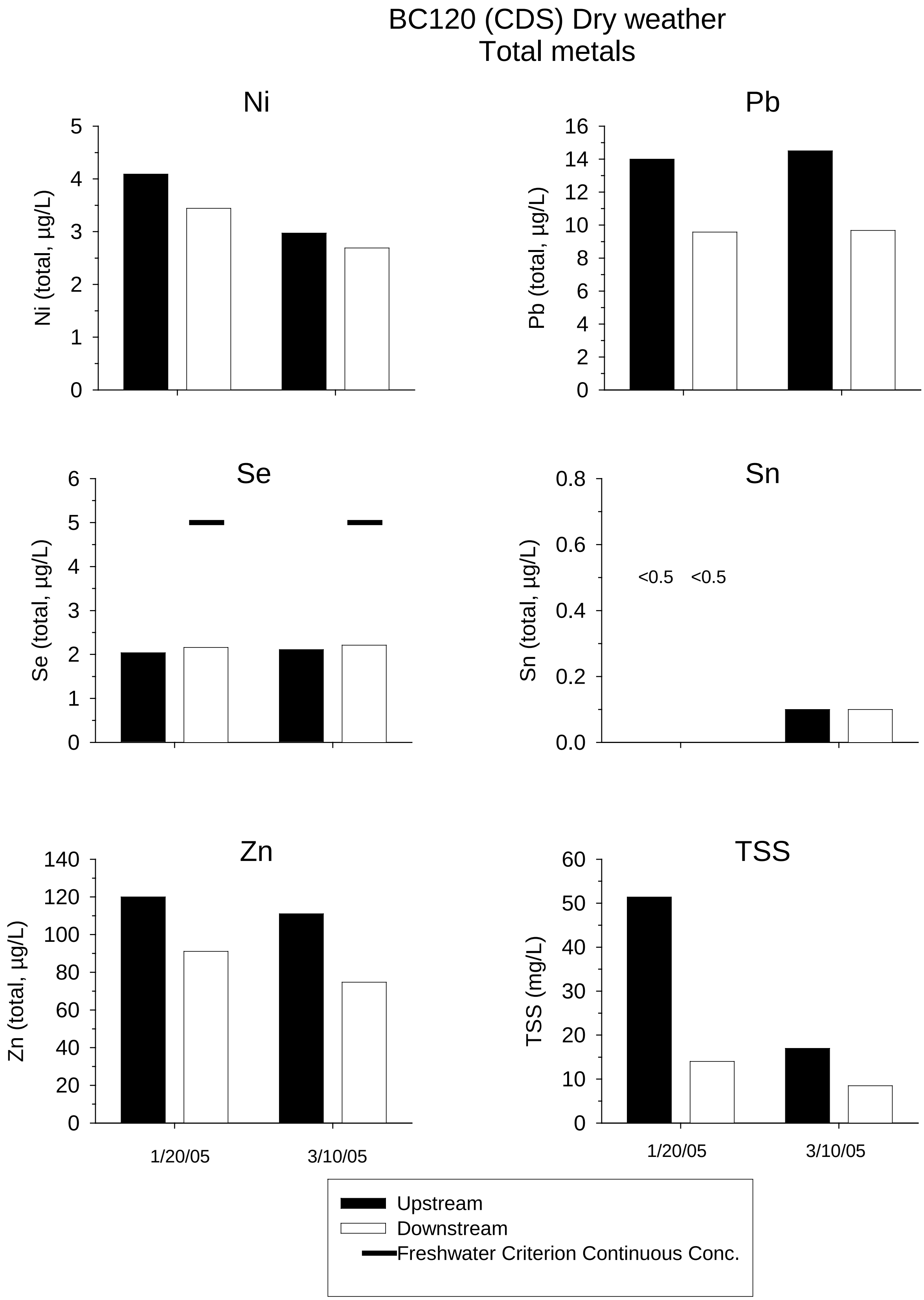


Figure 24 continued.

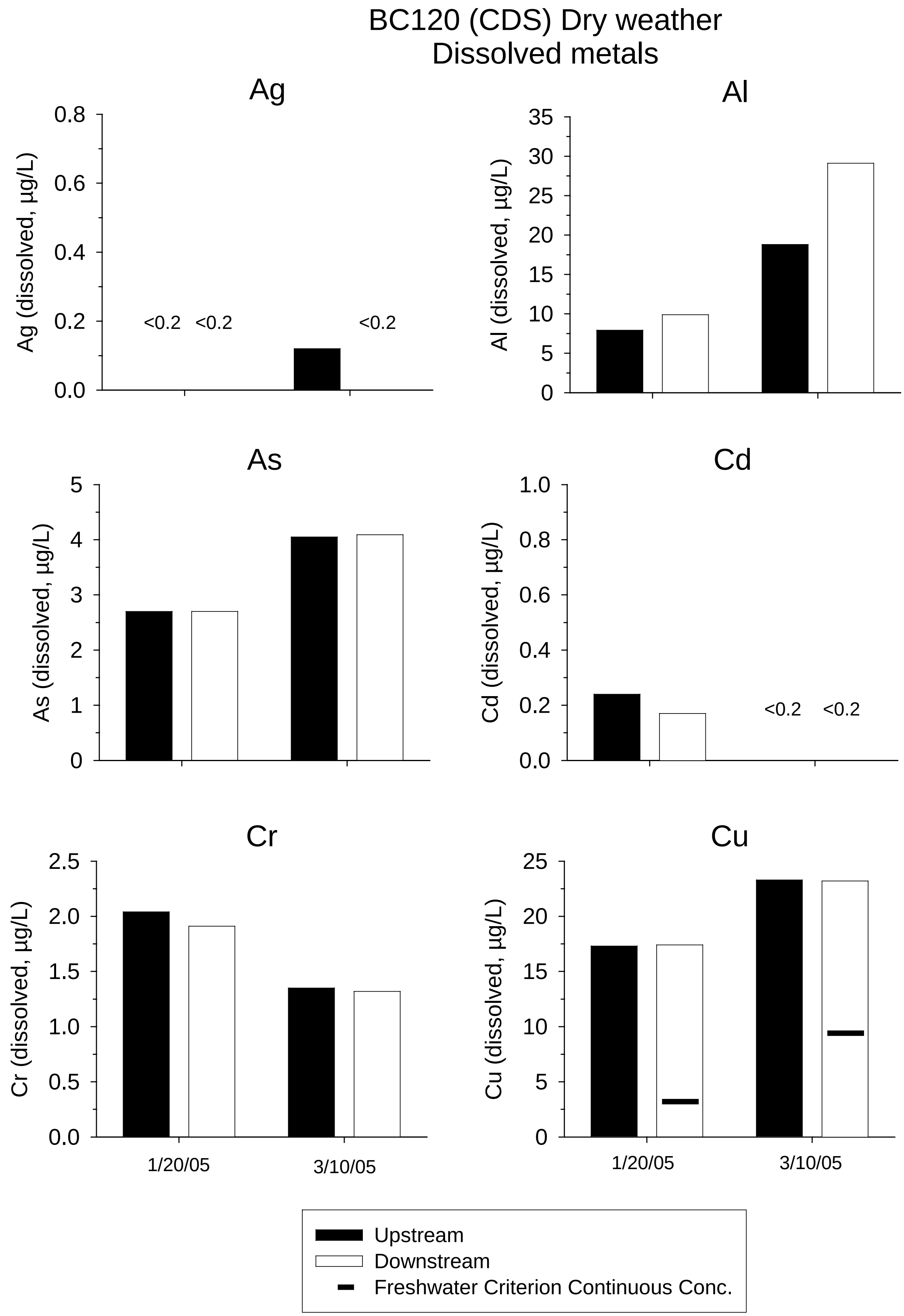


Figure 25. Concentrations of dissolved metals at the BC120 CDS site over two dry weather sampling events. The chronic criteria for dissolved As, Cd and Ni (not shown) are greater than the measured concentrations.

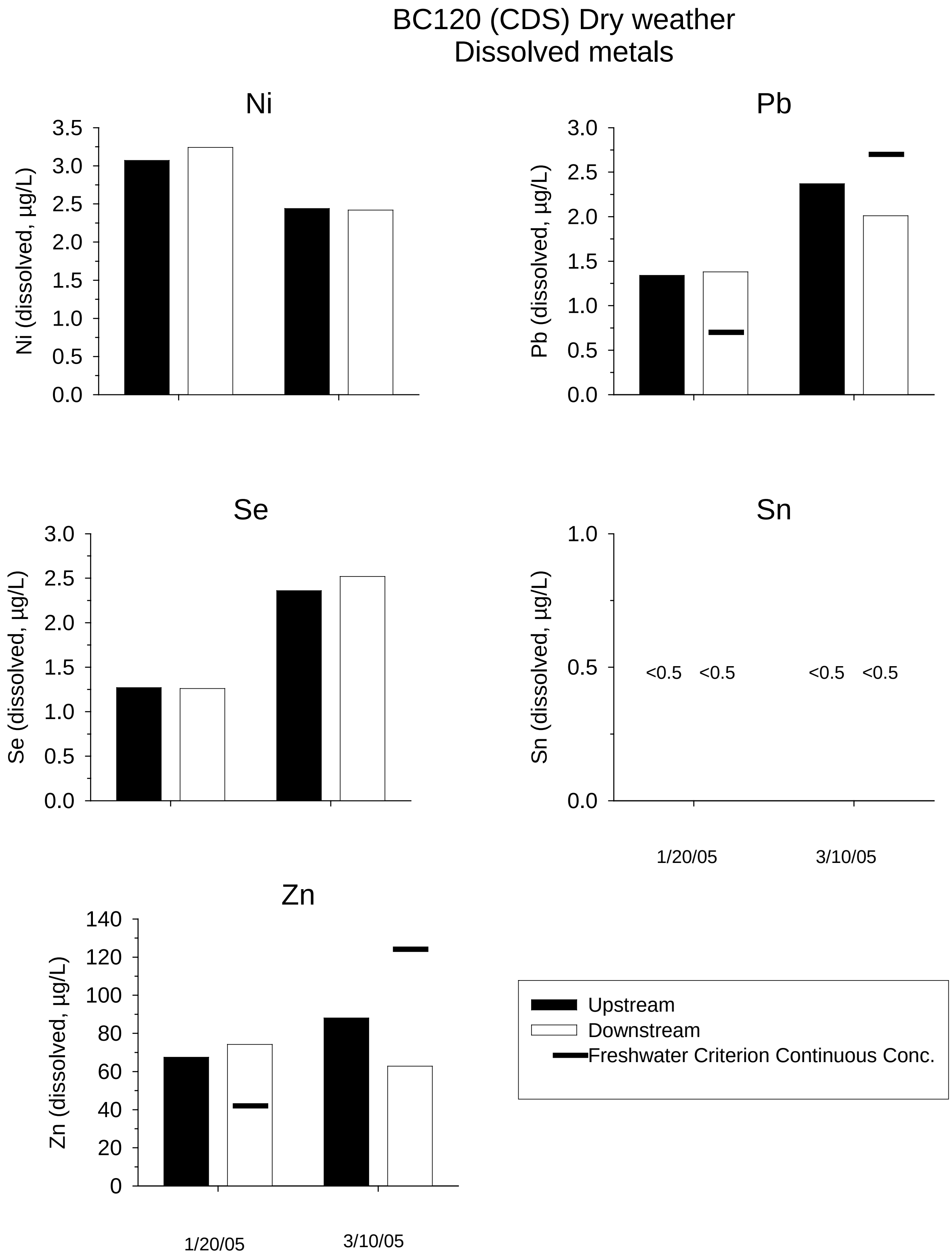


Figure 25 continued.

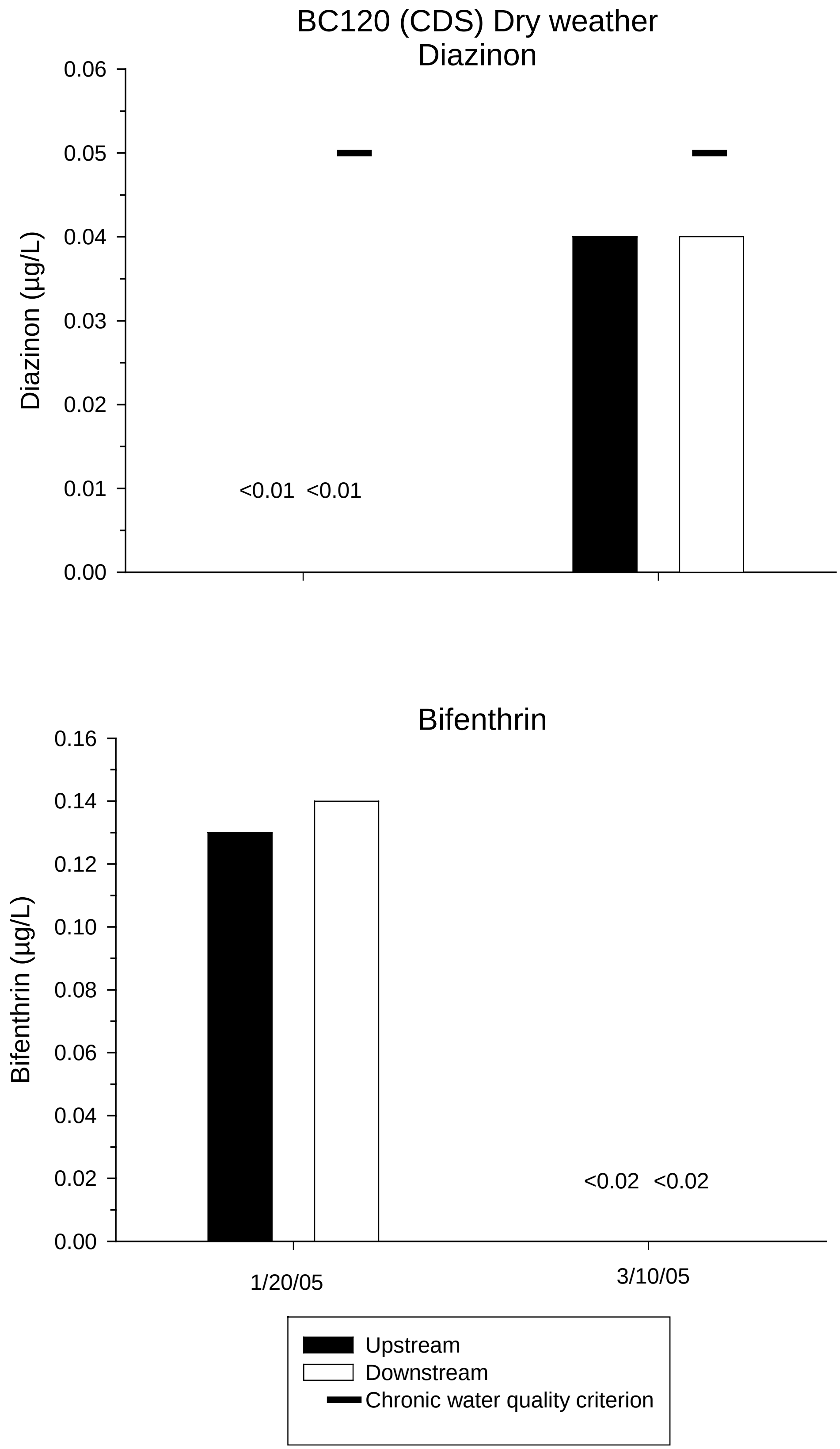


Figure 26. Concentrations of the diazinon (organophosphorus pesticide) and bifenthrin (pyrethroid pesticide) at the BC120 CDS site during the two dry weather sampling events. There is no chronic criterion for bifenthrin.

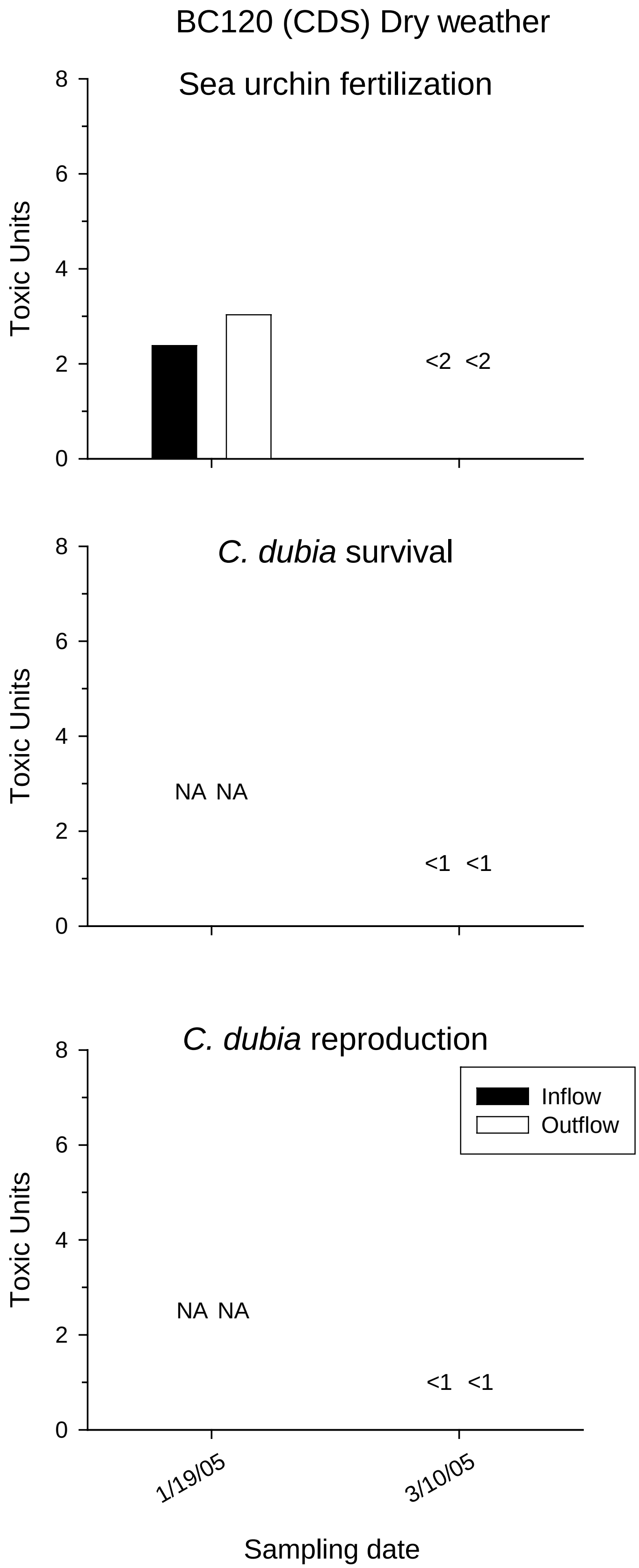


Figure 27. Toxicity in the BC120 dry weather samples. NA = not analyzed.

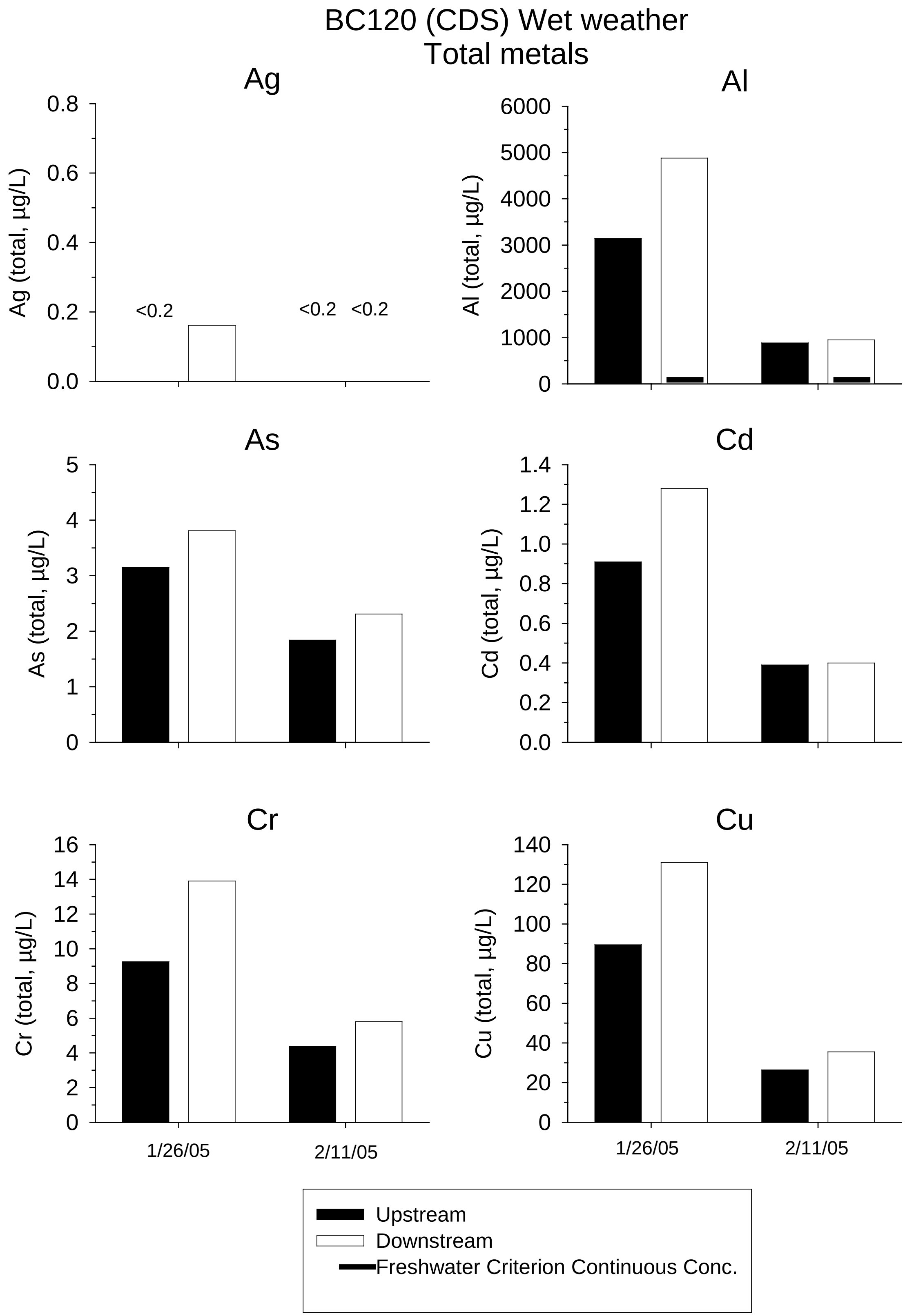


Figure 28. Concentrations of total metals at the BC120 CDS site over two wet weather sampling events.

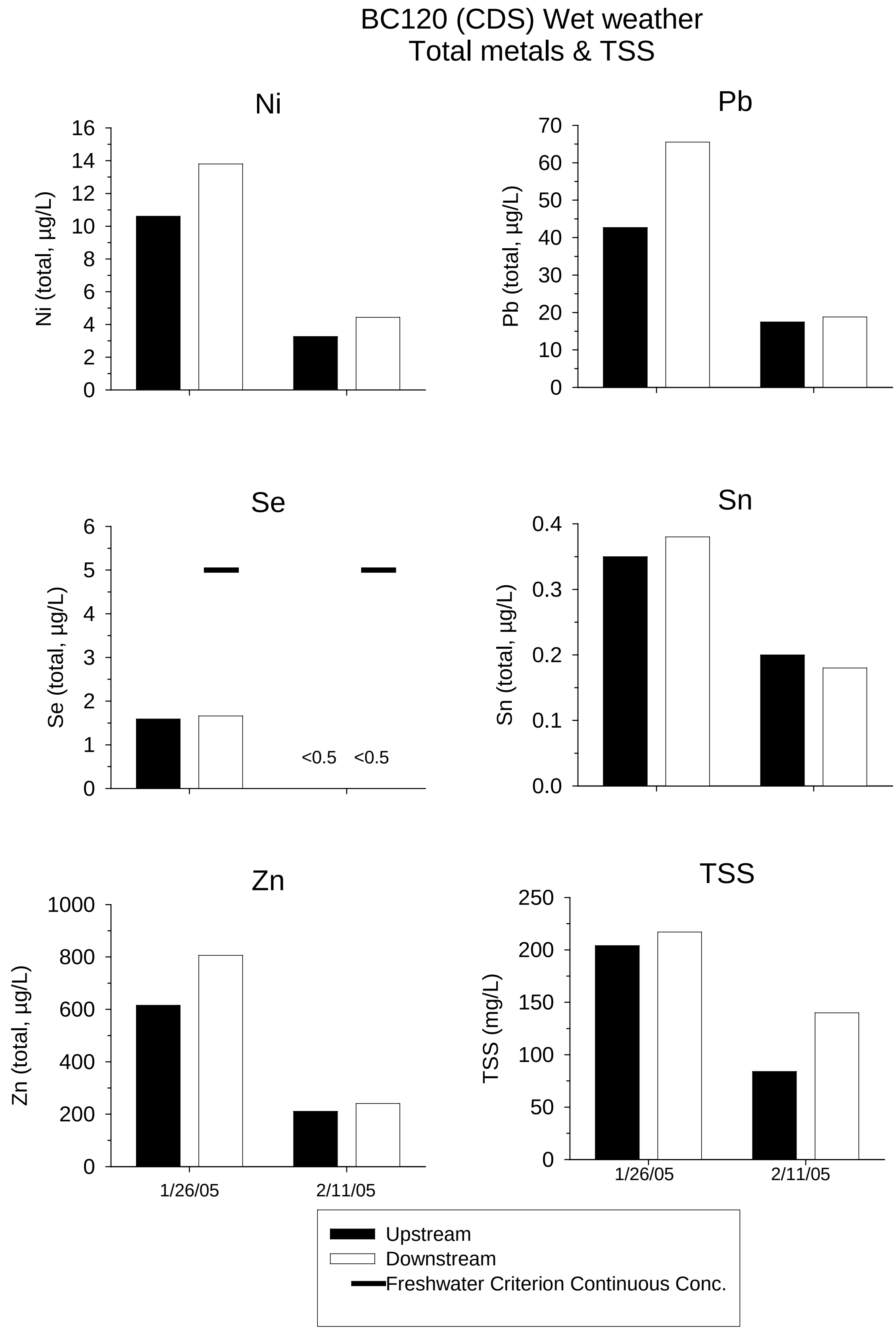


Figure 28 continued.

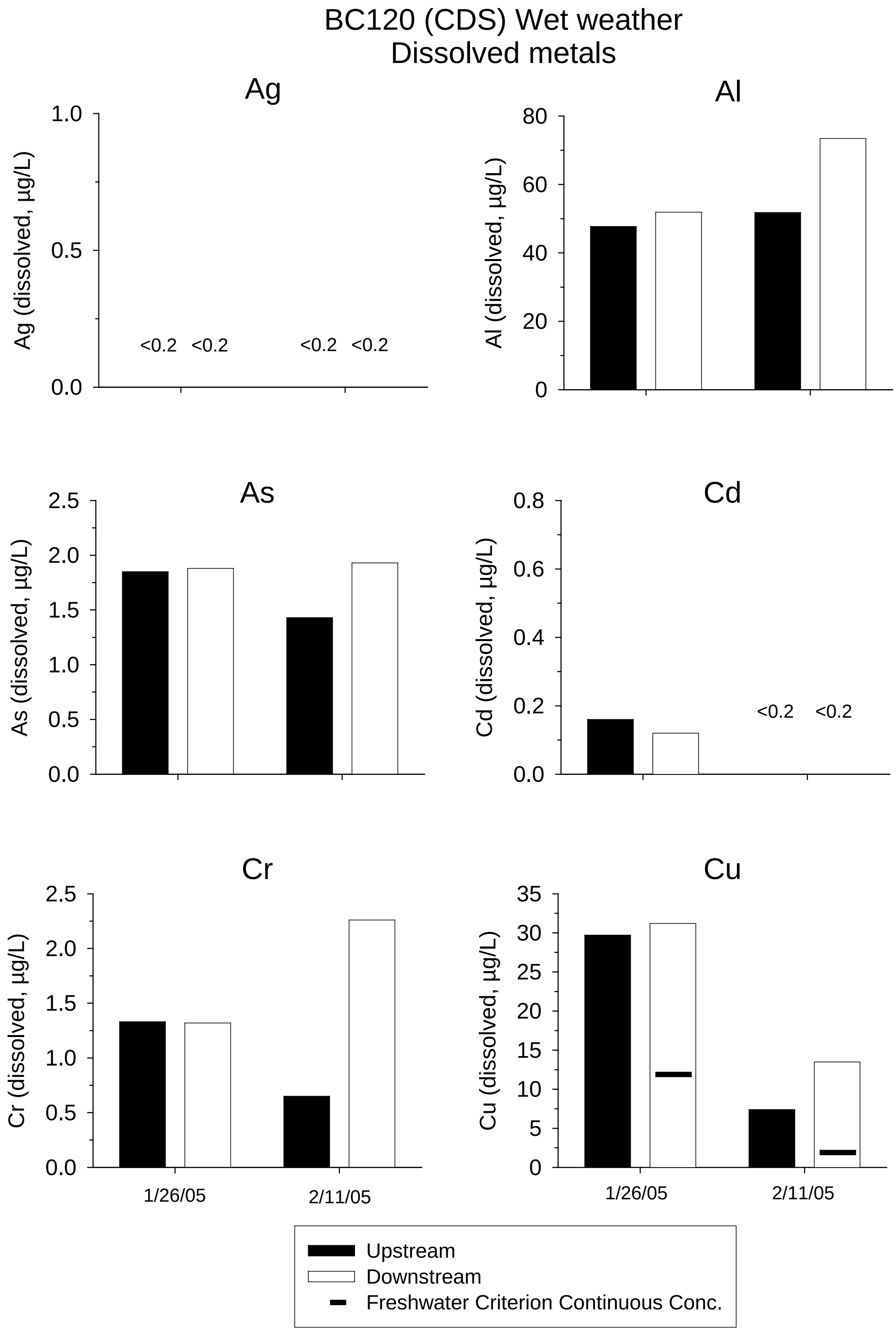


Figure 29. Concentrations of dissolved metals at the BC120 CDS site over two wet weather sampling events. The chronic criteria for dissolved As, Cd and Ni (not shown) are greater than the measured concentrations.

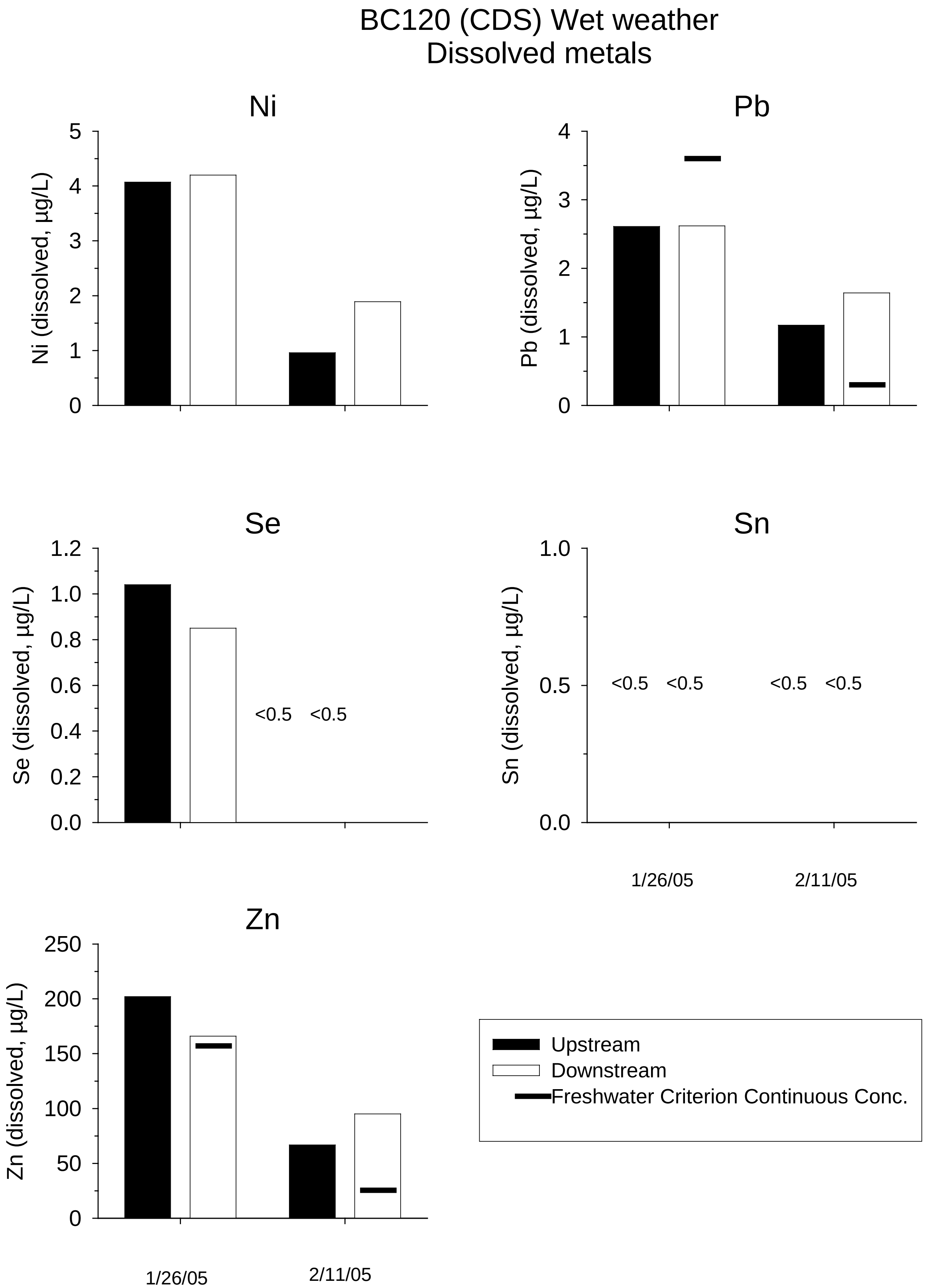


Figure 29. continued.

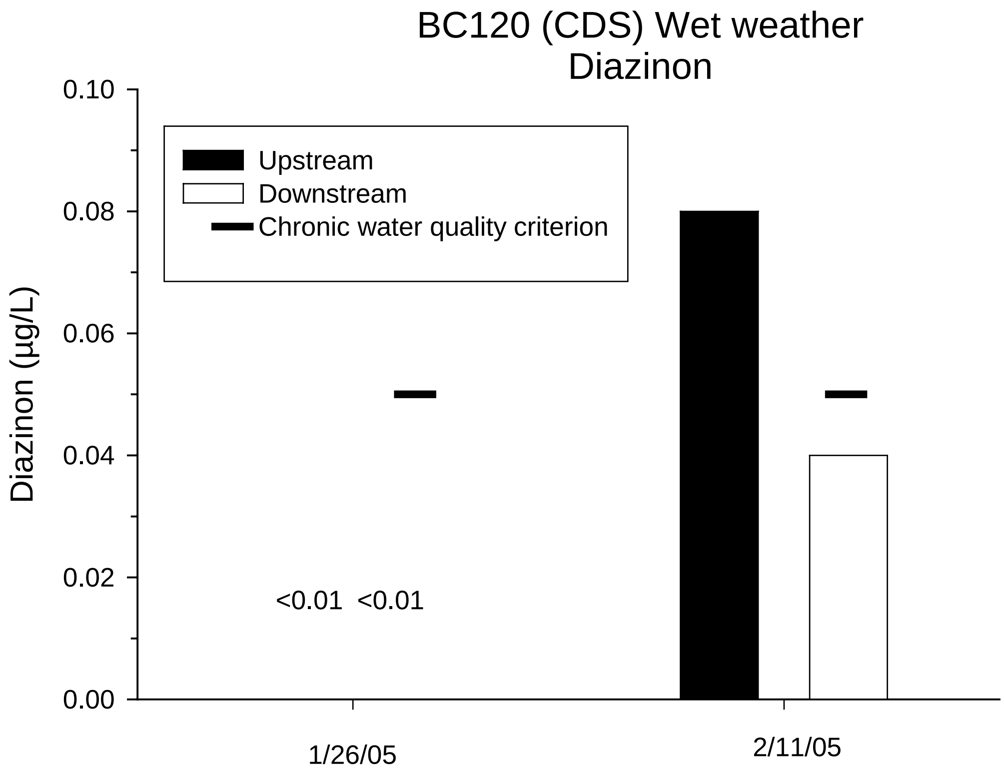


Figure 30. Concentrations of the diazinon (organophosphorus pesticide) at the BC120 CDS site during the two wet weather sampling events.

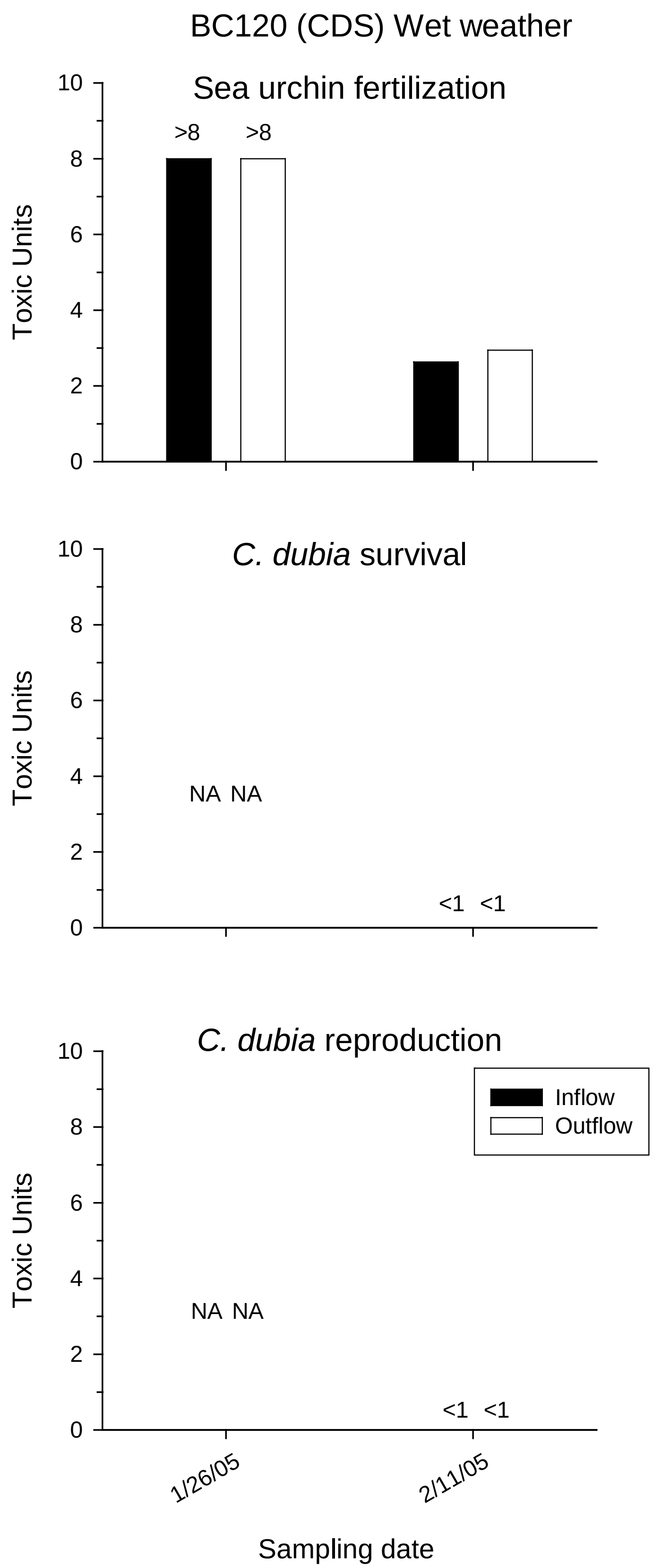


Figure 31. Toxicity in the wet weather samples from the BC120 CDS unit. NA = not analyzed.

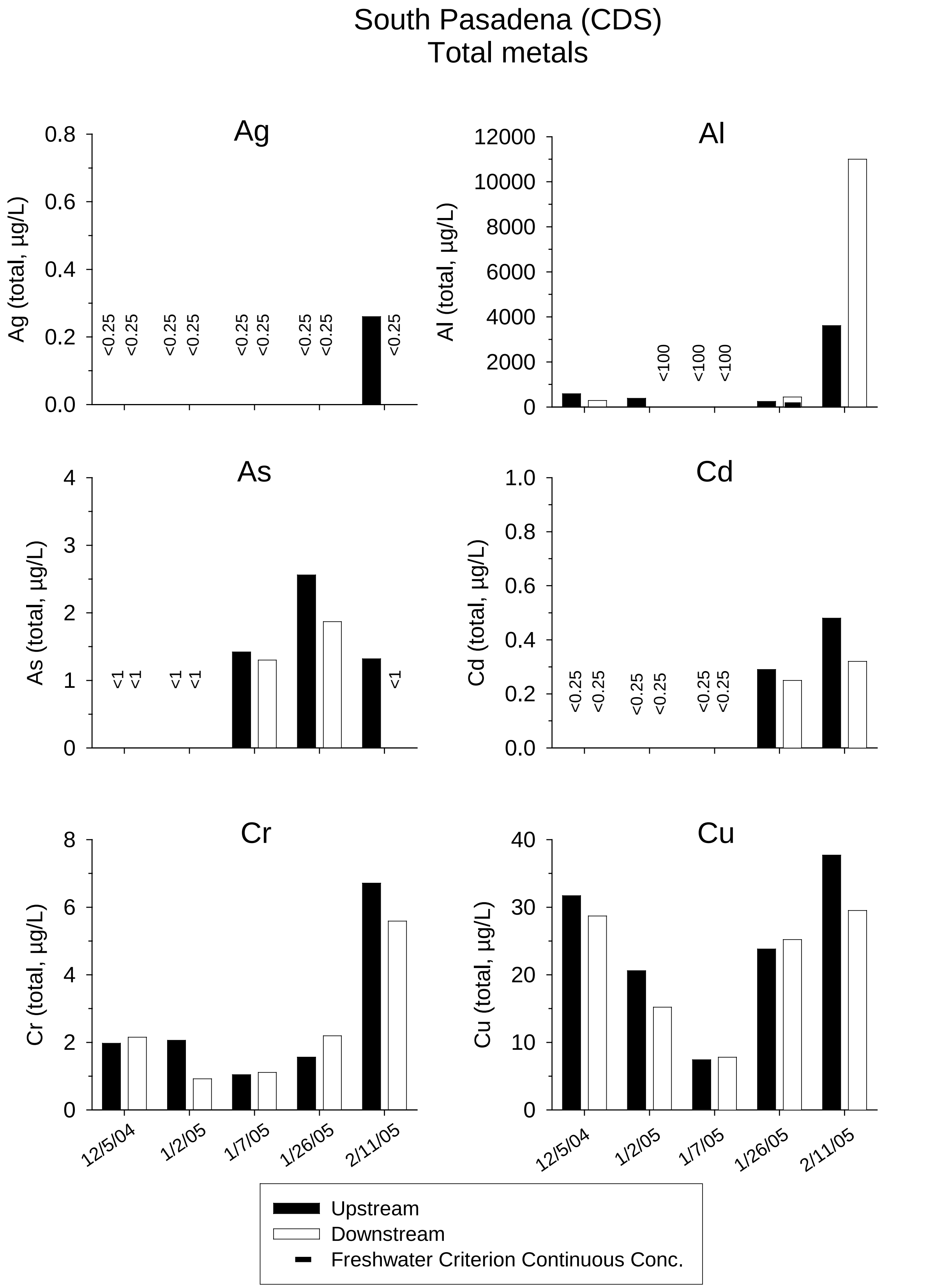


Figure 32. Concentrations of total metals and total suspended solids (TSS) at the South Pasadena CDS site over five sampling events. Tin was not analyzed in the South Pasadena samples.

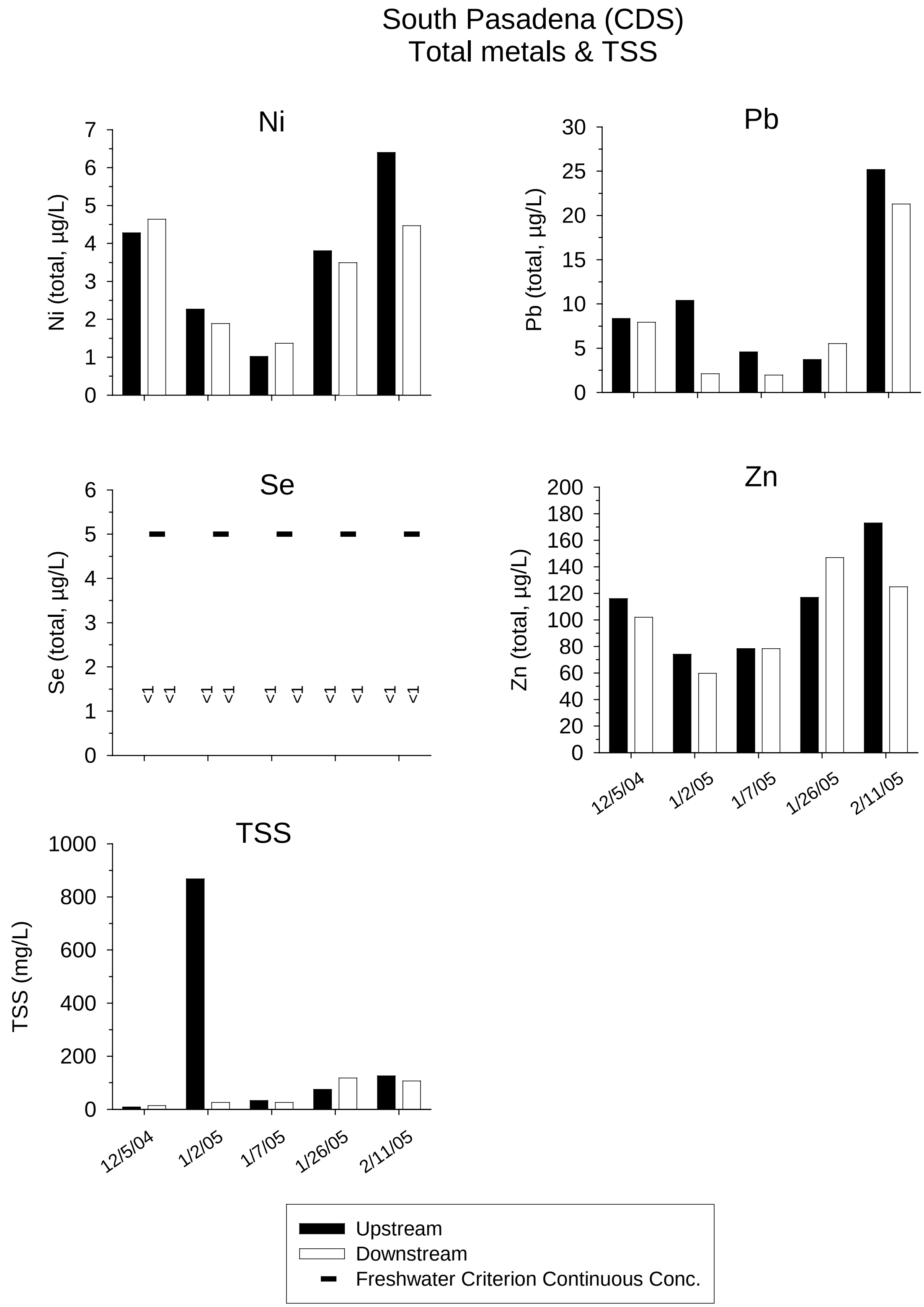


Figure 32 continued.

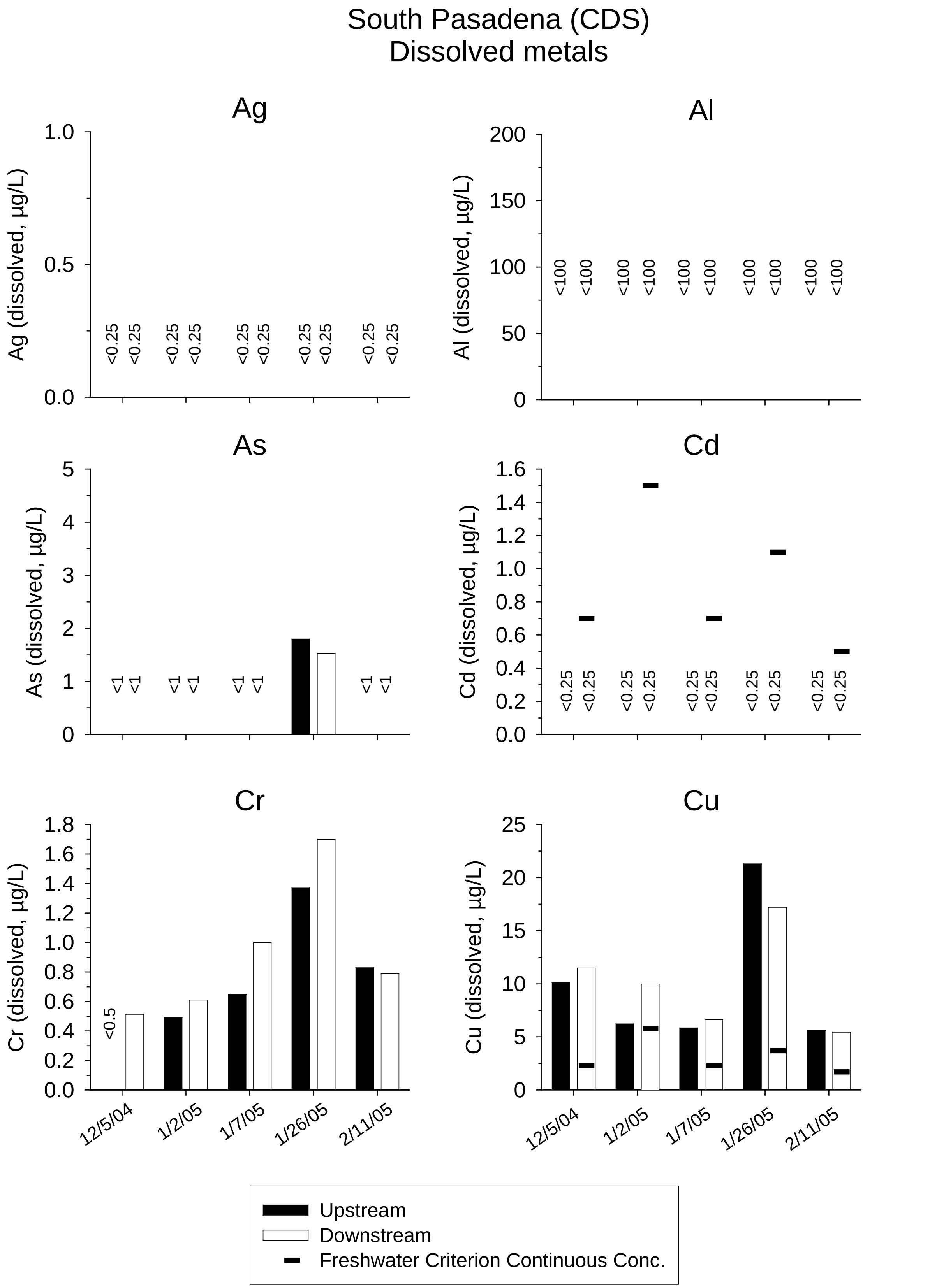


Figure 33. Concentrations of dissolved metals at the South Pasadena CDS site over five sampling events. The chronic criterion for dissolved As (150 µg/L) is not shown. Tin was not analyzed in the South Pasadena samples.

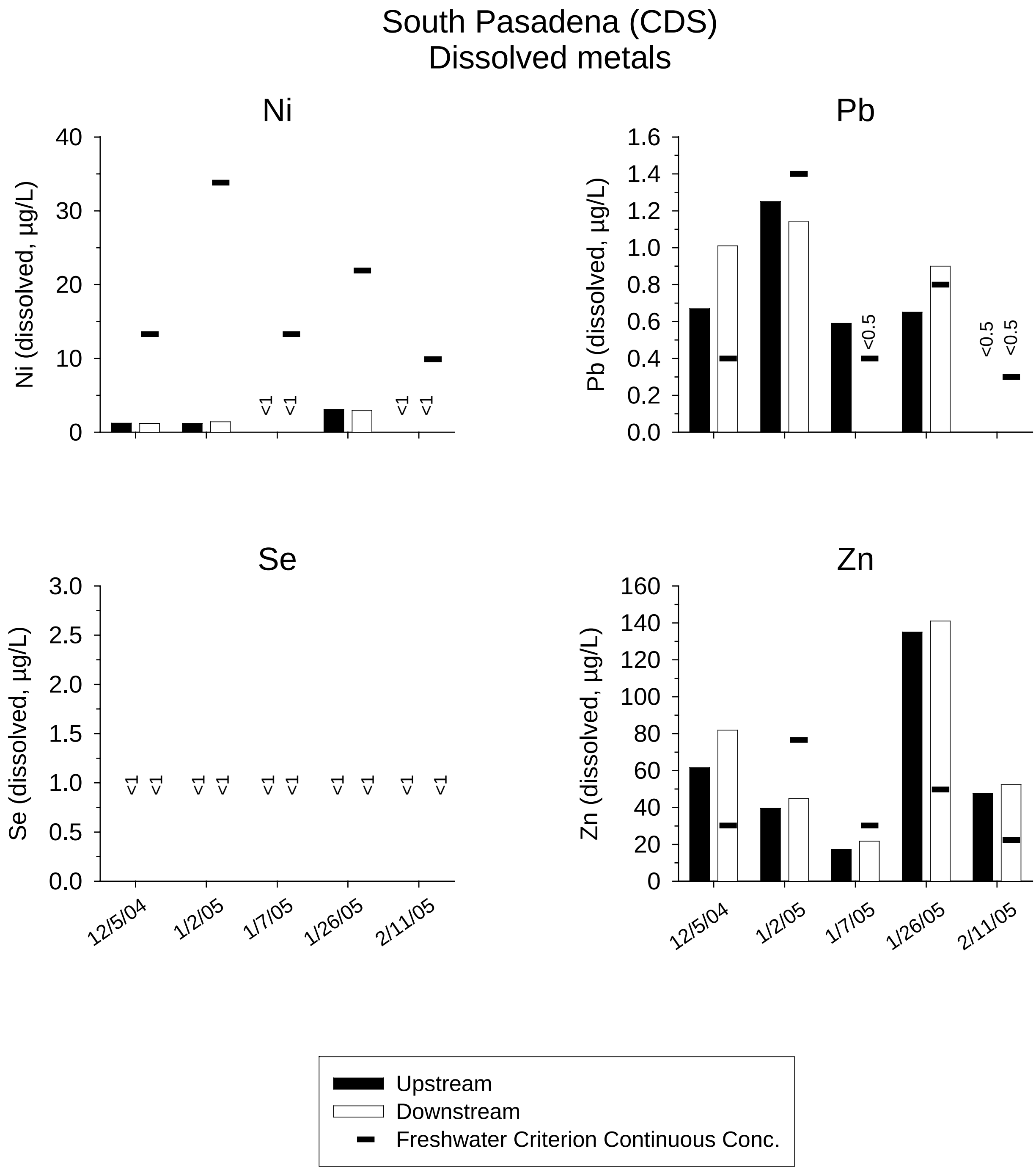


Figure 33 continued.

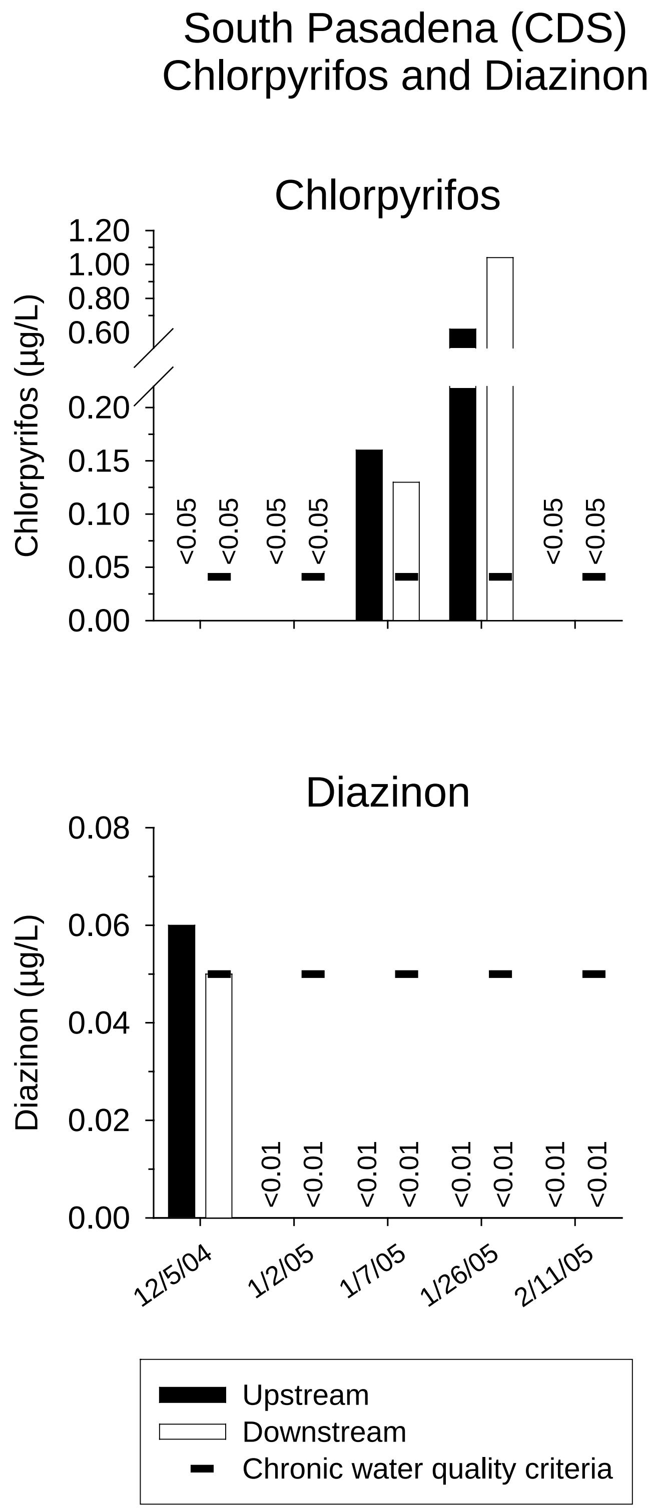


Figure 34. Concentrations of chlorpyrifos and diazinon from the South Pasadena CDS site over five stormwater sampling events.

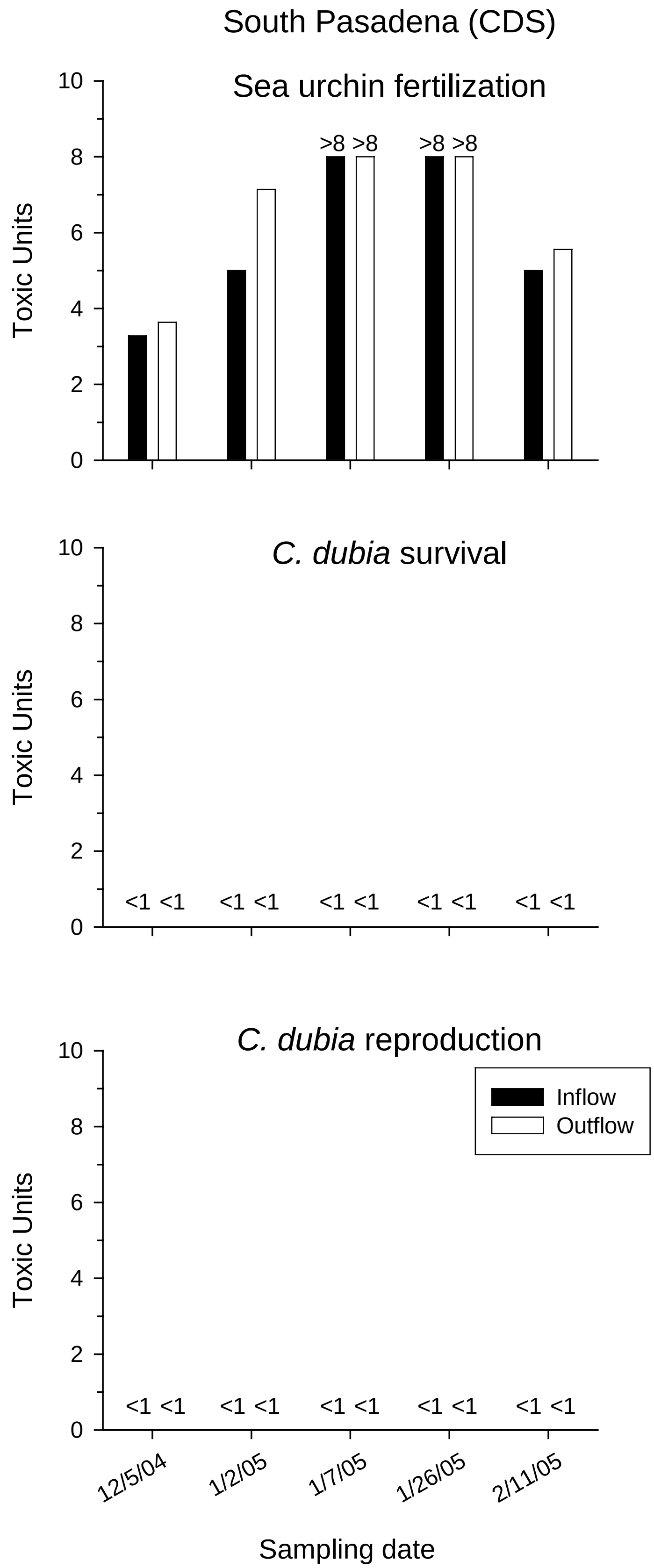


Figure 35. Toxicity of the South Pasadena CDS unit storm samples. None of the samples reduced the survival or reproduction of *Ceriodaphnia dubia* (*C. dubia*) by 50%.

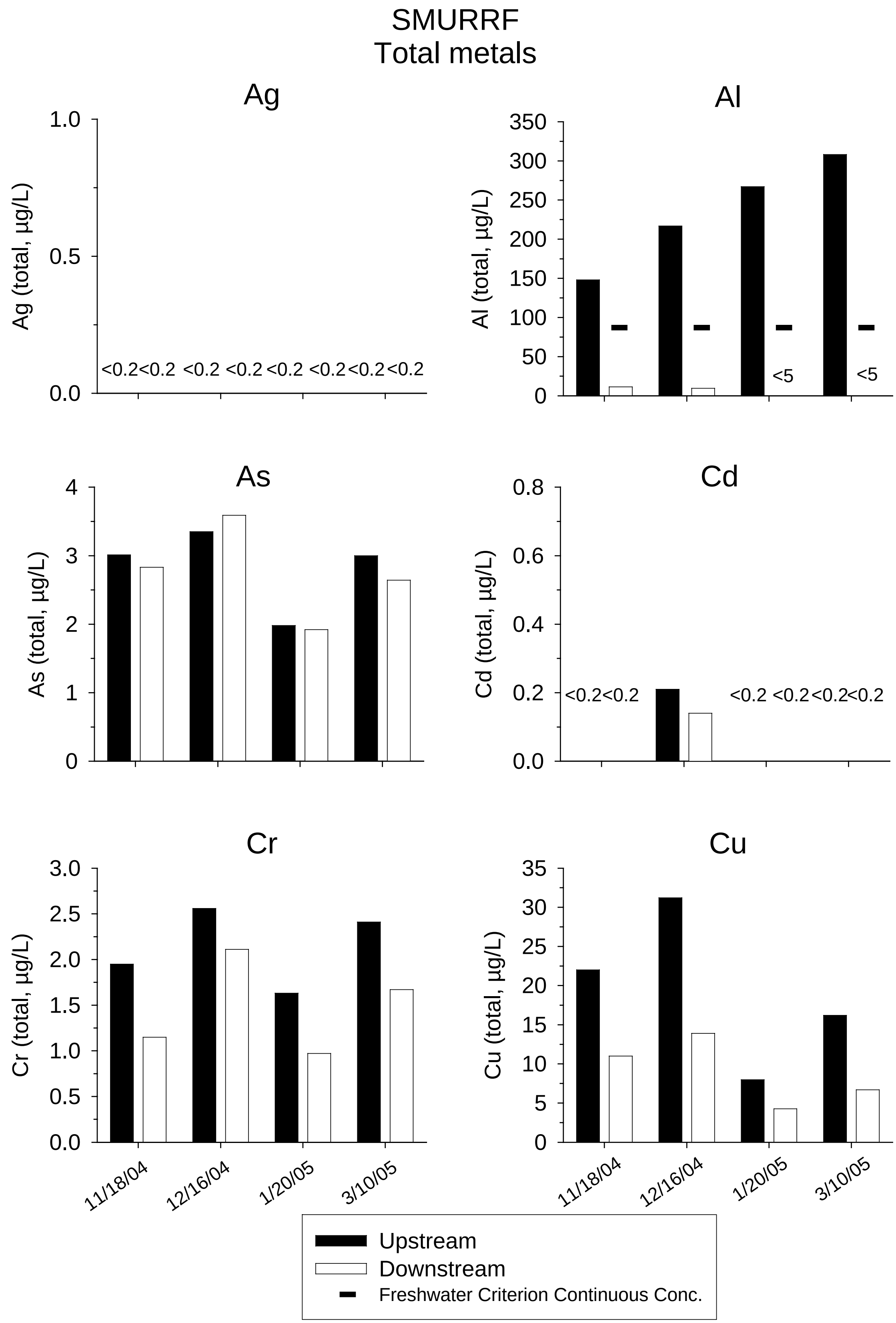


Figure 36. Concentrations of total metals and total suspended solids (TSS) at the SMURRF site over four sampling events.

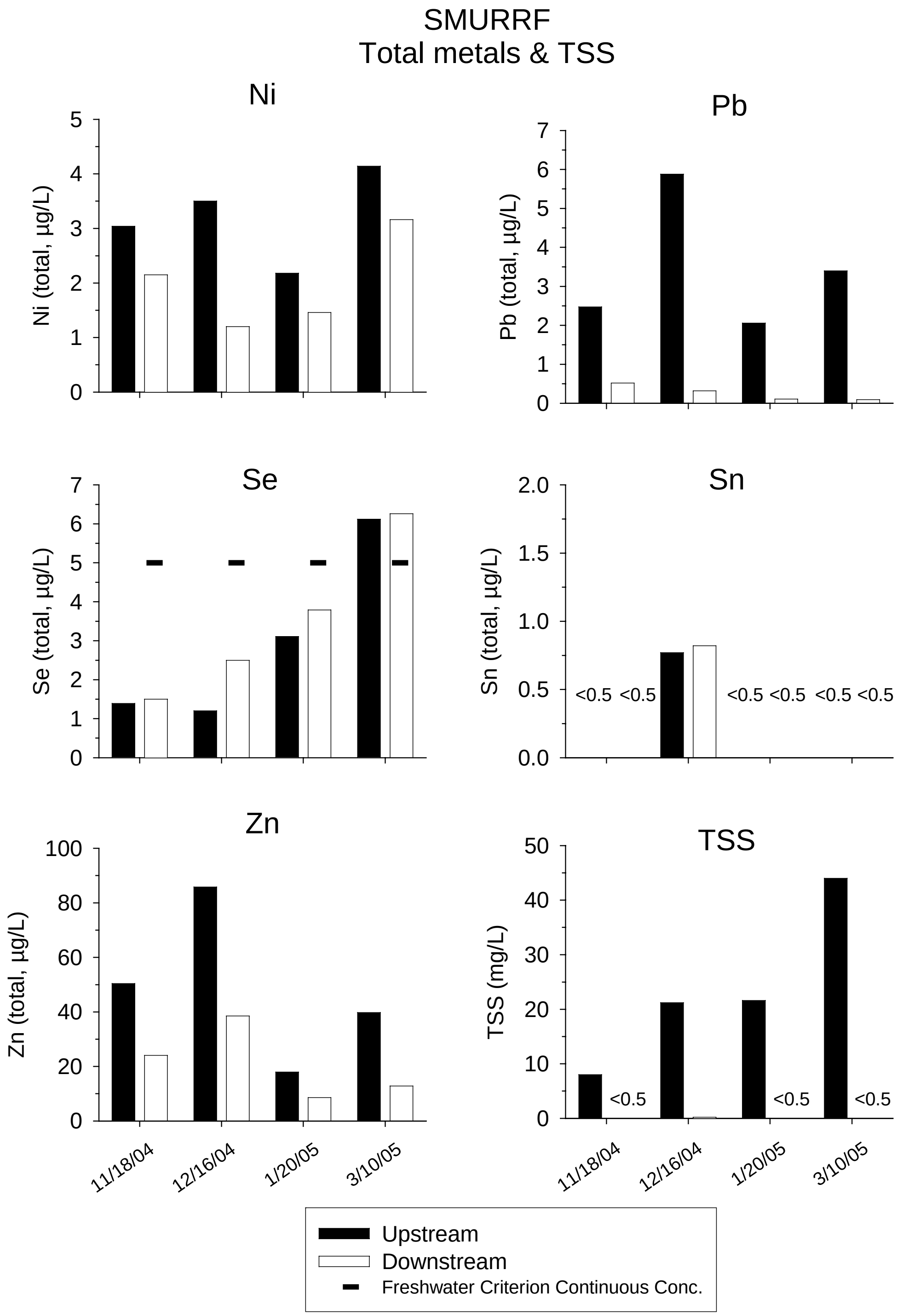


Figure 36 continued.

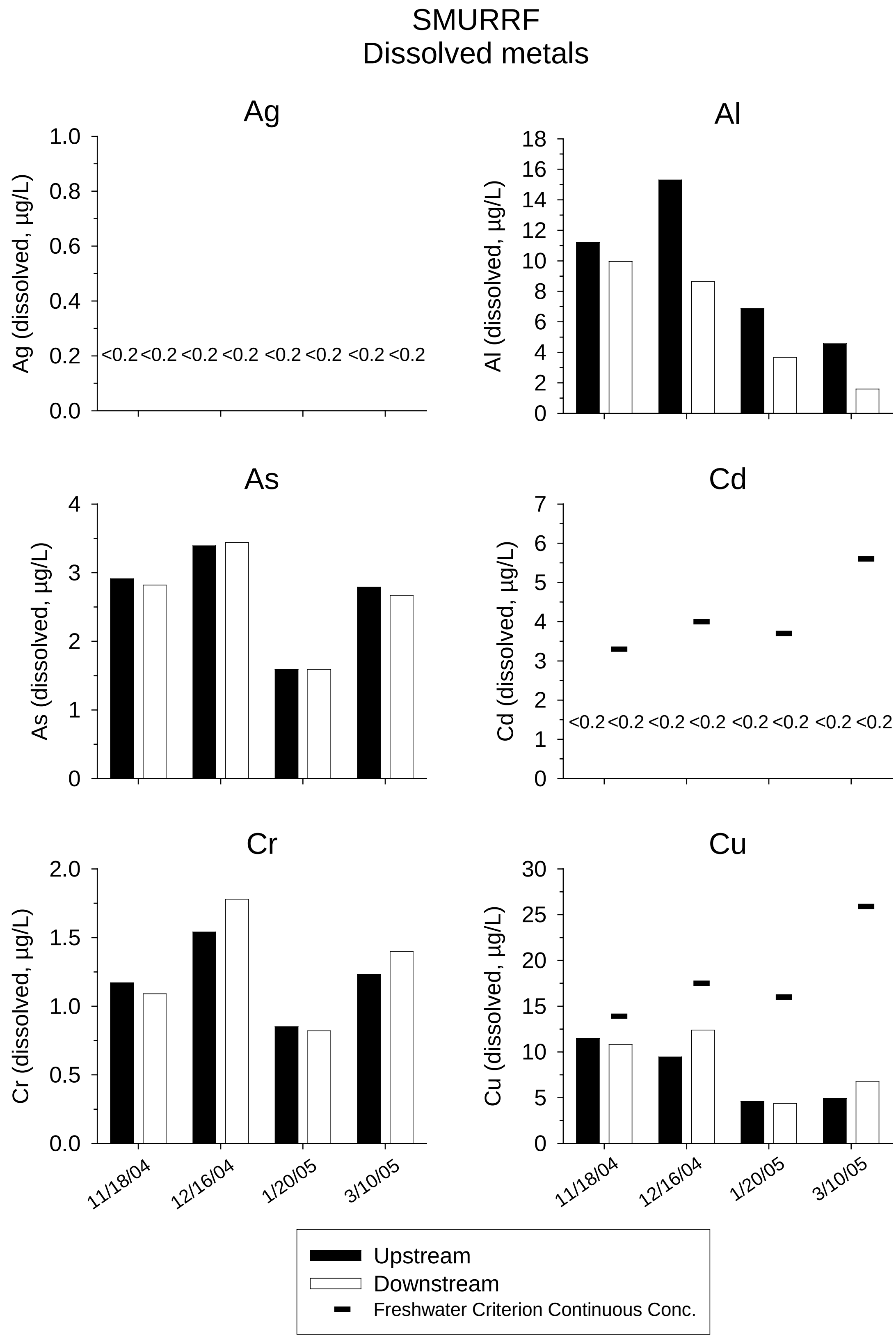


Figure 37. Concentrations of dissolved metals at the SMURRF site over four sampling events. The chronic criteria for dissolved As, Ni and Pb (not shown) are greater than the measured concentrations.

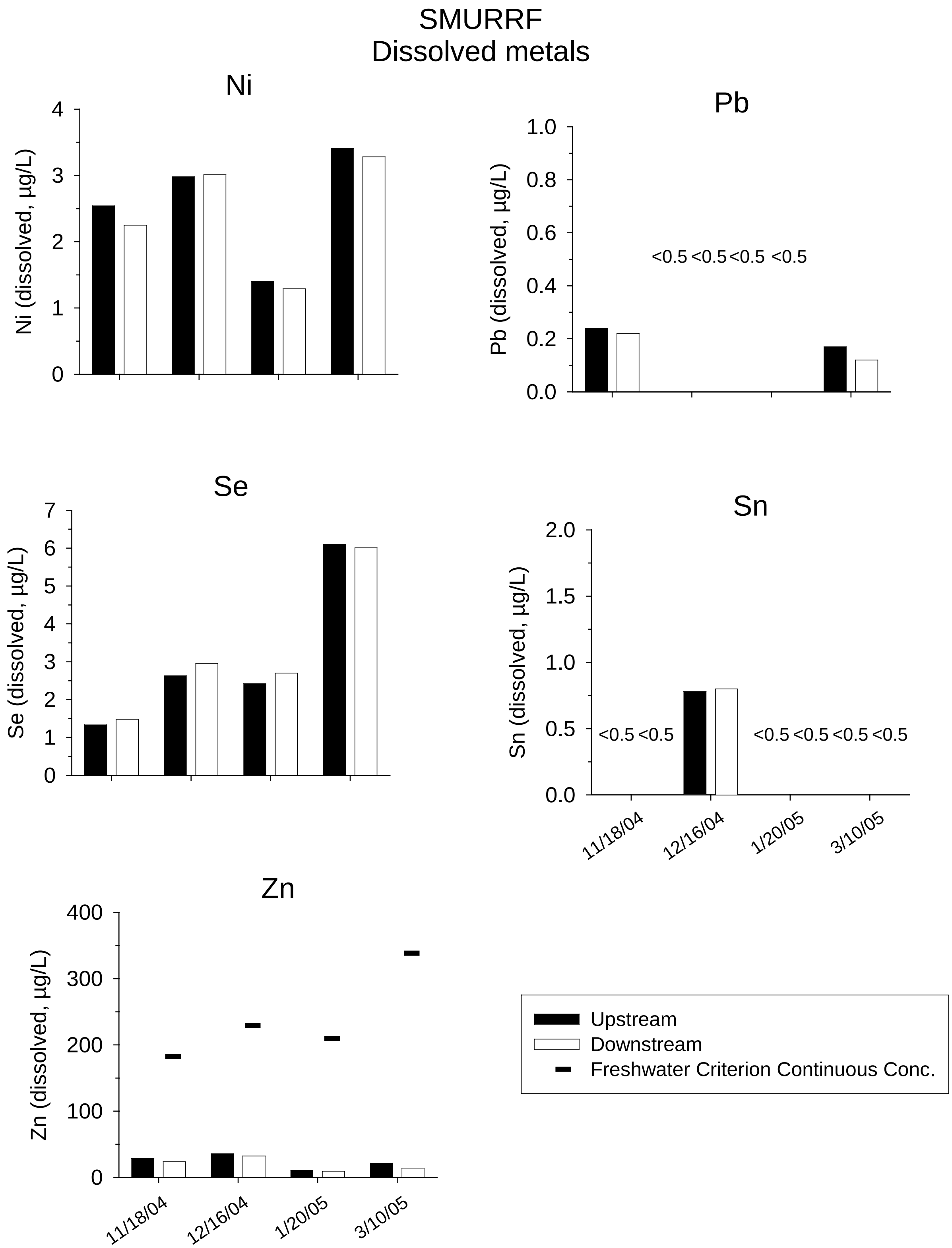


Figure 37 continued.

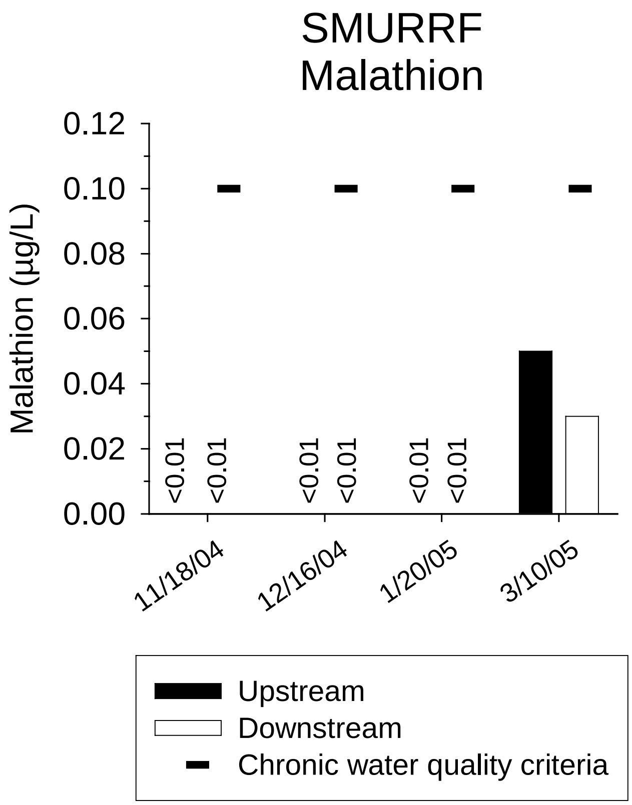


Figure 38. Concentrations of malathion at the SMURRF site over four sampling events.

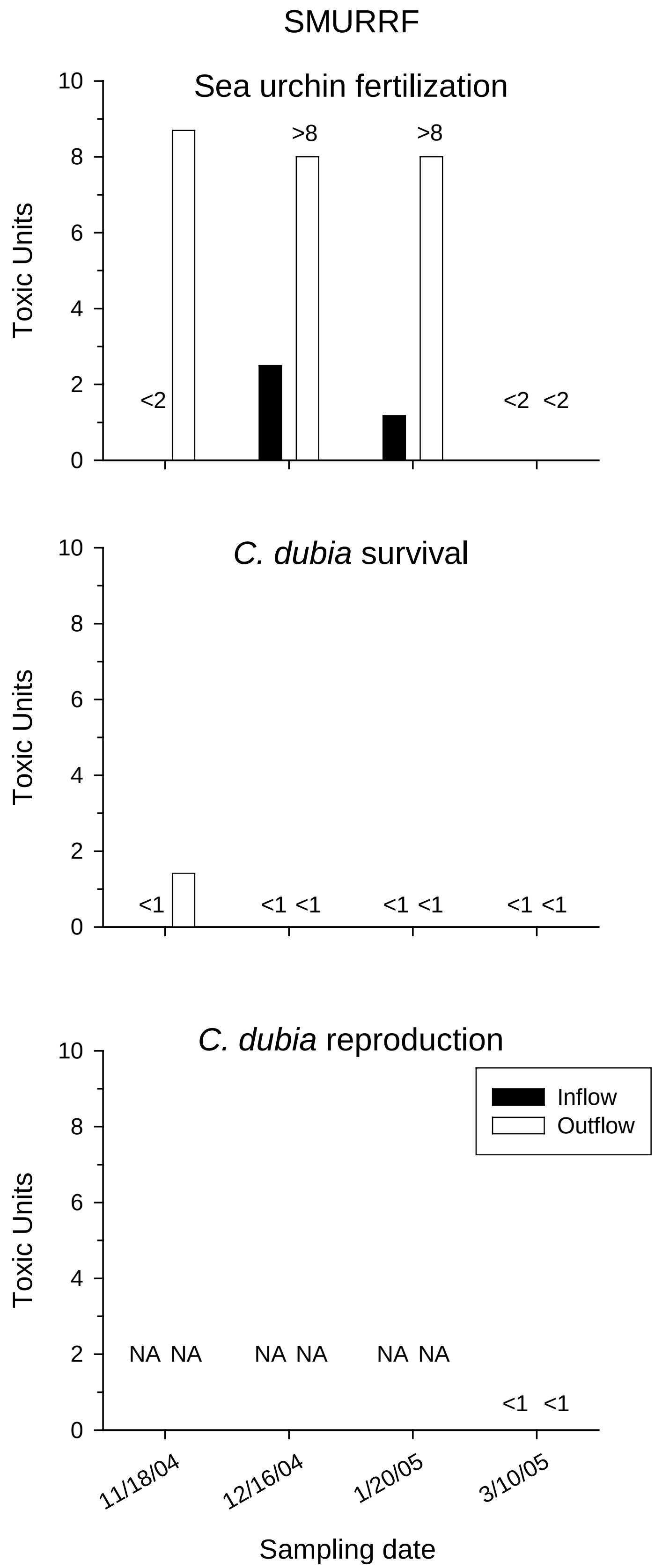


Figure 39. Toxicity in the SMURRF samples. NA = not analyzed.

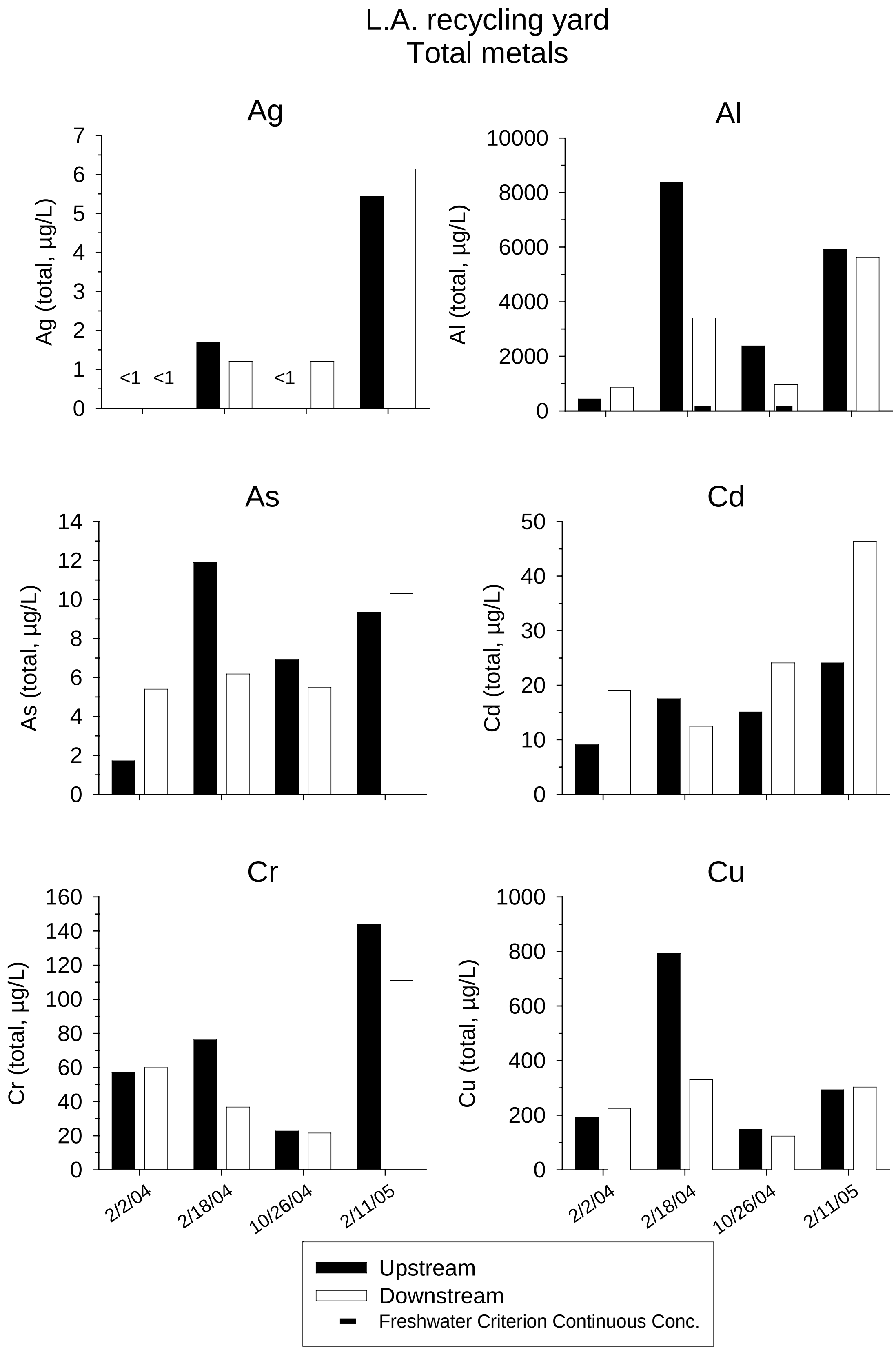


Figure 40. Concentrations of total metals and total suspended solids (TSS) at the L.A. metal recycling site over four sampling events.

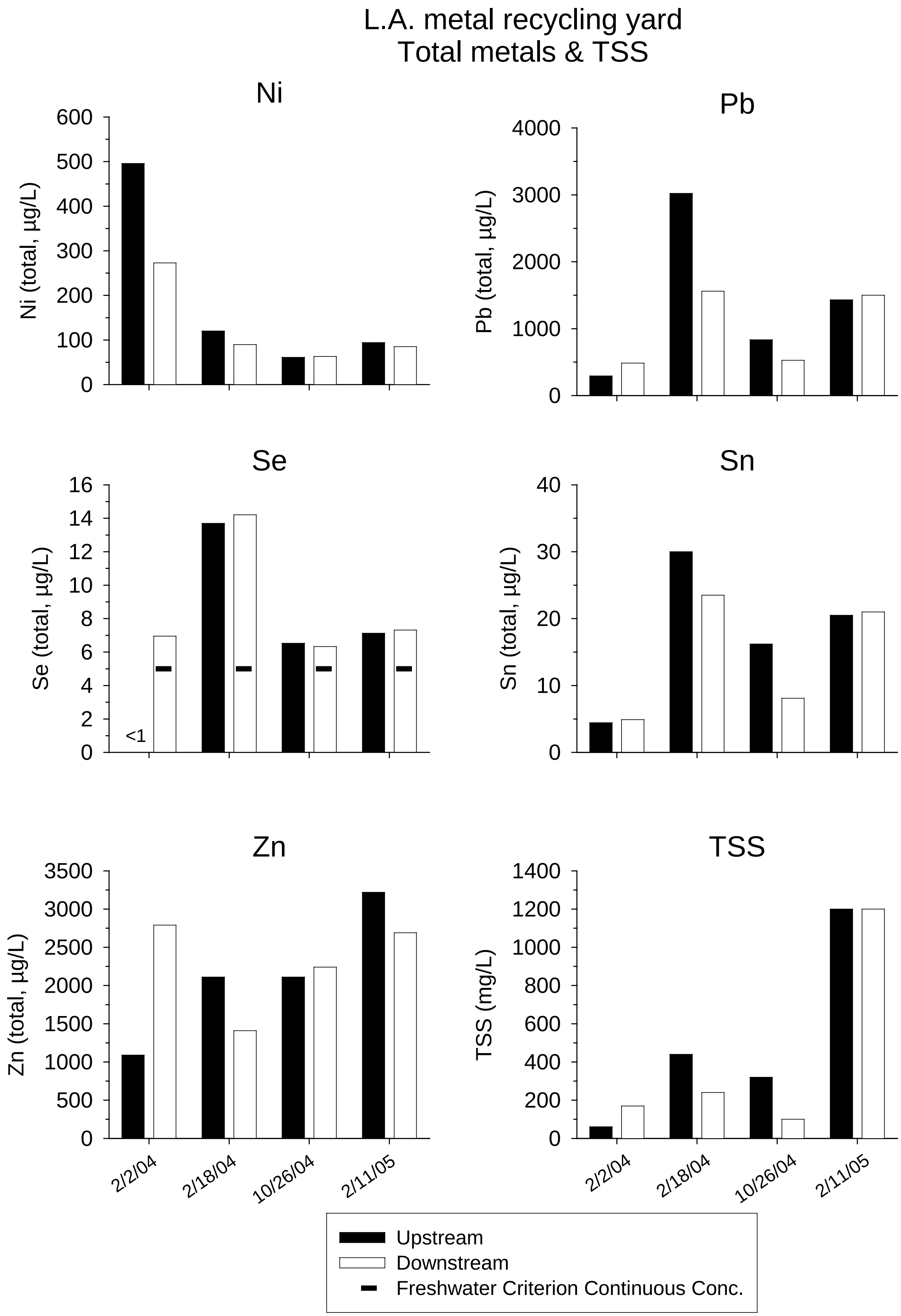


Figure 40 continued.

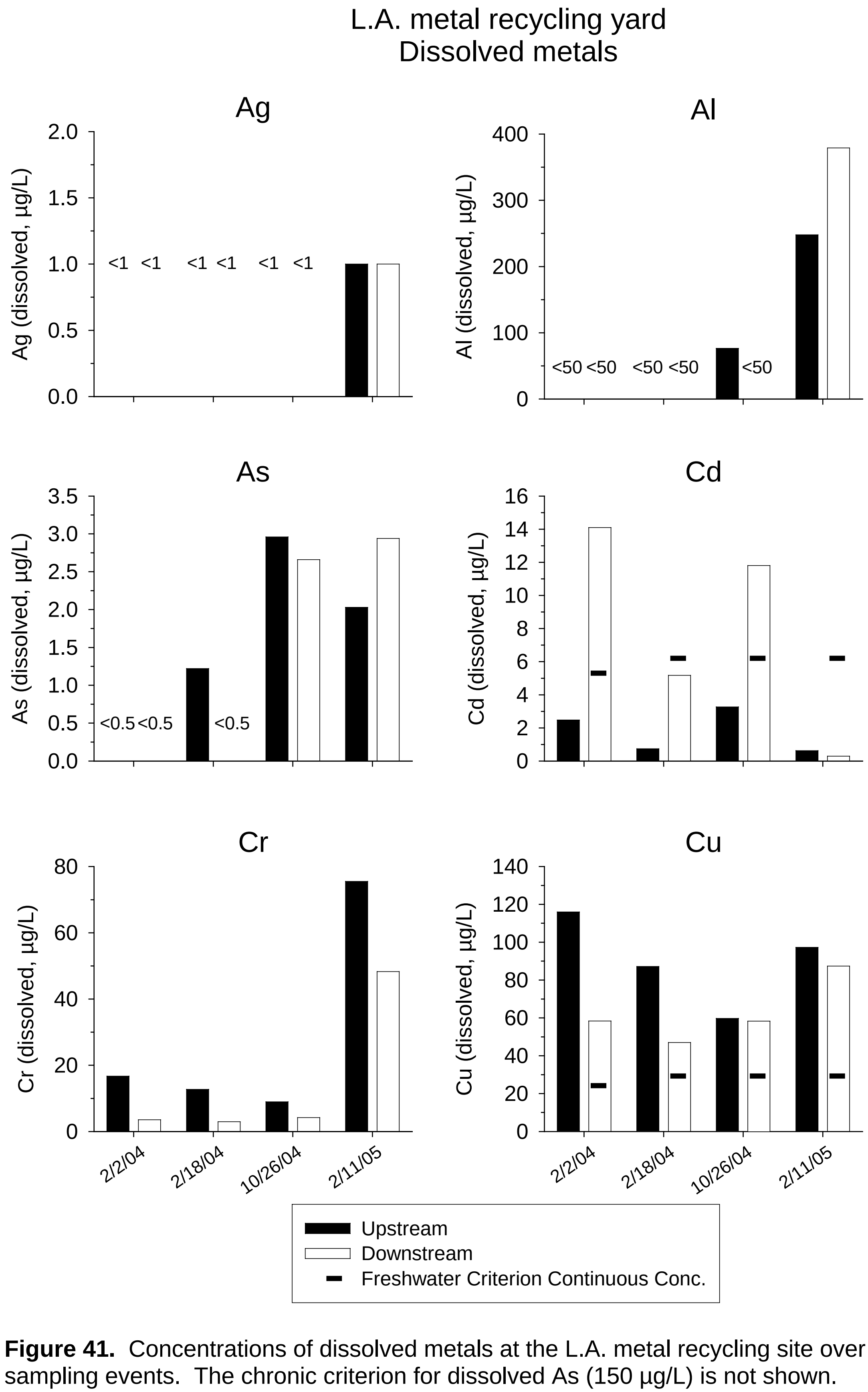


Figure 41. Concentrations of dissolved metals at the L.A. metal recycling site over four sampling events. The chronic criterion for dissolved As (150 µg/L) is not shown.

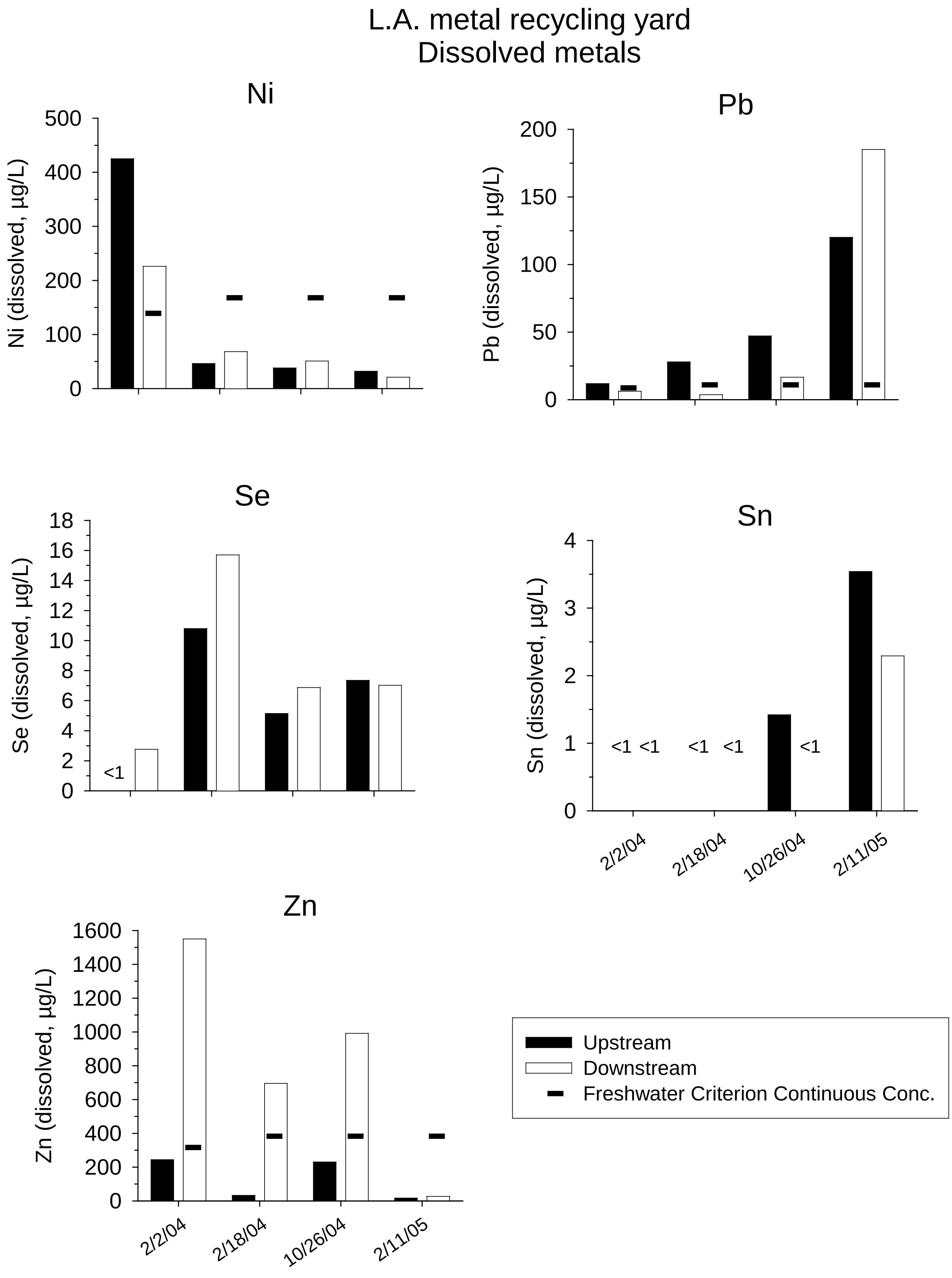


Figure 41 continued.

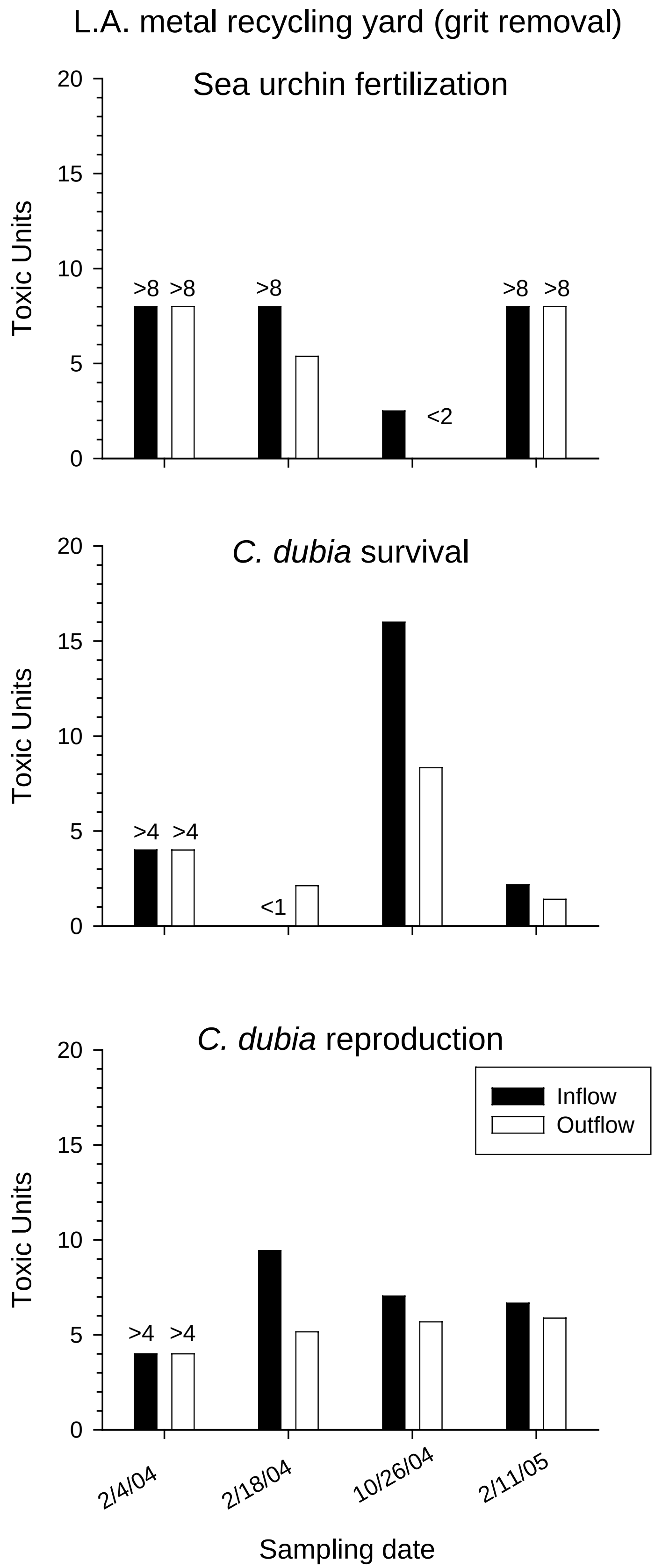
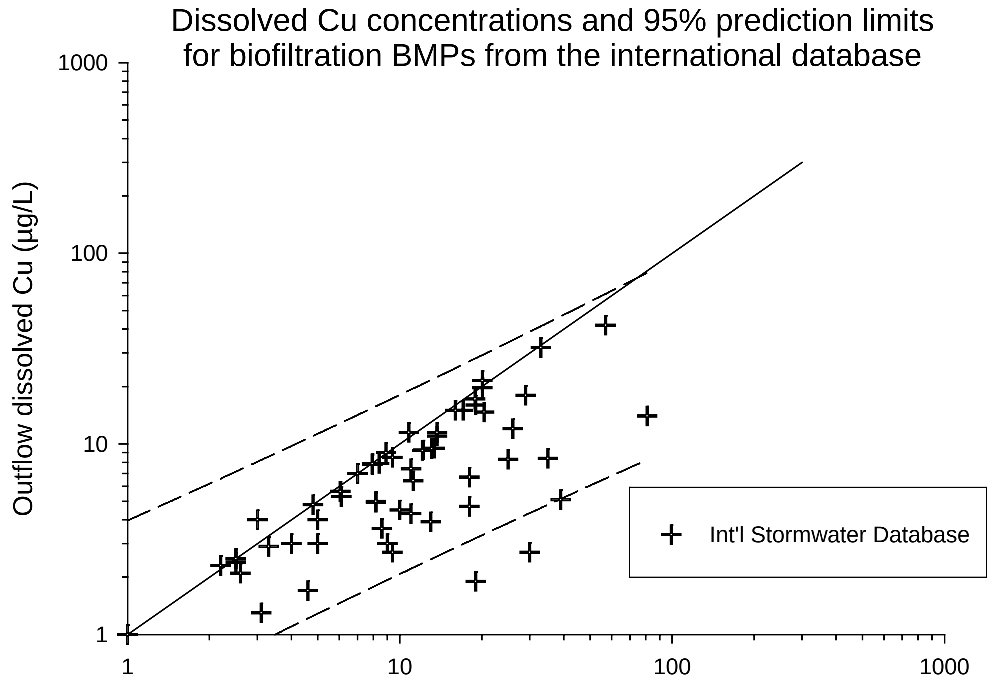


Figure 42. Toxicity in the stormwater samples from the L.A. metal recycling site.



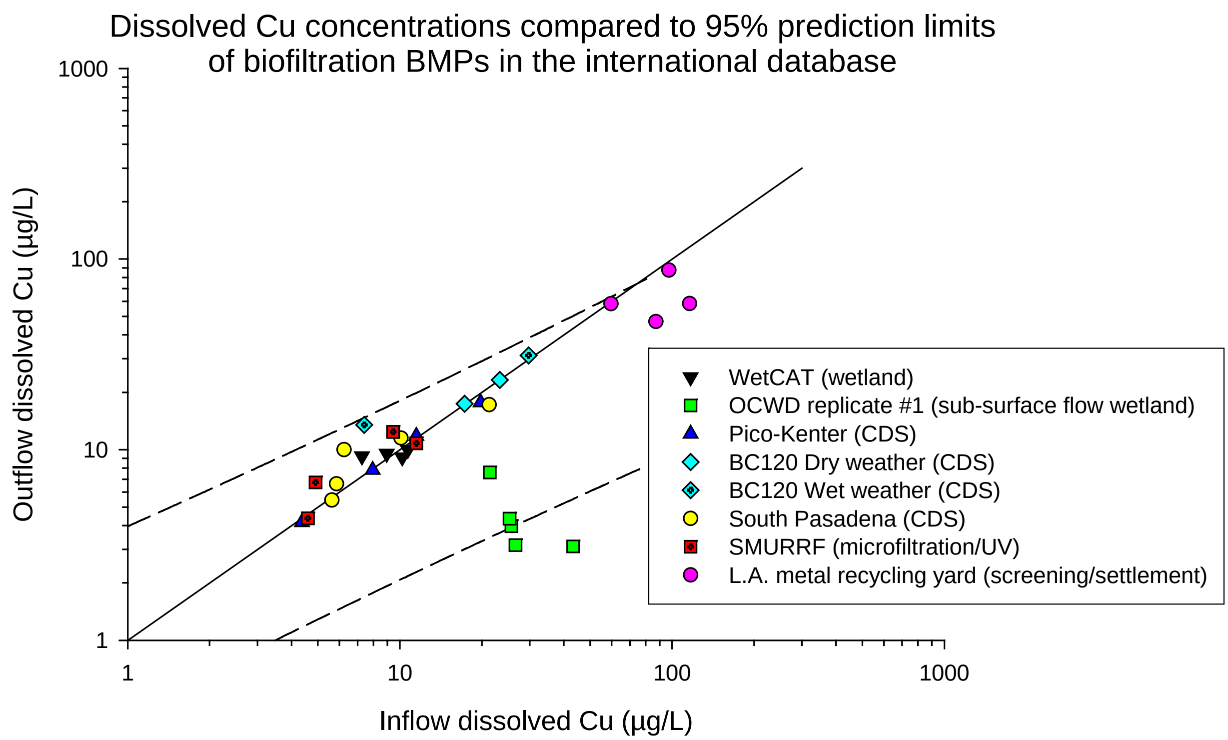
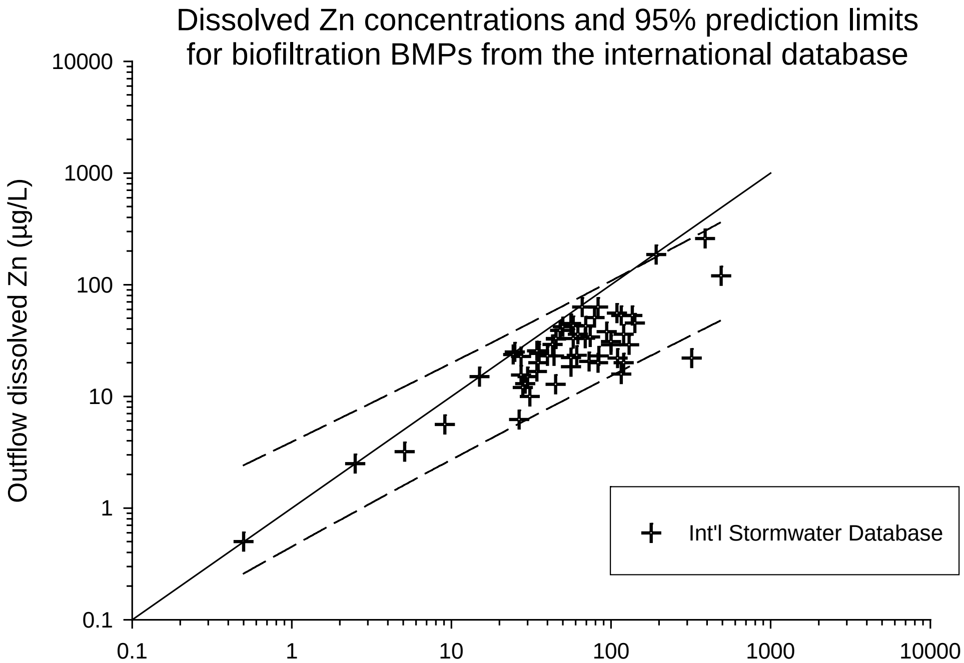


Figure 43. Dissolved Cu concentrations and 95% prediction limits (dashed lines) of biofiltration BMPs in the international stormwater database (top graph). The bottom graph shows data from the current study plotted against the biofiltration prediction limits from the database. The solid line is the one-to-one relationship. There were 60 pairs of inflow/outflow dissolved Cu data for biofiltration BMPs in the international database.



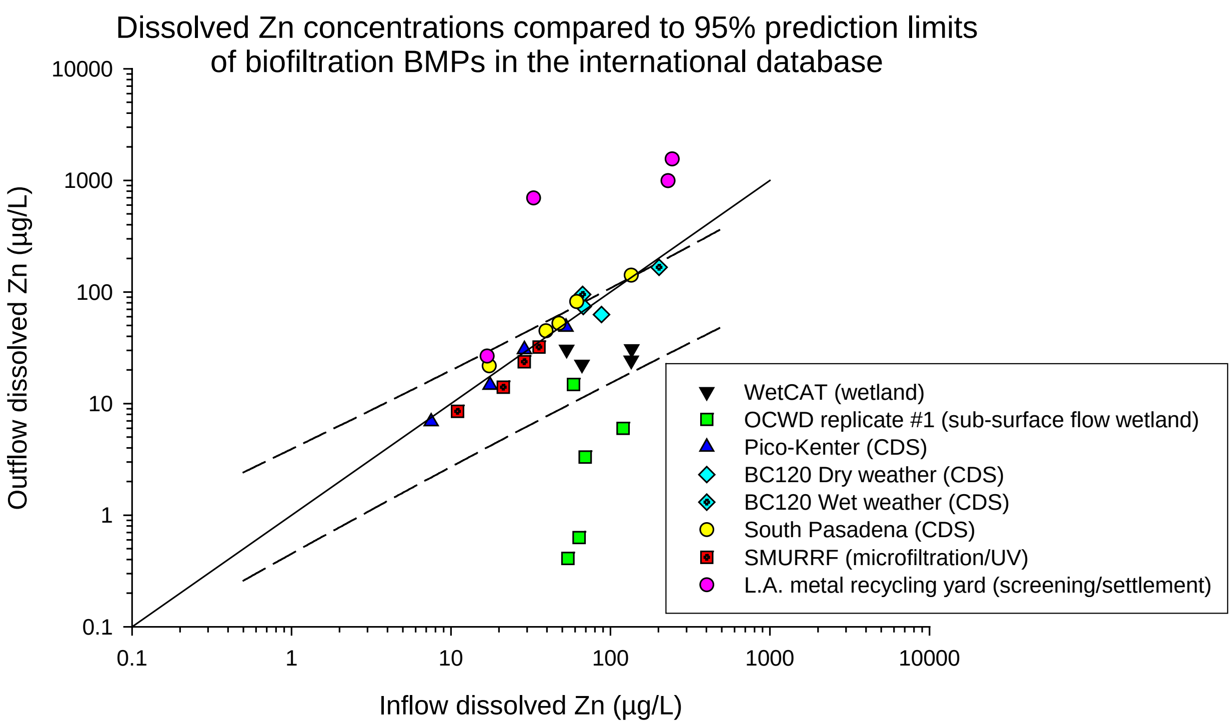
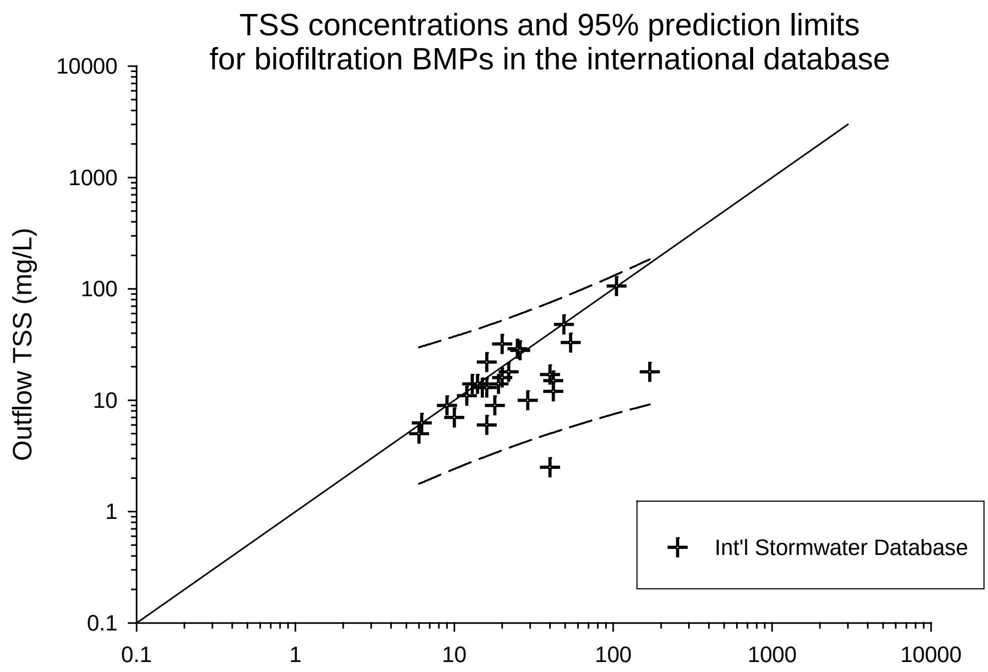


Figure 44. Dissolved Zn concentrations and 95% prediction limits (dashed lines) of biofiltration BMPs in the international stormwater database (top graph). The bottom graph shows data from the current study plotted against the biofiltration prediction limits from the database. The solid line is the one-to-one relationship. There were 60 pairs of inflow/outflow dissolved Zn data for biofiltration BMPs in the international database.



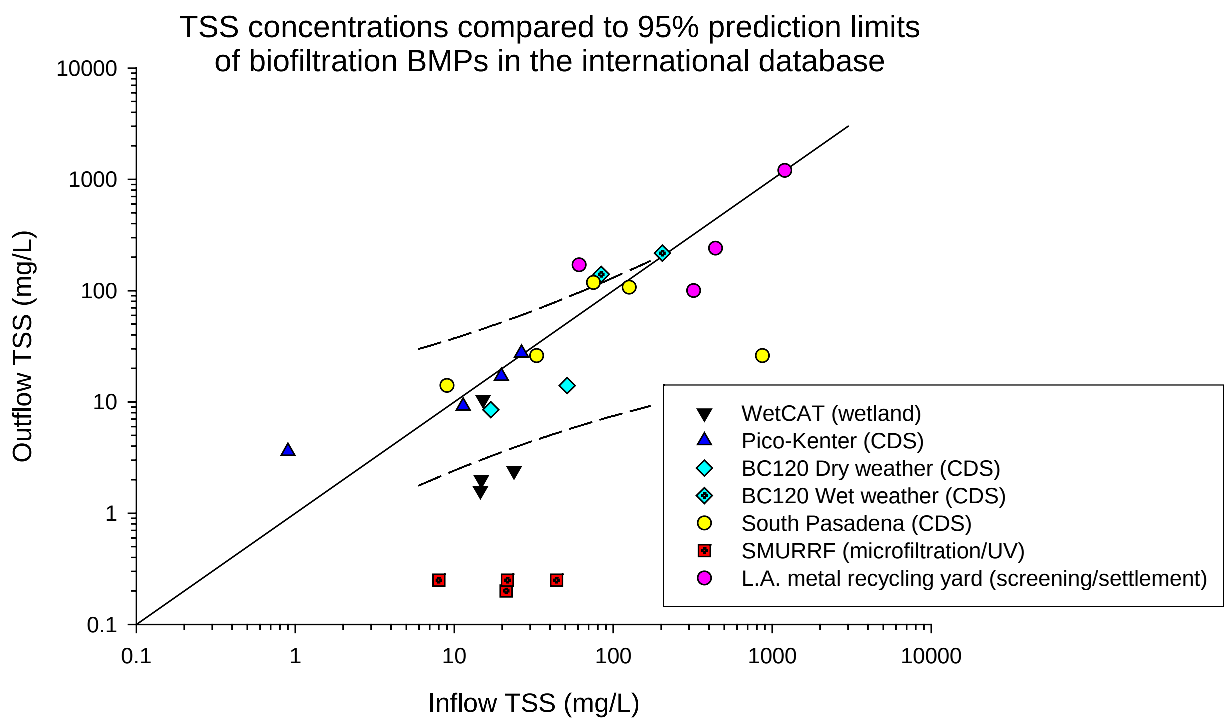
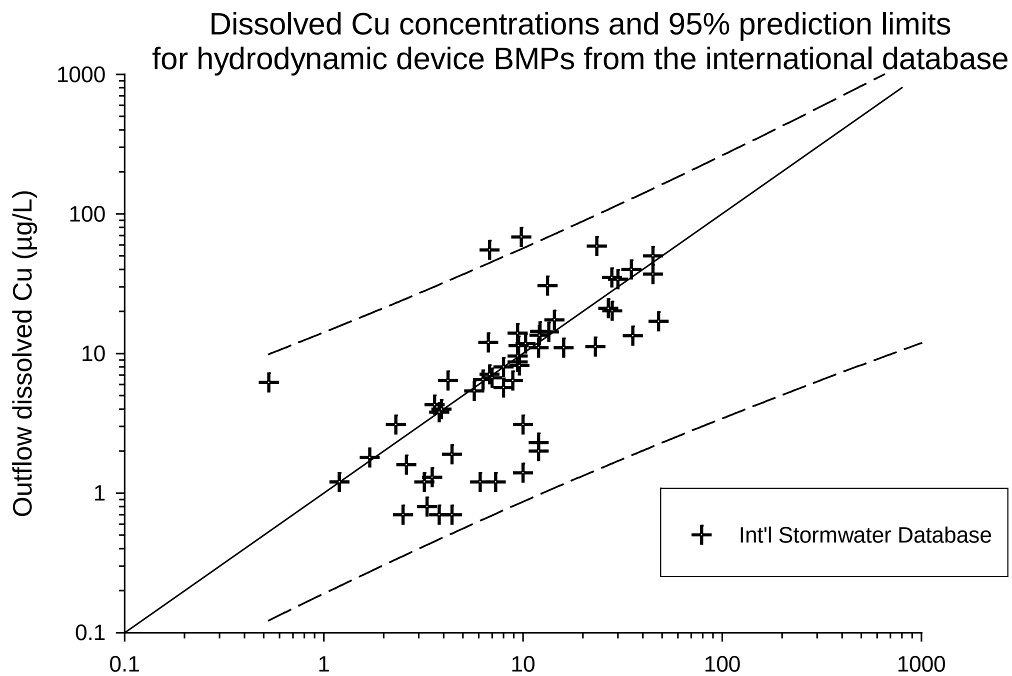


Figure 45. Concentrations of TSS and 95% prediction limits (dashed lines) of biofiltration BMPs in the international stormwater database (top graph). The bottom graph shows data from the current study plotted against the biofiltration prediction limits from the database. The solid line is the one-to-one relationship. There were 27 pairs of inflow/outflow TSS data from biofiltration BMPs in the international database.



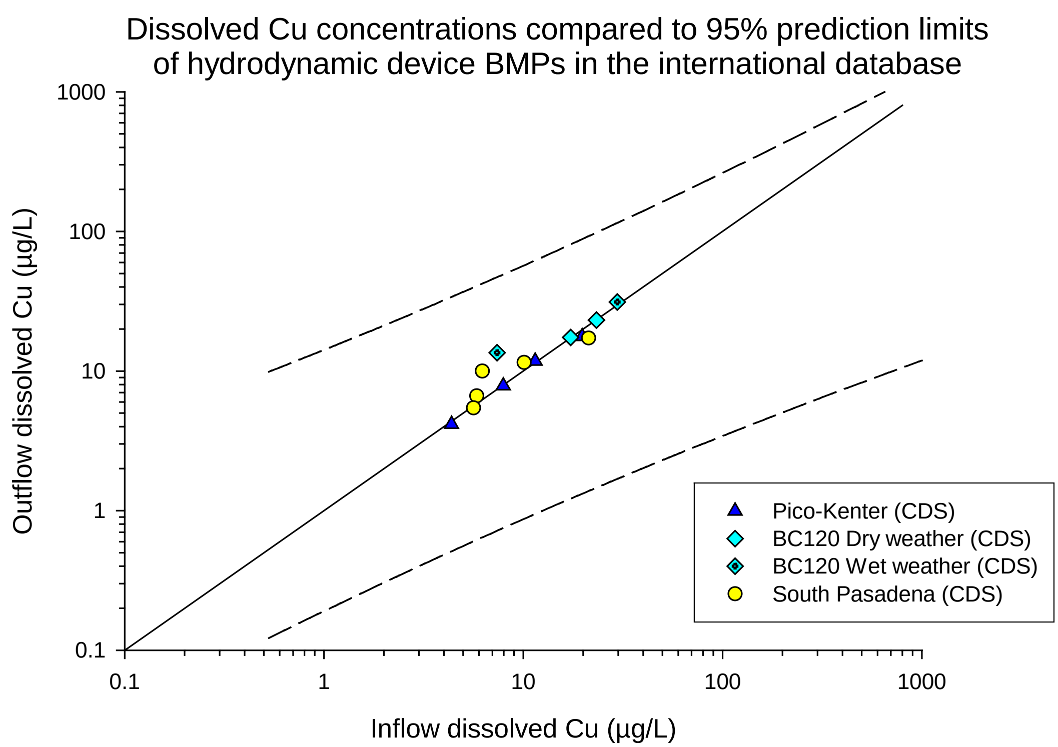
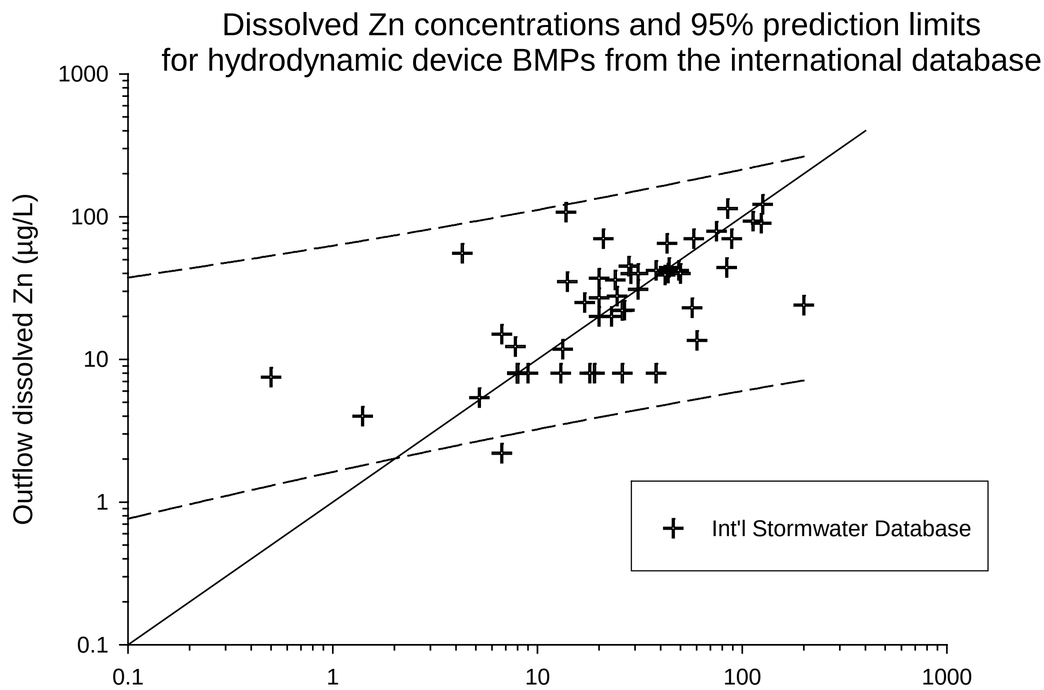


Figure 46. Concentrations of dissolved Cu and 95% prediction limits (dashed lines) of hydrodynamic device BMPs in the international stormwater database (top graph). The bottom graph shows data from the current study plotted against the hydrodynamic device prediction limits from the database. The solid line is the one-to-one relationship. There were 58 pairs of inflow/outflow dissolved Cu data from hydrodynamic device BMPs in the international database.



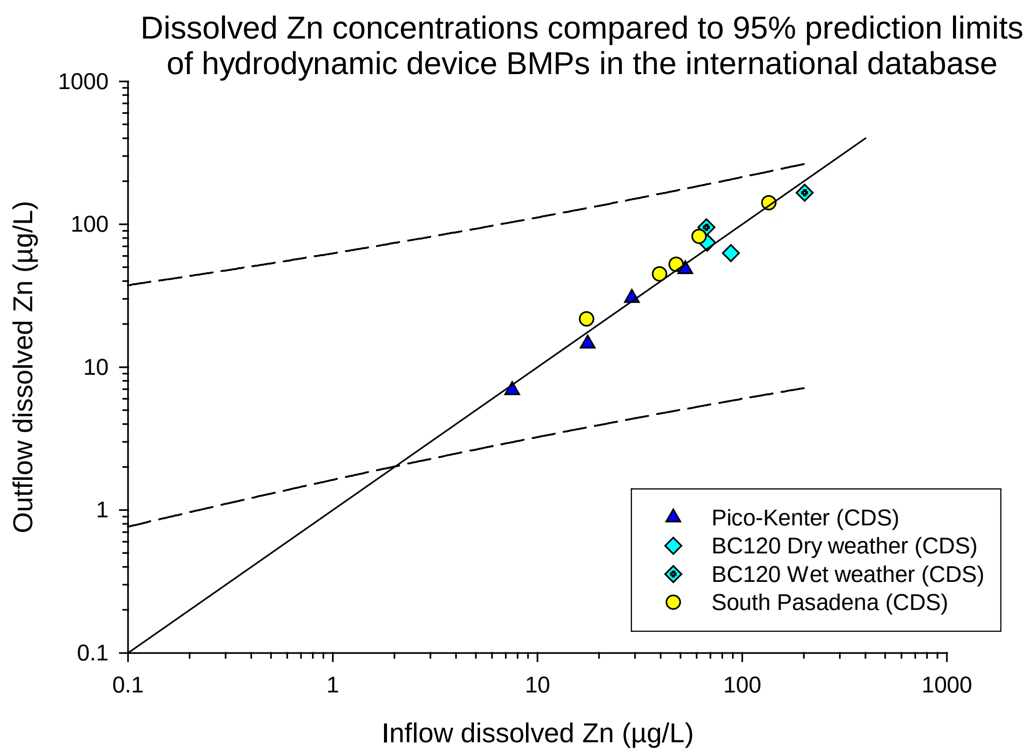
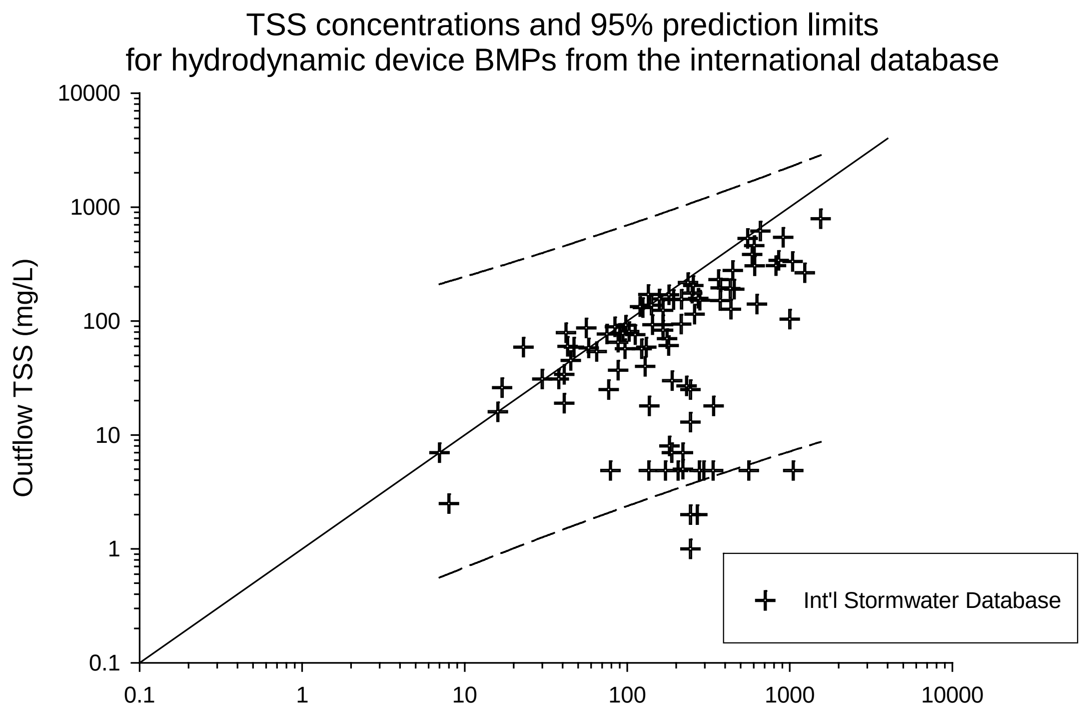


Figure 47. Concentrations of dissolved Zn and 95% prediction limits (dashed lines) of hydrodynamic device BMPs in the international stormwater database (top graph). The bottom graph shows data from the current study plotted against the hydrodynamic device prediction limits from the database. The solid line is the one-to-one relationship. There were 57 pairs of inflow/outflow dissolved Zn data from hydrodynamic device BMPs in the international database.



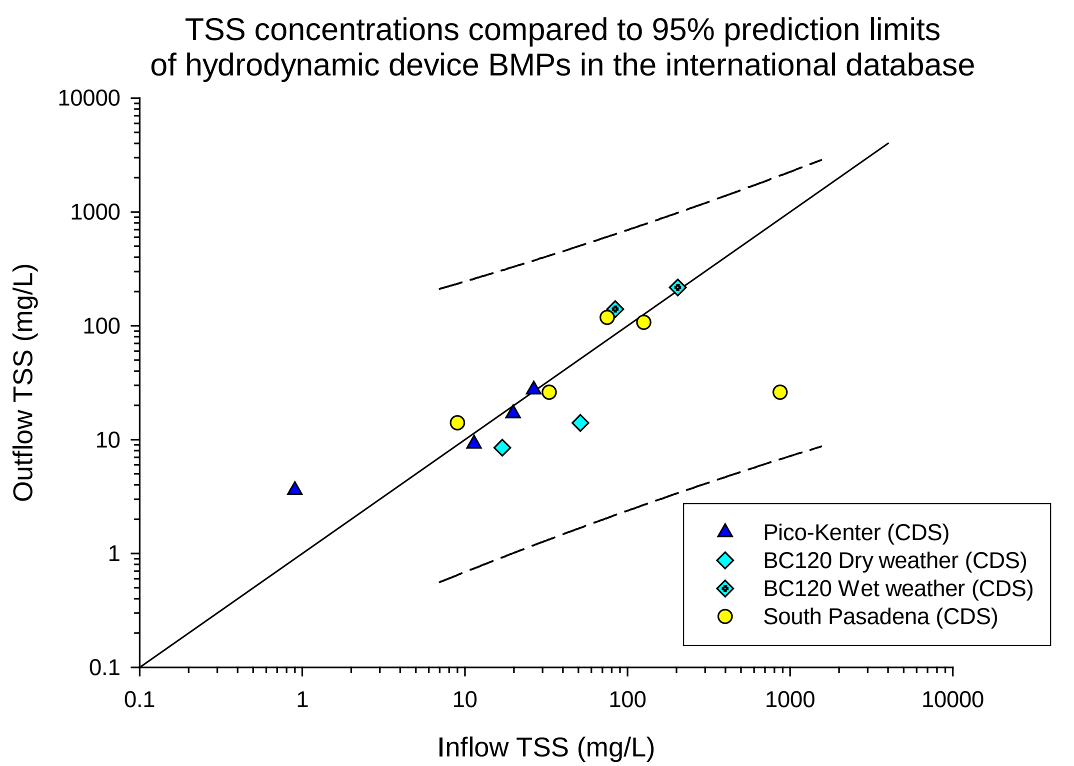


Figure 48. Concentrations of TSS and 95% prediction limits (dashed lines) of hydrodynamic device BMPs in the international stormwater database (top graph). The bottom graph shows data from the current study plotted against the hydrodynamic device prediction limits from the database. The solid line is the one-to-one relationship. There were 93 pairs of inflow/outflow TSS data from hydrodynamic device BMPs in the international database.

Table 7. Toxicity in the Wet CAT wetland samples. NA = not analyzed. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 or LC50 = concentration of sample that caused a 50% reduction in fertilization or reproduction (EC50), or survival (LC50). TU = toxic units.

	11/18/04			12/16/04			1/20/05			3/10/05		
	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU
Inflow												
Echinoderm fertilization	50	>50	<2	50	>50	<2	<12.5	33	3.1	<12.5	<12.5	>8
C. dubia survival	50	41	2.4	100	>100	<1	100	>100	<1	100	>100	<1
C. dubia reproduction	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	>100	<1
Outflow												
Echinoderm fertilization	50	>50	<2	50	>50	<2	50	>50	<2	25	46	2.2
C. dubia survival	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1
C. dubia reproduction	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	>100	<1

Table 8. Toxicity in the OCWD sub-surface flow wetland cells. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 = concentration of sample that caused a 50% reduction in fertilization. TU = toxic units.

	2/3/05			2/10/05			2/24/05			3/3/05			3/10/05		
	NOEC (%)	EC50 (%)	TU	NOEC (%)	EC50 (%)	TU	NOEC (%)	EC50 (%)	TU	NOEC (%)	EC50 (%)	TU	NOEC (%)	EC50 (%)	TU
Wetland cell#1															
Inflow Echinoderm fertilization	25	>50	<2	50	>50	<2	50	>50	<2	50	>50	<2	25	>50	<2
Outflow Echinoderm fertilization	50	>50	<2	50	>50	<2	50	>50	<2	50	>50	<2	50	>50	<2
Wetland cell#2															
Inflow Echinoderm fertilization	50	>50	<2	50	>50	<2	50	>50	<2	50	>50	<2	50	>50	<2
Outflow Echinoderm fertilization	50	>50	<2	50	>50	<2	50	>50	<2	50	>50	<2	50	>50	<2

Table 9. Toxicity in the Pico-Kenter CDS samples. NA = not analyzed. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 or LC50 = concentration of sample that caused a 50% reduction in fertilization or reproduction (EC50), or survival (LC50). TU = toxic units.

	11/18/04			12/16/04			1/20/05			3/10/05		
	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU
Inflow												
Echinoderm fertilization	50	>50	<2	25	60	1.7	25	>50	<2	<12.5	>50	<2
C. dubia survival	100	>100	<1	100	>100	<1	NA	NA	NA	100	>100	<1
C. dubia reproduction	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	>100	<1
Outflow												
Echinoderm fertilization	50	>50	<2	25	48	2.1	25	44	2.3	12.5	>50	<2
C. dubia survival	100	>100	<1	100	>100	<1	NA	NA	NA	100	>100	<1
C. dubia reproduction	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	>100	<1

Table 10. Toxicity in the BC120 CDS dry weather samples. NA = not analyzed. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 or LC50 = concentration of sample that caused a 50% reduction in fertilization or reproduction (EC50), or survival (LC50). TU = toxic units.

	1/19/05			3/10/05		
	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU
Inflow						
Echinoderm fertilization	25	42	2.4	50	>50	<2
C. dubia survival	NA	NA	NA	100	>100	<1
C. dubia reproduction	NA	NA	NA	100	>100	<1
Outflow						
Echinoderm fertilization	12.5	33	3.0	<12.5	>50	<2
C. dubia survival	NA	NA	NA	100	>100	<1
C. dubia reproduction	NA	NA	NA	100	>100	<1

Table 11. Toxicity in the BC120 CDS wet weather samples. NA = not analyzed. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 or LC50 = concentration of sample that caused a 50% reduction in fertilization or reproduction (EC50) or survival (LC50). TU = toxic units.

	1/26/05			2/11/05		
	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU
Inflow						
Echinoderm fertilization	<12.5	<12.5	>8	25	38	2.6
C. dubia survival	NA	NA	NA	100	>100	<1
C. dubia reproduction	NA	NA	NA	100	>100	<1
Outflow						
Echinoderm fertilization	<12.5	<12.5	>8	25	34	2.9
C. dubia survival	NA	NA	NA	100	>100	<1
C. dubia reproduction	NA	NA	NA	100	>100	<1

Table 12. Toxicity in the South Pasadena CDS samples. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 or LC50 = concentration of sample that caused a 50% reduction in fertilization or reproduction (EC50) or survival (LC50). TU = toxic units.

	12/5/04			1/2/05			1/7/05			1/26/05			2/11/05		
	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU
Inflow															
Echinoderm fertilization	12.5	30.5	3.3	<12.5	20	5.0	<12.5	<12.5	>8	<12.5	<12.5	>8	12.5	20	30.5
C. dubia survival	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1
C. dubia reproduction	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1
Outflow															
Echinoderm fertilization	12.5	27.5	3.6	<12.5	14	7.1	<12.5	<12.5	>8	<12.5	<12.5	>8	<12.5	18	27.5
C. dubia survival	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1
C. dubia reproduction	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1

Table 13. Toxicity in the SMURRF samples. NA = not analyzed. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 or LC50 = concentration of sample that caused a 50% reduction in fertilization or reproduction (EC50), or survival (LC50). TU = toxic units

	11/18/04			12/16/04			1/20/05			3/10/05		
	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU
Inflow												
Echinoderm fertilization	50	>50	<2	25	40	2.5	<12.5	85	1.2	25	>50	<2
C. dubia survival	100	>100	<1	100	>100	<1	100	>100	<1	100	>100	<1
C. dubia reproduction	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	>100	<1
Outflow												
Echinoderm fertilization	6.25	11.5	8.7	<12.5	<12.5	>8	<12.5	<12.5	>8	25	>50	<2
C. dubia survival	50	70.7	1.4	100	>100	<1	100	>100	<1	100	>100	<1
C. dubia reproduction	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	>100	<1

Table 14. Toxicity in the L.A. metal recycling yard BMP samples. NA = not analyzed. NOEC = No Effect Concentration, which is the highest concentration of sample tested that did not cause an effect. EC50 or LC50 = concentration of sample that caused a 50% reduction in fertilization or reproduction (EC50), or survival (LC50). TU = toxic units.

	2/2/04			2/18/04			10/26/04			2/11/05		
	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU	NOEC (%)	EC50 or LC50 (%)	TU
Inflow												
Echinoderm fertilization	<12.5	<12.5	>8	<12.5	<12.5	>8	12.5	40	2.5	<12.5	<12.5	>8
C. dubia survival	<25	<25	>4	100	>100	<1	6.25	6.25	16.0	25	46	2.2
C. dubia reproduction	<25	<25	>4	6.25	10.6	9.4	<6.25	14.2	7.0	<25	15	6.7
Outflow												
Echinoderm fertilization	<12.5	<12.5	>8	12.5	19	5.4	50	>50	<2	<12.5	<12.5	>8
C. dubia survival	<25	<25	>4	25	47	2.1	12.5	12	8.3	50	71	1.4
C. dubia reproduction	<25	<25	>4	12.5	19	5.2	12.5	18	5.7	<25	17	5.9

Table 15. Proportion of sampling events with ≥10% reduction between inflow and outflow samples. NA = not analyzed. ND = not detected.

	Wet CAT (wetland) Dry weather	OCWD (sub-surface flow wetland) Experimental dosing	Pico-Kenter (CDS) Dry weather	BC120 (CDS) Dry weather	BC120 (CDS) Wet weather	South Pasadena (CDS) Wet weather	SMURRF (filtration + UV) Dry weather	L.A. metal recycling yard (grit removal) Wet weather
Total metals								
Al	3/4	NA	1/4	2/2	0/2	2/4	4/4	2/4
As	1/4	NA	1/4	0/2	0/2	ND	1/4	2/4
Cd	4/4	NA	ND	ND	0/2	ND	1/1	1/4
Cr	3/4	NA	0/4	1/2	0/2	2/5	4/4	1/4
Cu	4/4	5/5 (cell#1 & #2)	0/4	2/2	0/2	2/5	4/4	1/4
Ni	4/4	NA	0/4	1/2	0/2	2/5	4/4	2/4
Pb	0/2	NA	2/4	2/2	0/2	3/5	4/4	2/4
Se	4/4	NA	0/4	0/2	0/2	ND	0/4	0/4
Zn	4/4	5/5 (cell#1 & #2)	0/4	2/2	0/2	3/5	4/4	2/4
Dissolved metals								
Al	4/4	NA	2/4	0/2	0/2	ND	4/4	1/2
As	0/4	NA	0/4	0/2	0/2	ND	0/4	2/3
Cd	4/4	NA	0/1	1/1	1/1	ND	ND	1/4
Cr	2/4	NA	2/4	0/2	0/2	0/4	0/4	4/4
Cu	1/4	5/5 (cell#1 & #2)	1/4	0/2	0/2	1/5	0/4	3/4
Ni	4/4	NA	0/4	0/2	0/2	0/3	1/4	2/4
Pb	0/1	NA	0/2	1/2	0/2	0/3	1/2	3/4
Se	1/4	NA	2/4	0/2	1/2	ND	0/4	0/4
Zn	4/4	5/5 (cell#1 & #2)	1/4	1/2	1/2	0/5	4/4	0/4
Total suspended solids	4/4	NA	2/4	2/2	0/2	3/5	4/4	2/4
Organophosphorus pesticides								
Chlorpyrifos	ND	NA	0/1	ND	ND	1/2	ND	NA
Diazinon	2/2	3/4 (cell#1) 5/5 (cell#2)	ND	0/1	1/1	1/1	ND	NA
Malathion	1/1	NA	ND	ND	ND	ND	1/1	NA
Pyrethroid pesticide	ND	NA	ND	ND	ND	NA	ND	NA
Bifenthrin	ND	NA	ND	0/1	ND	ND	ND	NA
Glyphosate	ND	NA	ND	ND	ND	NA	ND	NA

Table 16. BMP effectiveness with regard to chronic water quality criteria. The denominator indicates the number of inflow samples that exceeded the water quality criteria, while the numerator indicates the number of outflow samples that met the criteria only after treatment by the BMP. Instances where the inflow sample was already below the water quality criteria are not counted. NA = not analyzed.

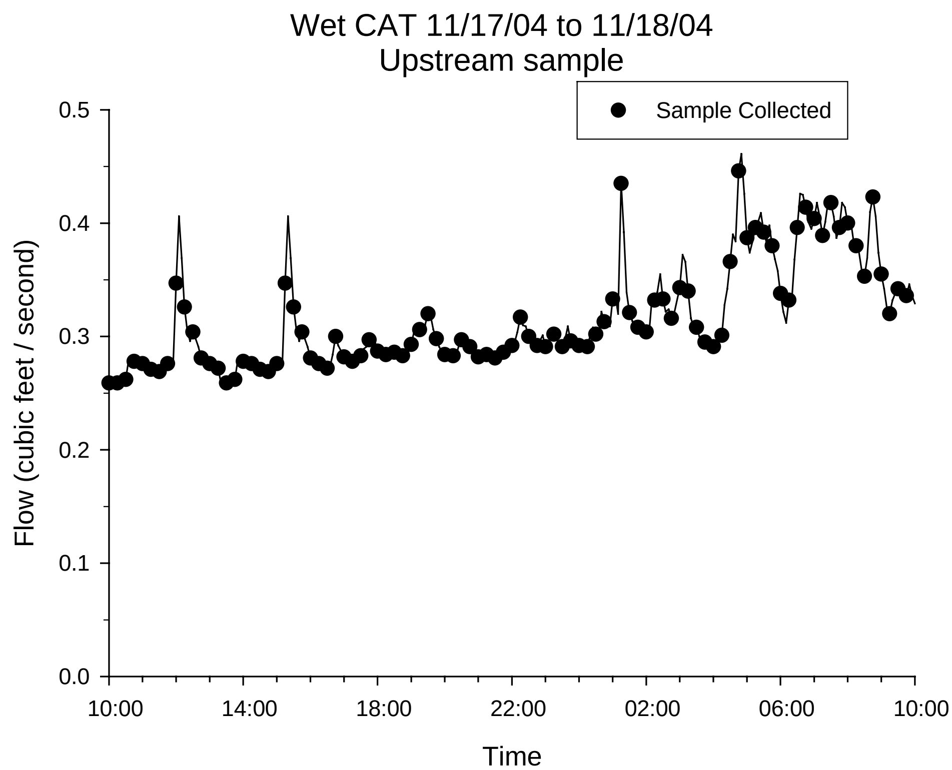
	Wet CAT (wetland) Dry weather	OCWD (sub-surface flow wetland) Experimental dosing	Pico-Kenter (CDS) Dry weather	BC120 (CDS) Dry weather	BC120 (CDS) Wet weather	South Pasadena (CDS) Wet weather	SMURRF (filtration + UV) Dry weather	L.A. metal recycling yard (grit removal) Wet weather
Total metals								
Al	3/4	NA	0/3	0/2	0/2	0/3	4/4	0/2
Se	0/4	NA	0/1	0/0	0/0	0/0	0/1	0/3
Dissolved metals								
As	0/0	NA	0/0	0/0	0/0	0/0	0/0	0/0
Cd	3/3	NA	0/0	0/0	0/0	0/0	0/0	0/0
Cu	0/0	5/5 (cell#1) 2/2 (cell#2)	1/1	0/2	0/2	0/5	0/0	0/4
Ni	2/2	NA	0/0	0/0	0/0	0/0	0/0	0/1
Pb	0/0	NA	0/0	0/1	0/1	1*/3	0/0	2/4
Zn	0/0	0/0 (cell#1) 0/0 (cell#2)	0/0	0/1	0/2	0*/4	0/0	0/1
OP pesticides								
Chlorpyrifos	0/0	NA	0/0	0/0	0/0	0/2	0/0	NA
Diazinon	0/0	0/4 (cell#1) 1/5 (cell#2)	0/0	0/0	1/1	1/1	0/0	NA

* = The outflow sample from 1/2/05 met the water quality criterion only because the hardness of the outflow sample increased substantially relative to the inflow sample, thereby increasing the criterion. These samples are not counted as meeting the chronic criteria after treatment in this table.

Table 17. Overall effectiveness of BMP treatment. The evaluation of the BMP efficiency used a two-tier approach, with a designation of effectiveness for each tier (tier 1/tier 2). The first part of the designation refers to the ability to reduce concentrations by $\geq$10%, while the second part of the designation refers to the ability to attain a water quality criterion. Reductions less than 10% were given a "No/U" designation for no meaningful reduction by the BMP. If the concentrations were reduced by $\geq$10% for at least 75% of the sampling events, the data were then compared to water quality criteria (second tier). If there was insufficient data to assess effectiveness (e.g., measurements were usually below the reporting level), the designation of "U/U" was used. If the outflow sample was reduced to below the chronic criterion a "Yes/+" designation was used. If the reduction did not result in outflow concentrations below the criterion, a "Yes/-" designation was used. If there was a consistent reduction, but the outflow inconsistently met the criterion, the designation of "Yes/?" was used. Instances where concentrations were reduced, but the inflow data was consistently below the criteria were given a "Yes/U" designation. NA = not analyzed.

	Wet CAT (wetland) Dry weather	OCWD (sub-surface flow wetland) Experimental dosing	Pico-Kenter (CDS) Dry weather	BC120 (CDS) Dry weather	BC120 (CDS) Wet weather	South Pasadena (CDS) Wet weather	SMURRF (filtration + UV) Dry weather	L.A. metal recycling yard (grit removal) Wet weather
Total metals								
Al	Yes/?	NA	No/U	Yes/–	No/U	No/U	Yes/+	No/U
Se	Yes/–	NA	No/U	No/U	U/U	U/U	No/U	No/U
Dissolved metals								
As	No/U	NA	No/U	No/U	No/U	U/U	No/U	No/U
Cd	Yes/+	NA	U/U	U/U	U/U	U/U	U/U	No/U
Cu	No/U	Yes/+	No/U	No/U	No/U	No/U	No/U	Yes/–
Ni	Yes/+	NA	No/U	No/U	No/U	U/U	No/U	No/U
Pb	U/U	NA	U/U	No/U	No/U	No/U	U/U	Yes/?
Zn	Yes/U	Yes/U	No/U	No/U	No/U	No/U	Yes/U	No/U
OP pesticides								
Chlorpyrifos	U/U	NA	U/U	U/U	U/U	No/U	U/U	NA
Diazinon	Yes/U	Yes/?	U/U	U/U	U/U	U/U	U/U	NA

Appendix: Hydrographs



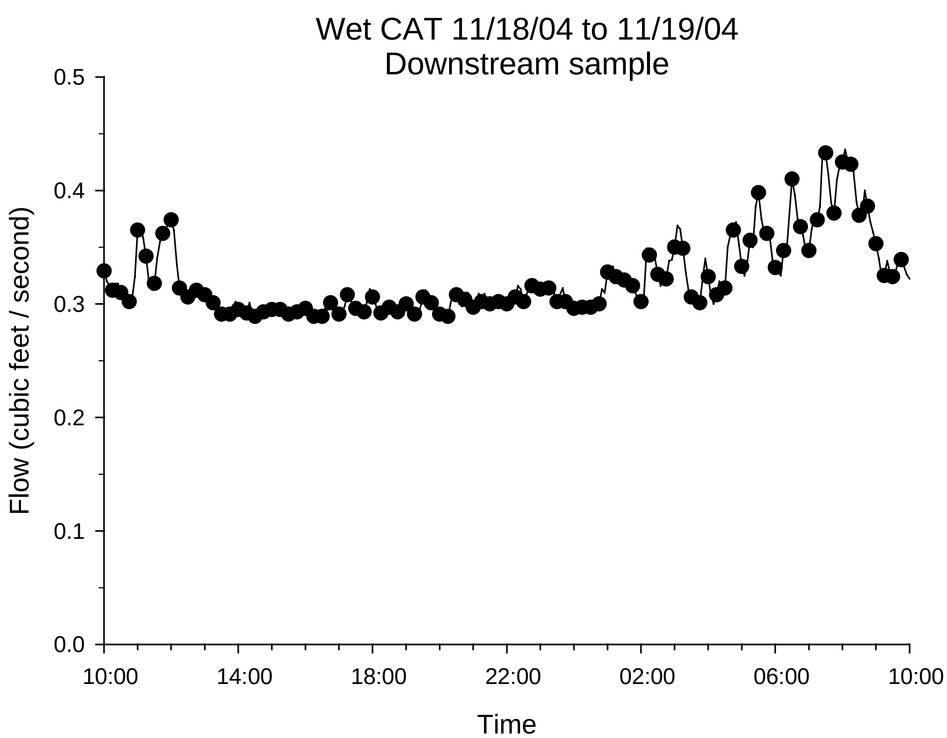
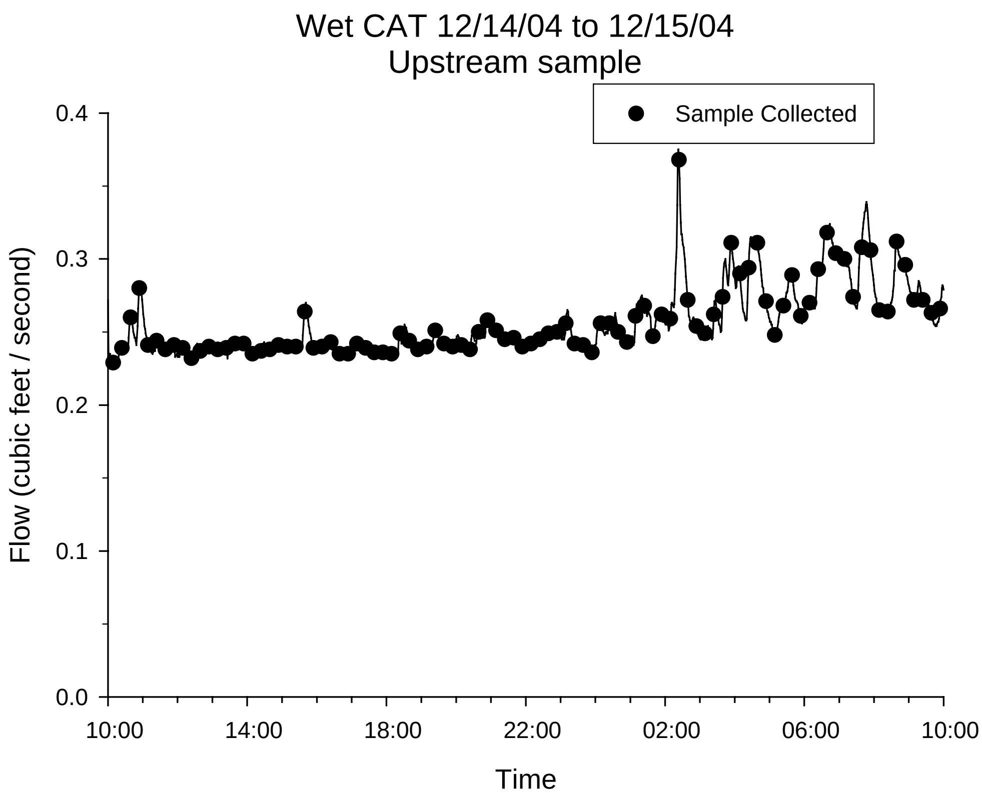


Figure A-1. Hydrograph at Wet CAT during the November 17-19, 2004 dry weather sampling event. Dots (●) indicate when the samples were collected for the chemistry and toxicity composite samples.



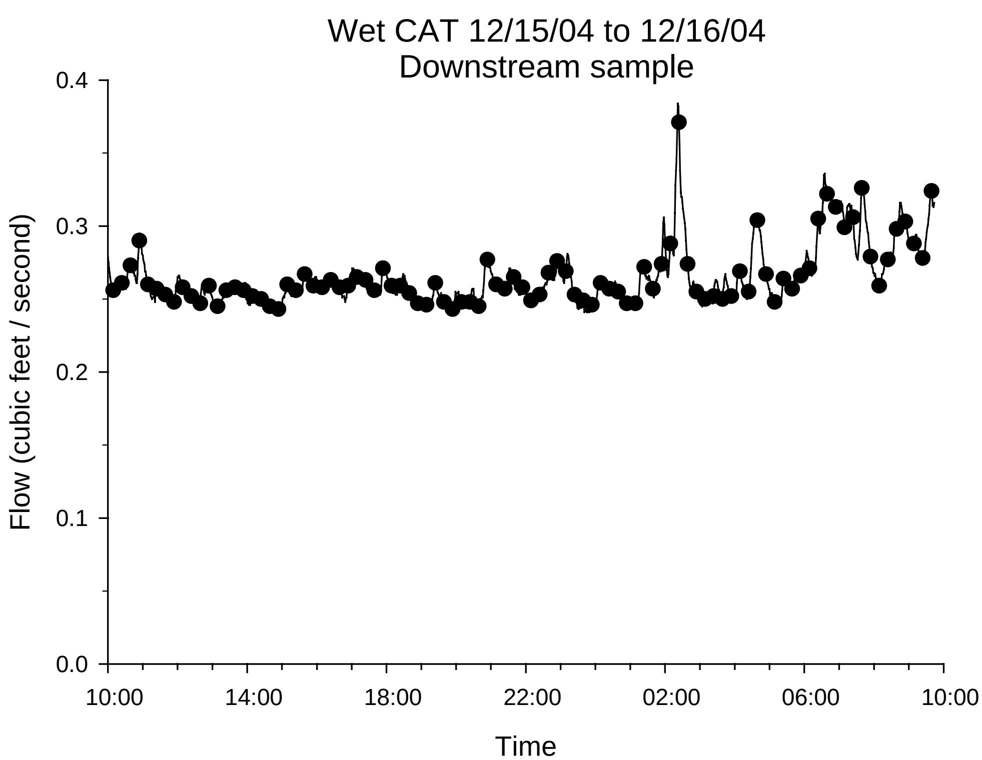
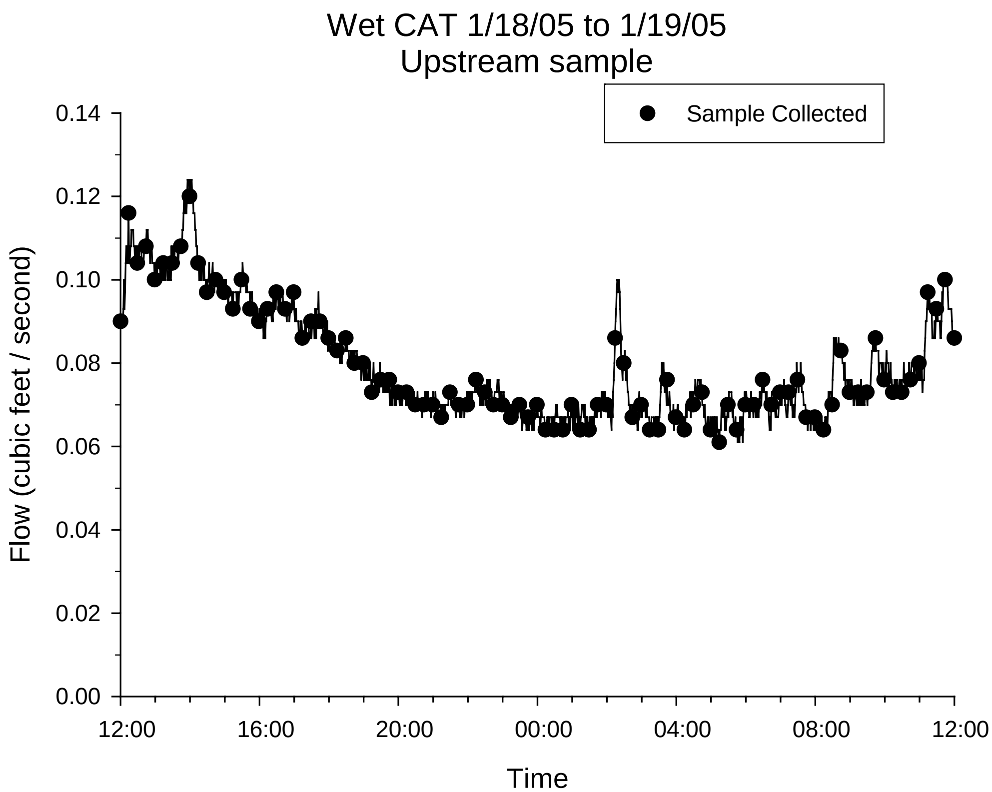


Figure A-2. Hydrograph at Wet CAT during the December 14-16, 2004 dry weather sampling event. Dots (●) indicate when the samples were collected for the chemistry and toxicity composite samples.



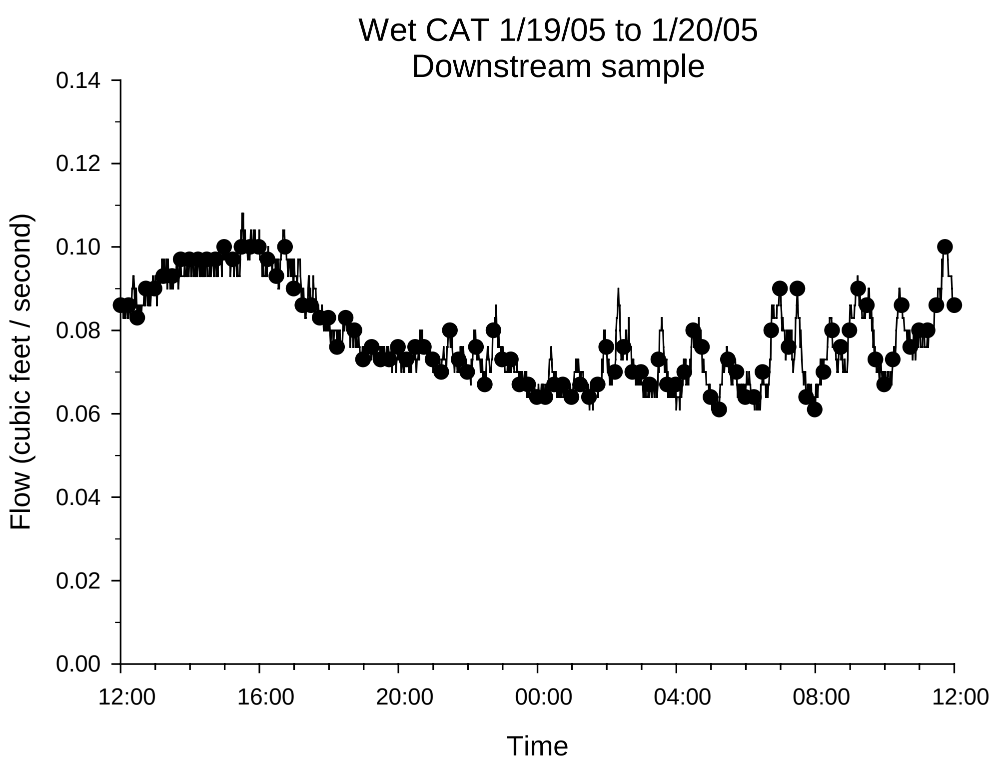
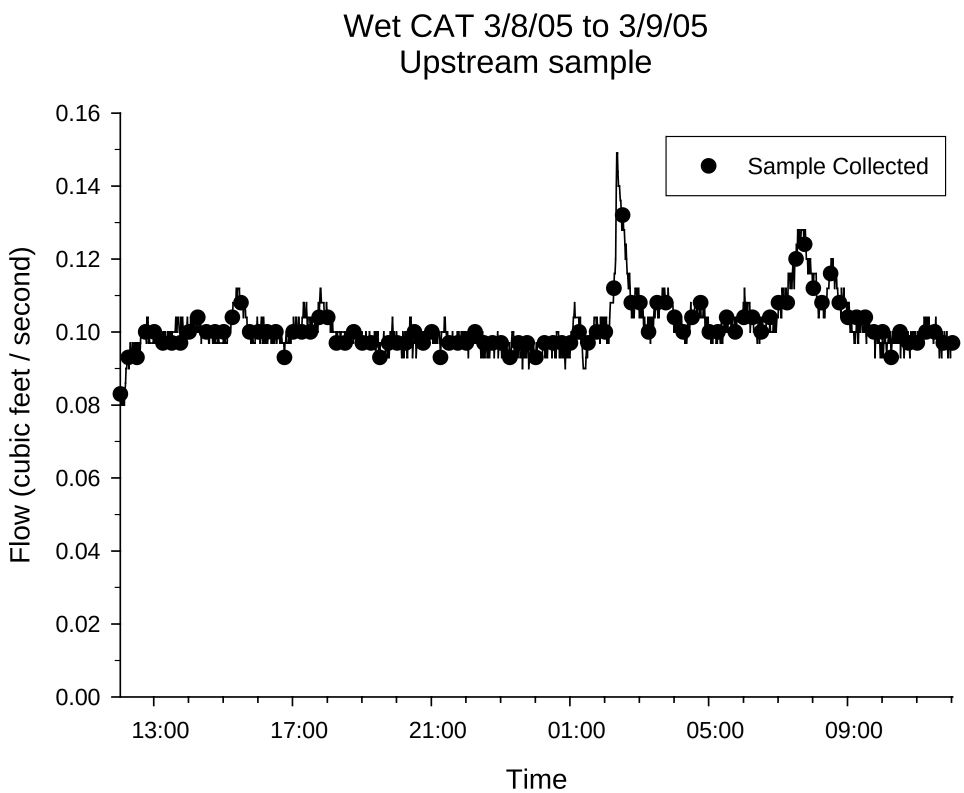


Figure A-3. Hydrograph at Wet CAT during the January 18-20, 2005 dry weather sampling event. Dots (●) indicate when the samples were collected for the composite toxicity and chemistry samples.



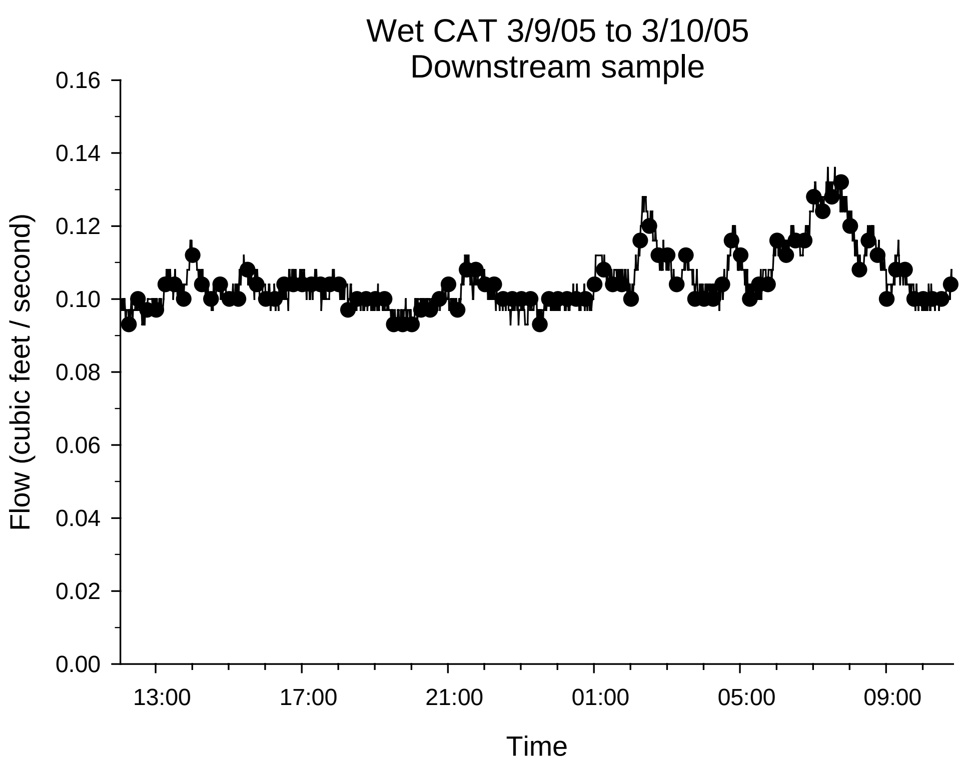


Figure A-4. Hydrograph at Wet CAT during the March 8-10, 2005 dry weather sampling event. Dots (●) indicate when the samples were collected for the composite toxicity and chemistry samples.

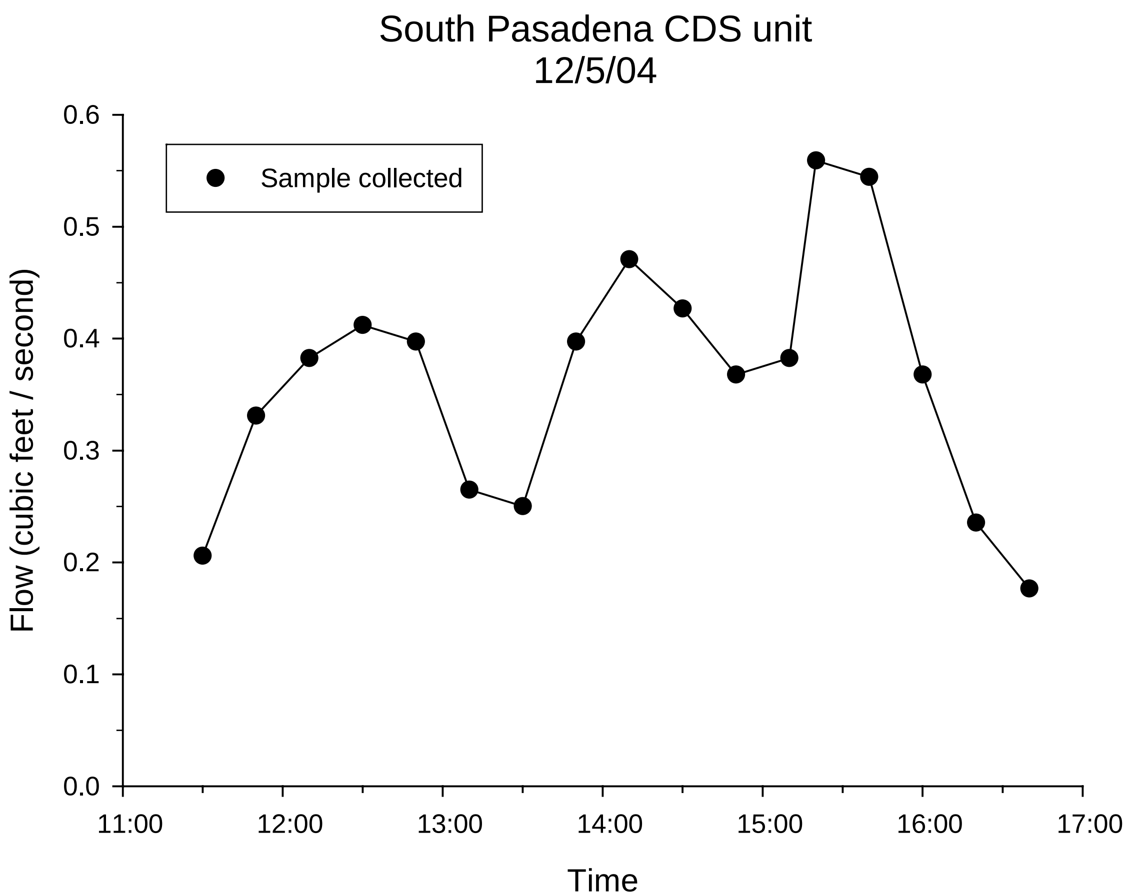


Figure A-5. Hydrograph at the South Pasadena CDS site during the December 5, 2004 storm water sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.

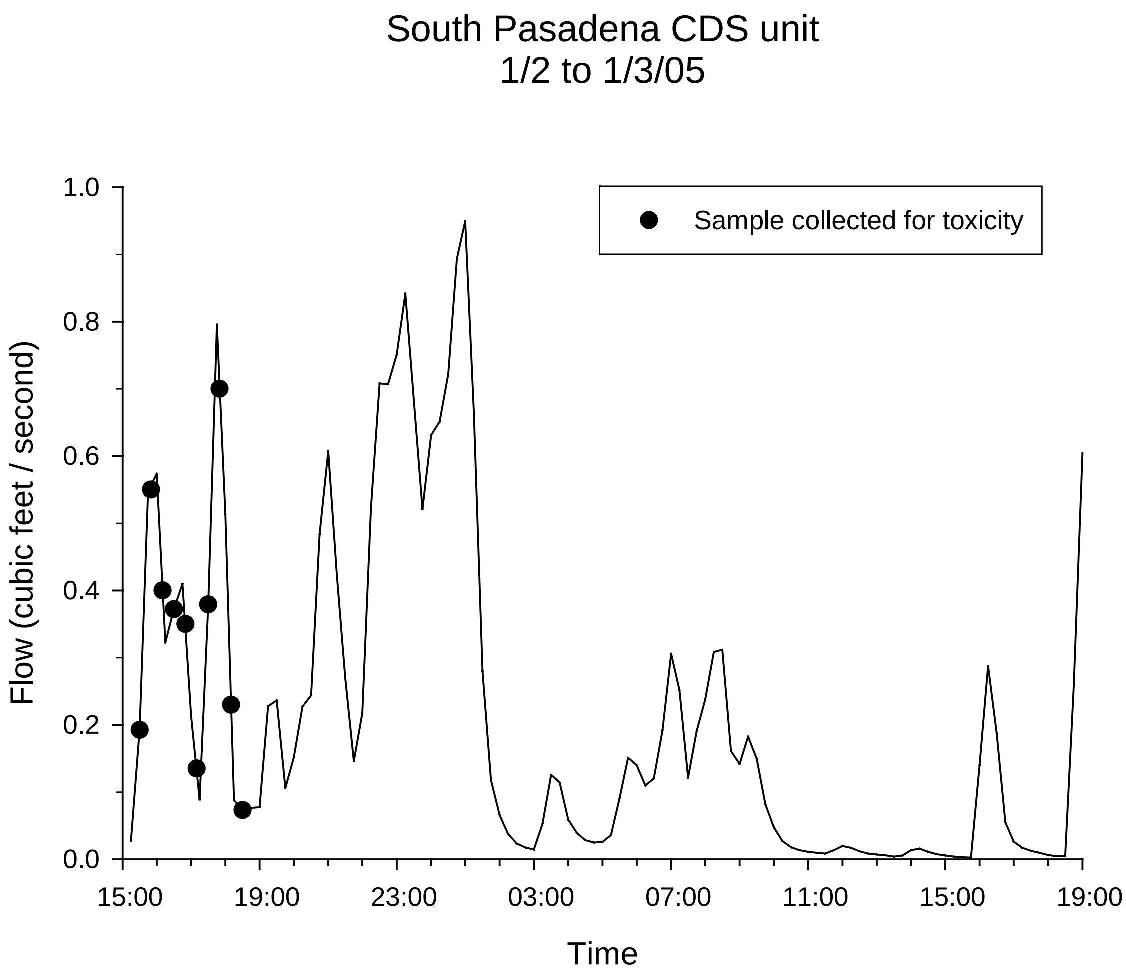


Figure A-6. Hydrograph at the South Pasadena CDS site during the January 2-3, 2005 storm water sampling event. Samples were collected at 20 min intervals from 15:30 to 18:30 for the toxicity composite (indicated by the dots). The entire hydrograph was sampled at 20 min intervals for chemical analysis.

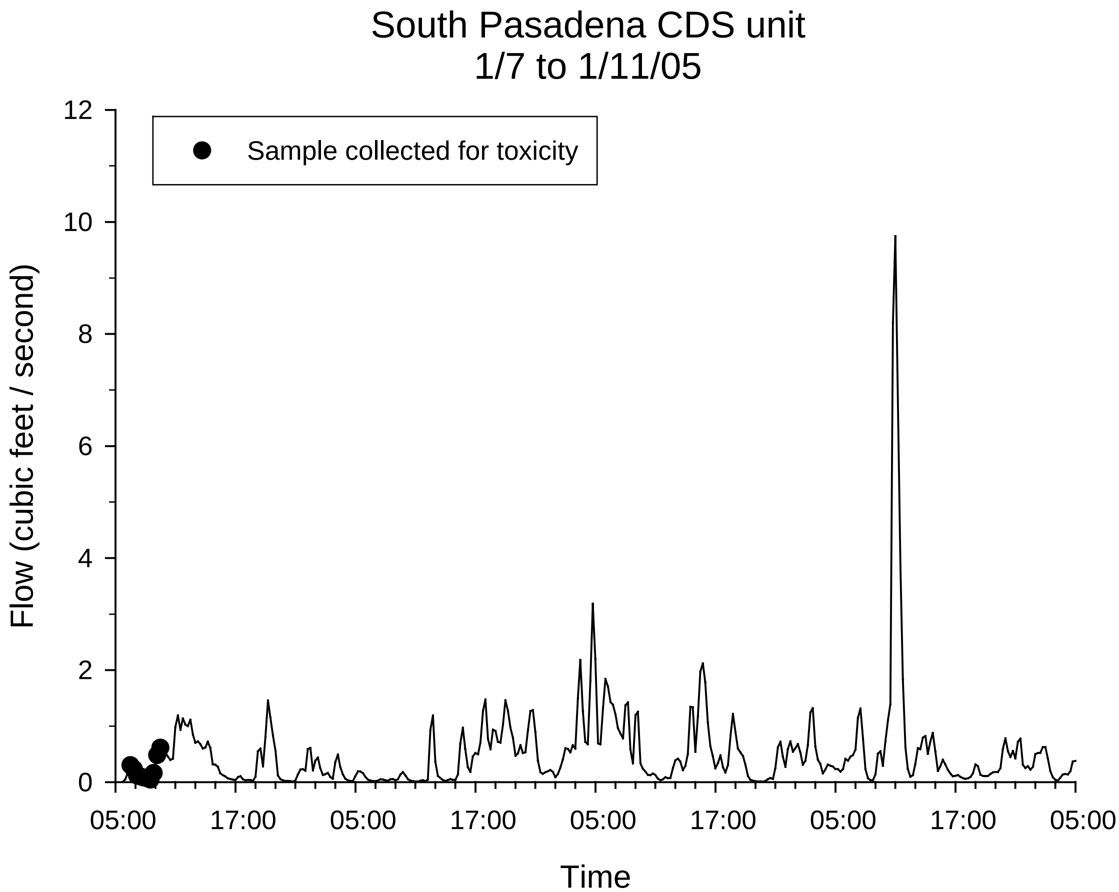


Figure A-7. Hydrograph at the South Pasadena CDS site during the January 7-11, 2005 storm water sampling event. Samples were collected at 20 min intervals from 5:30 am to 8:30 am for the toxicity composite (indicated by the dots). The entire hydrograph was sampled at 20 min intervals for chemical analysis.

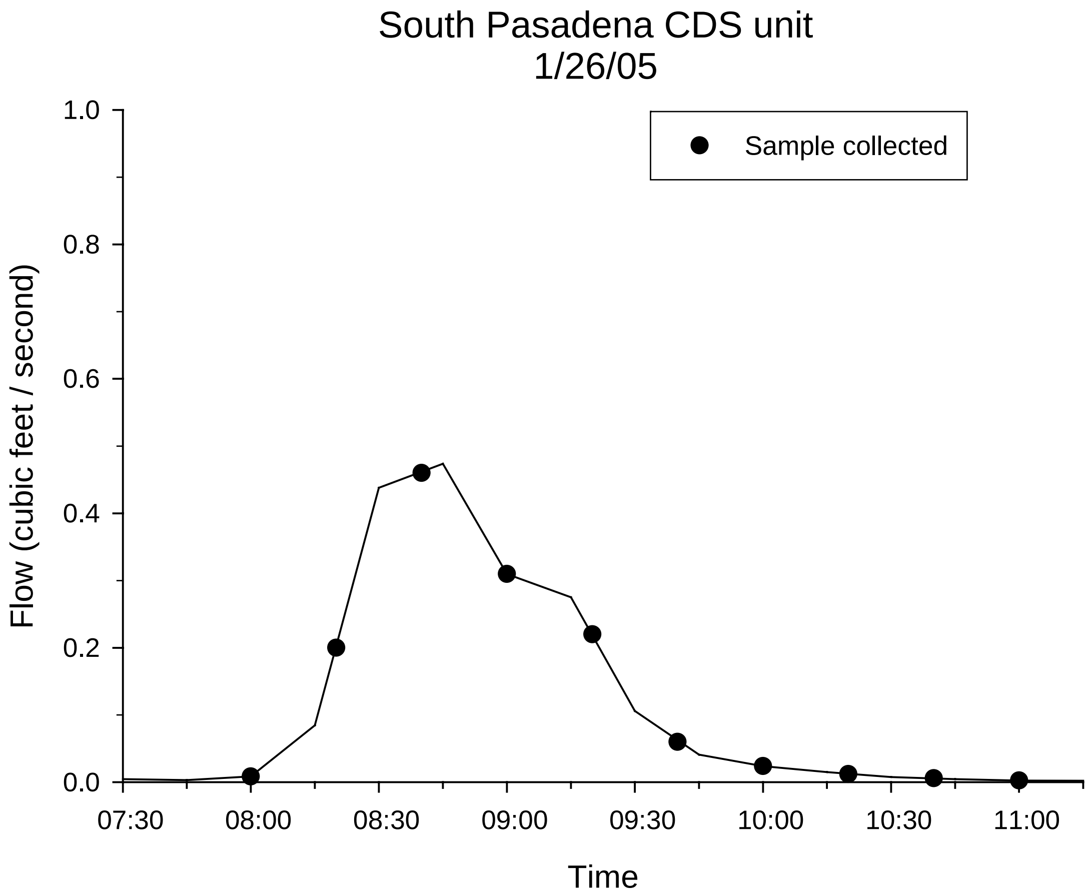


Figure A-8. Hydrograph at the South Pasadena CDS site during the January 26, 2005 storm water sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.

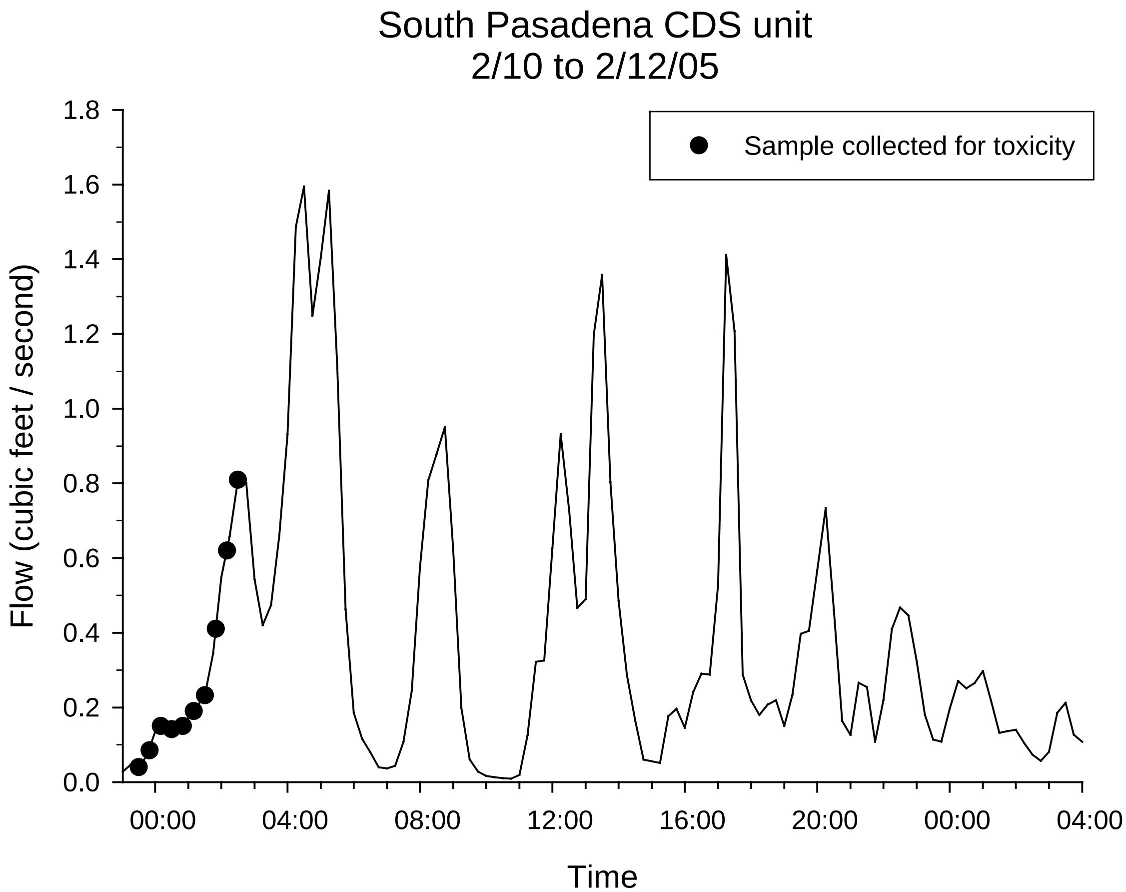
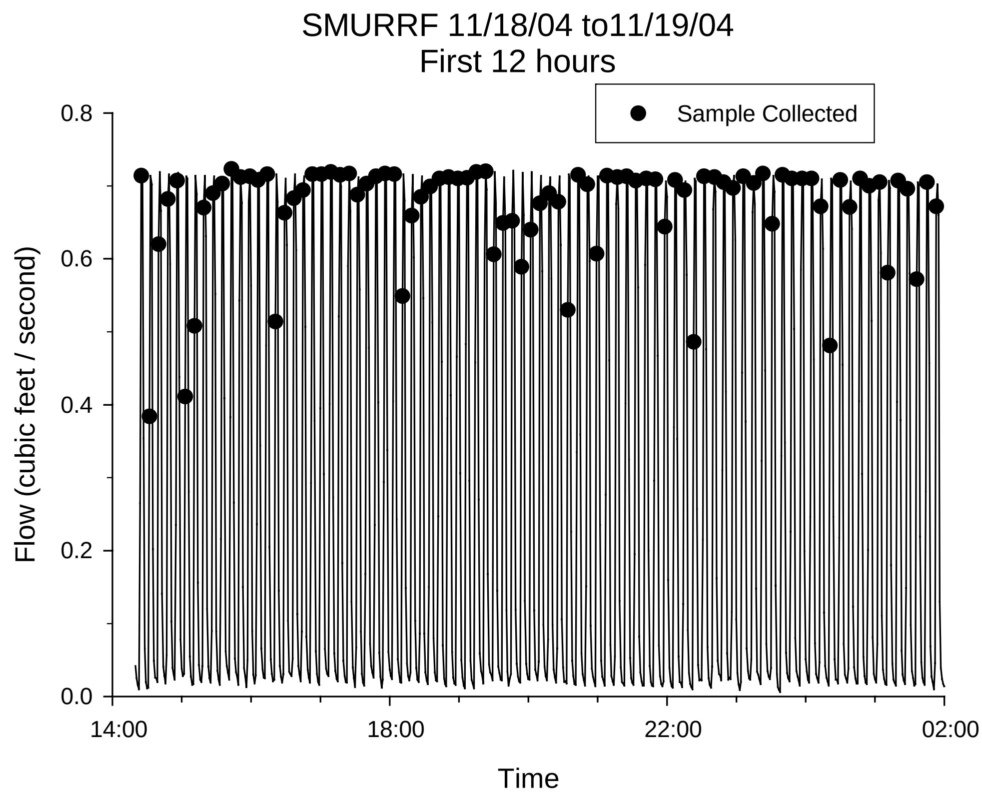


Figure A-9. Hydrograph at the South Pasadena CDS site during the February 10-11, 2005 storm water sampling event. Samples were collected at 20 min intervals from 23:30 to 2:30 am for the toxicity composite (indicated by the dots). The entire hydrograph was sampled at 20 min intervals for chemical analysis.



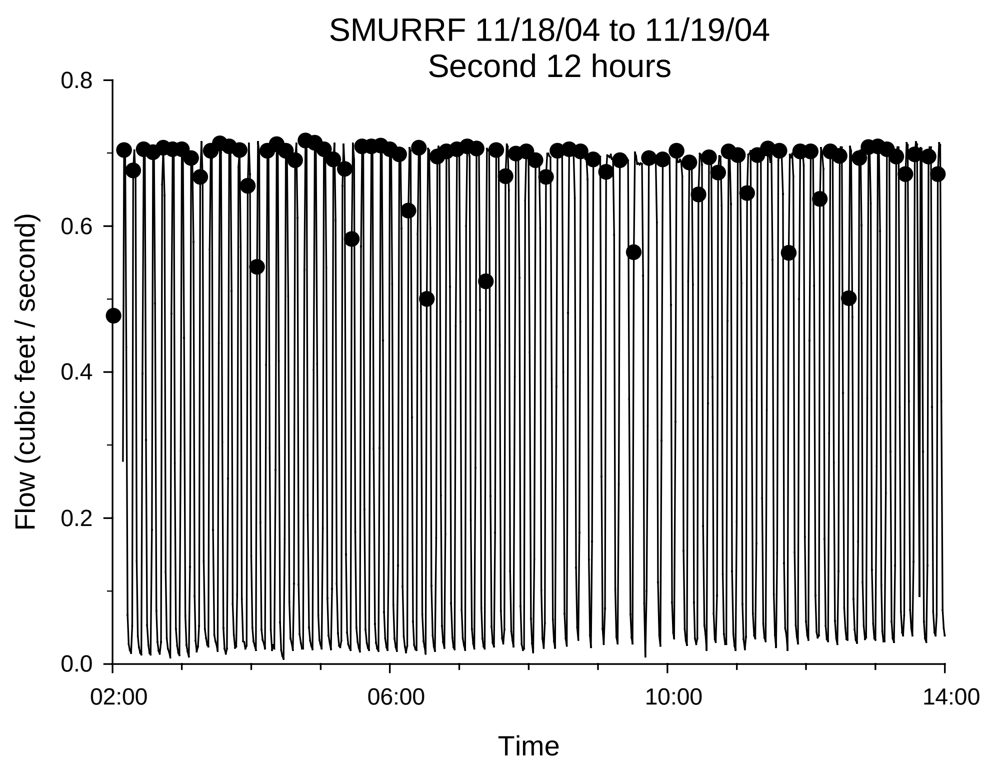
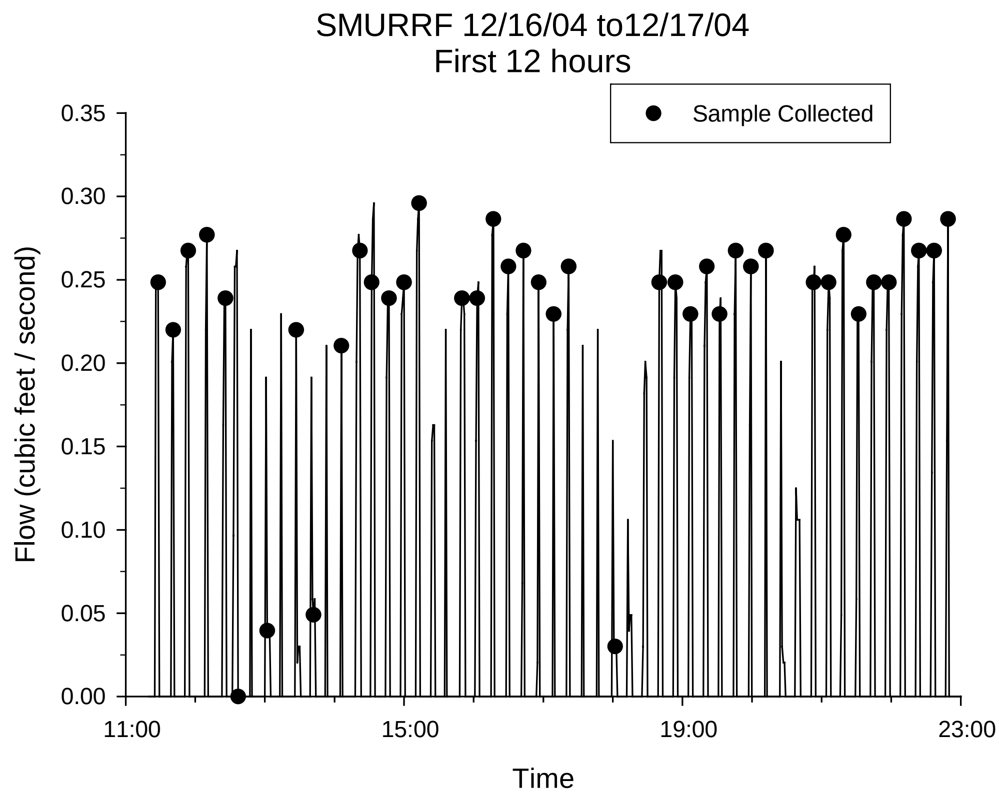


Figure A-10. Hydrograph at SMURRF during the November 18-19, 2004 dry weather sampling event. Dots (●) indicate when the samples were collected for the composite sample.



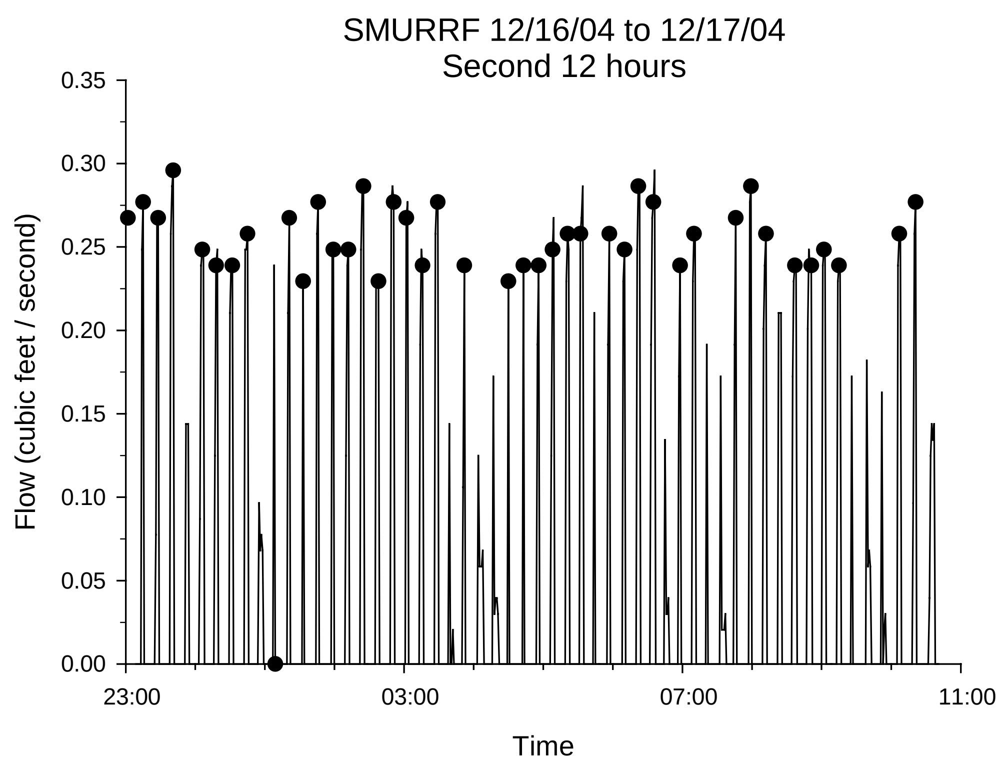
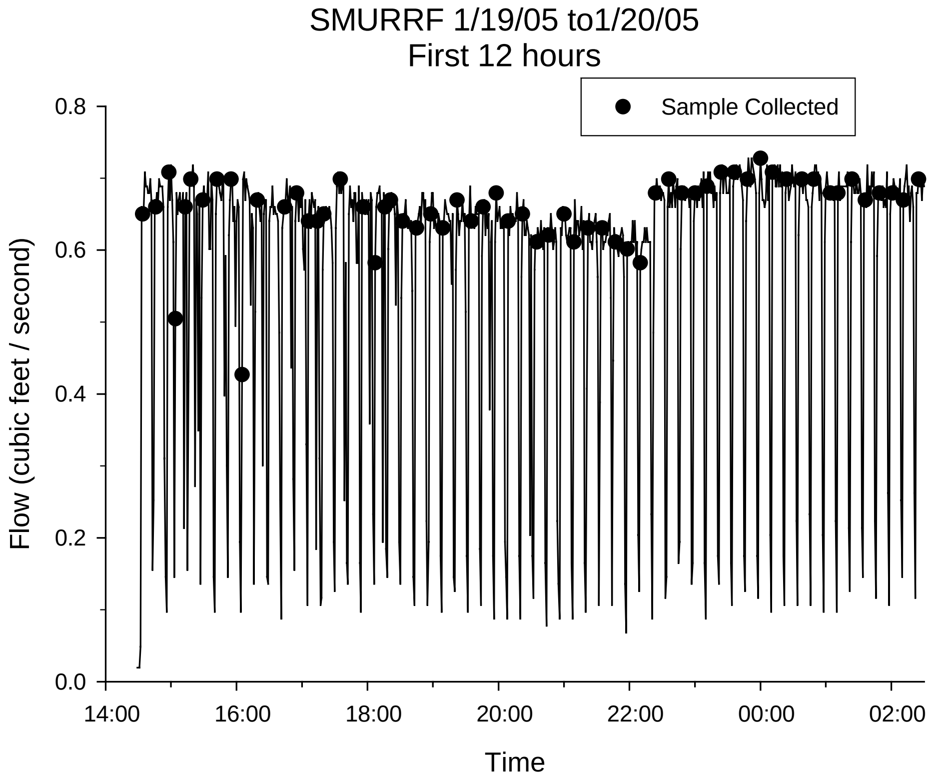


Figure A-11. Hydrograph at SMURRF during the December 16-17, 2004 dry weather sampling event. Dots (●) indicate when the samples were collected for the composite sample.



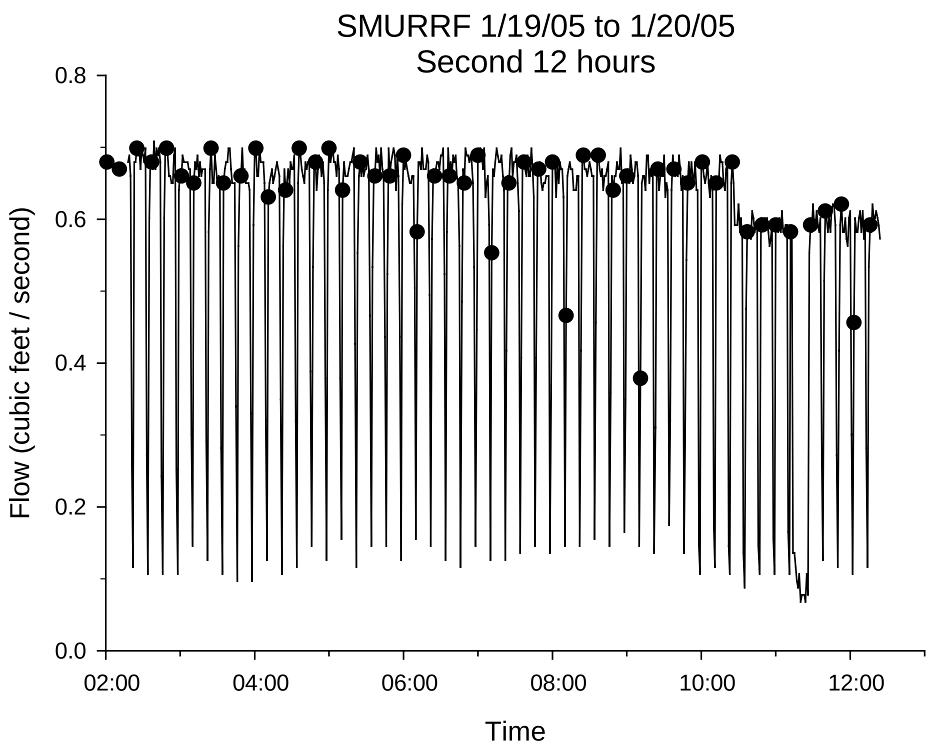
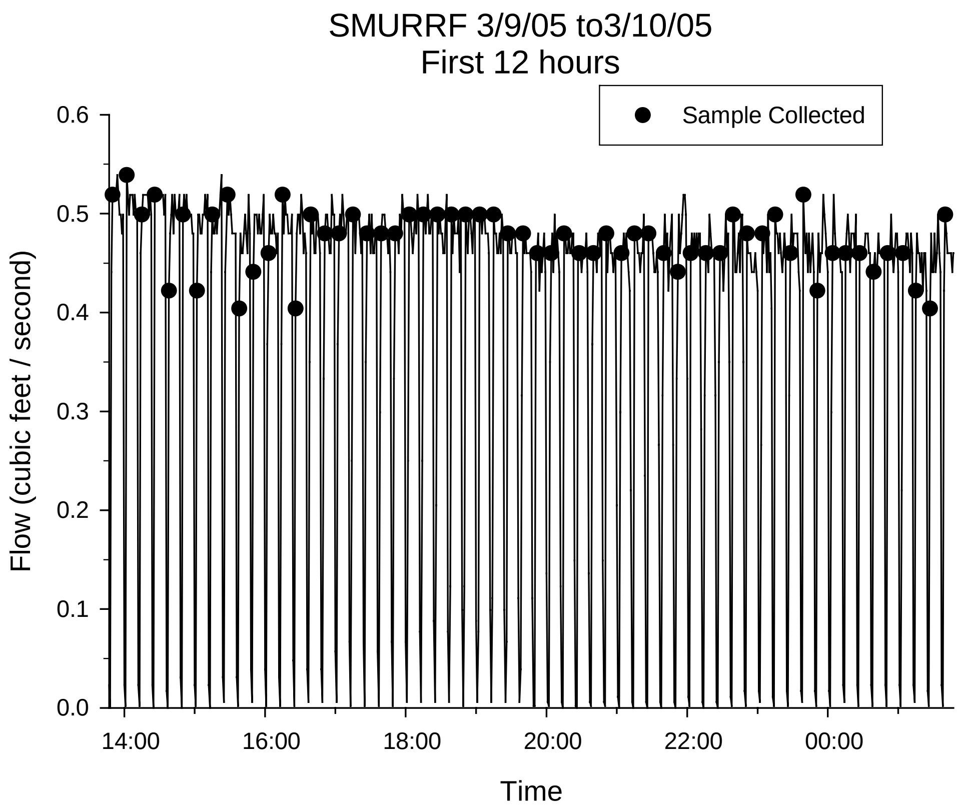


Figure A-12. Hydrograph at SMURRF during the January 19-20, 2005 dry weather sampling event. Dots (●) indicate when the samples were collected for the composite sample.



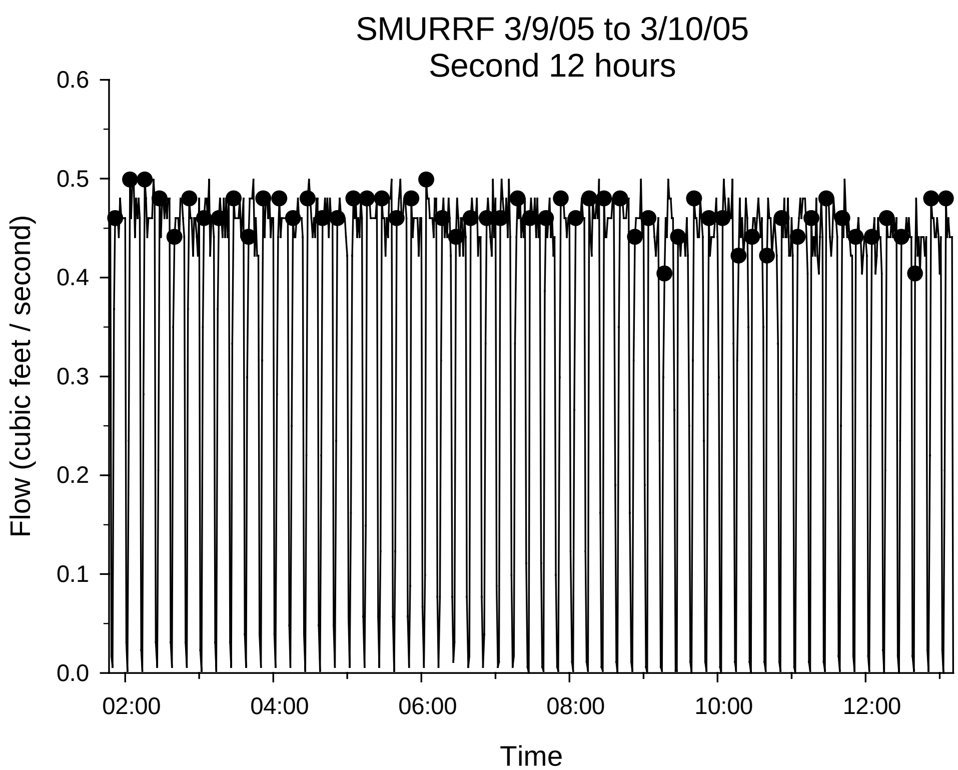


Figure A-13. Hydrograph at SMURRF during the March 9-10, 2005 dry weather sampling event. Dots (●) indicate when the samples were collected for the composite sample.

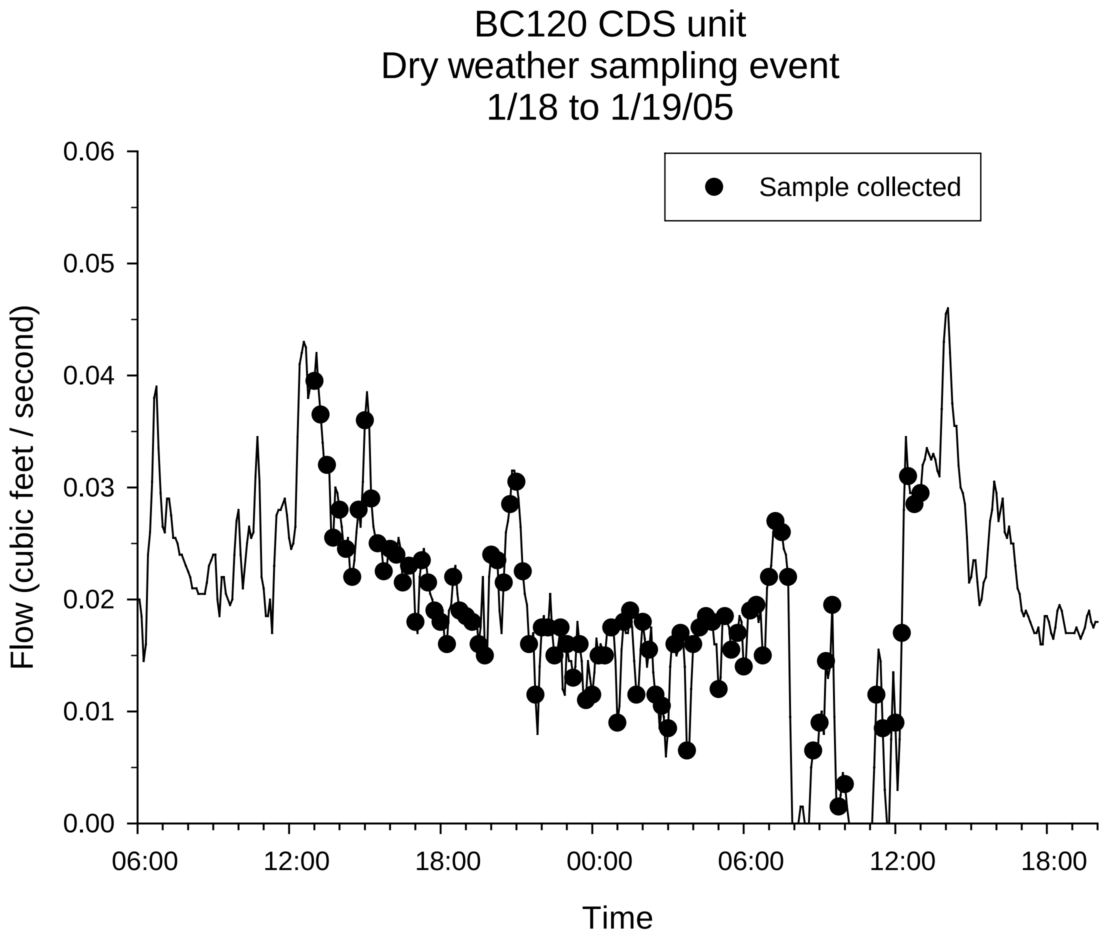


Figure A-14. Hydrograph at BC120 during the January 18-19, 2005 dry weather sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.

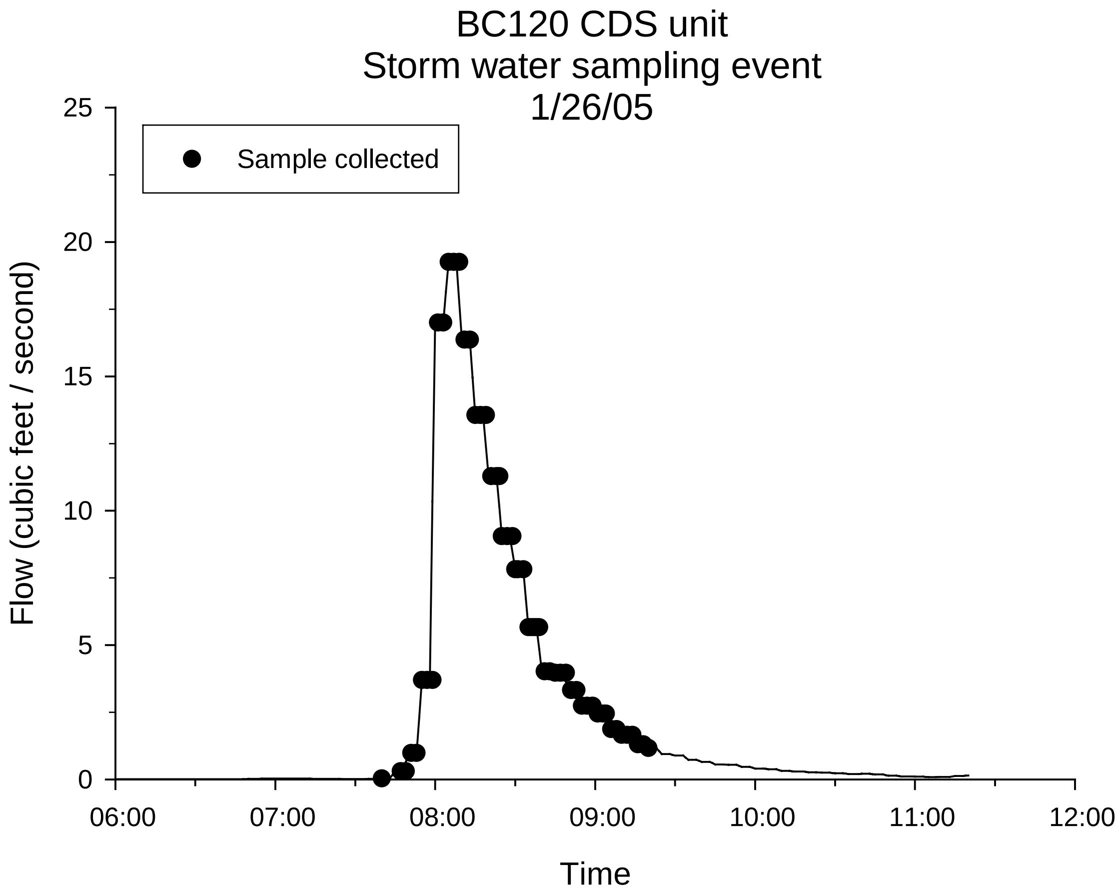


Figure A-15. Hydrograph at BC120 during the January 26, 2005 storm water sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.

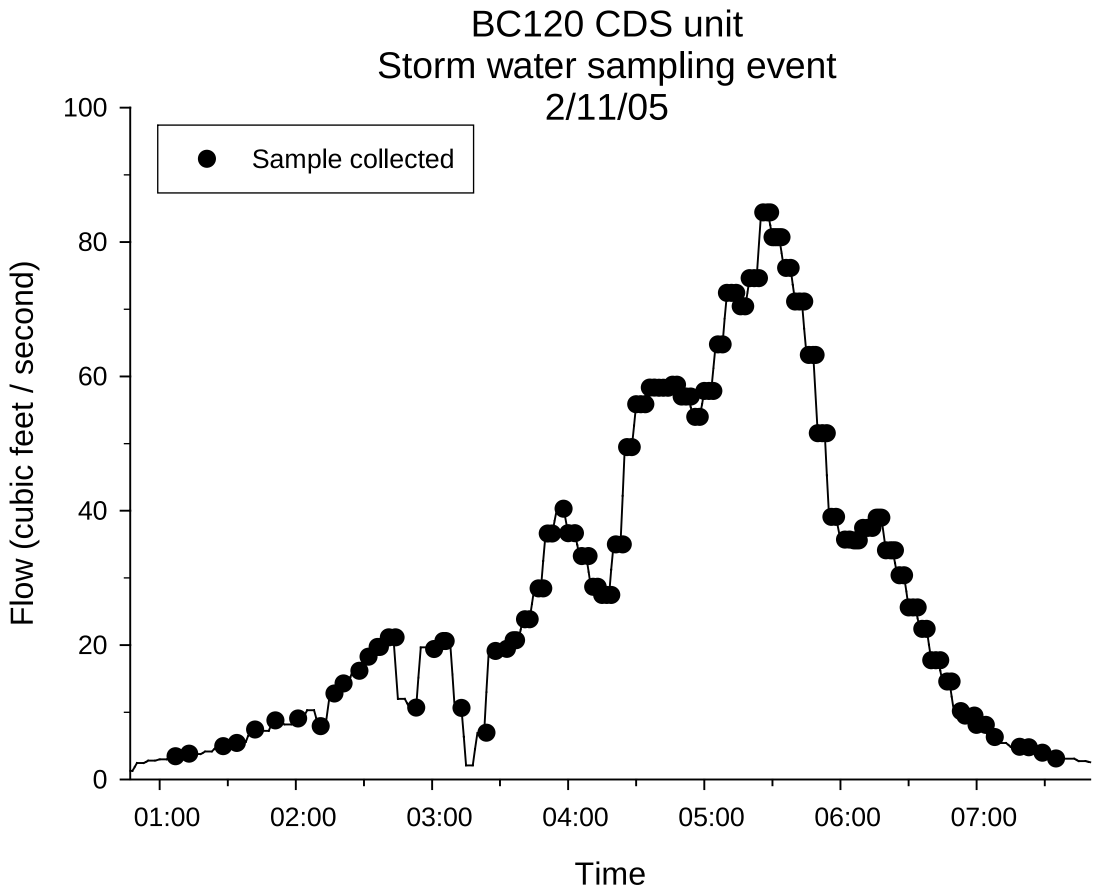


Figure A-16. Hydrograph at BC120 during the February 11, 2005 storm water sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.

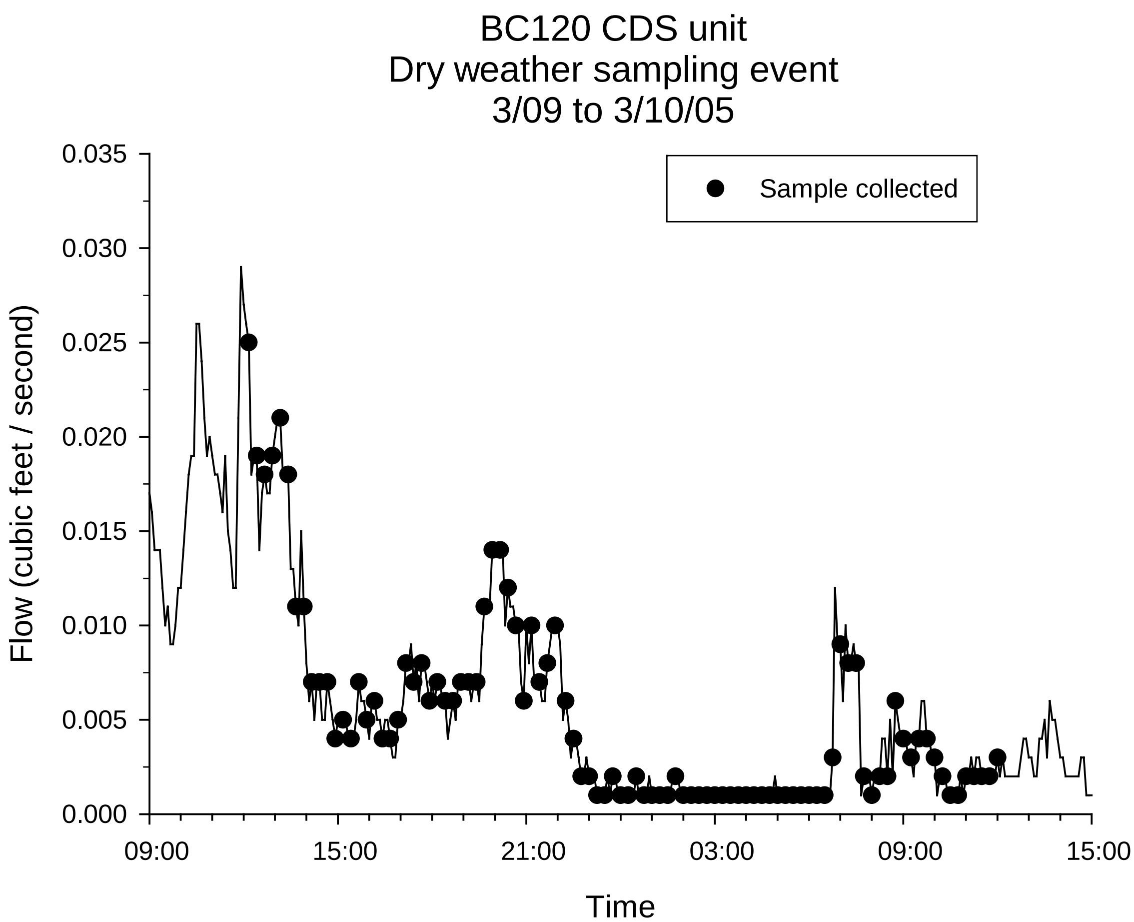
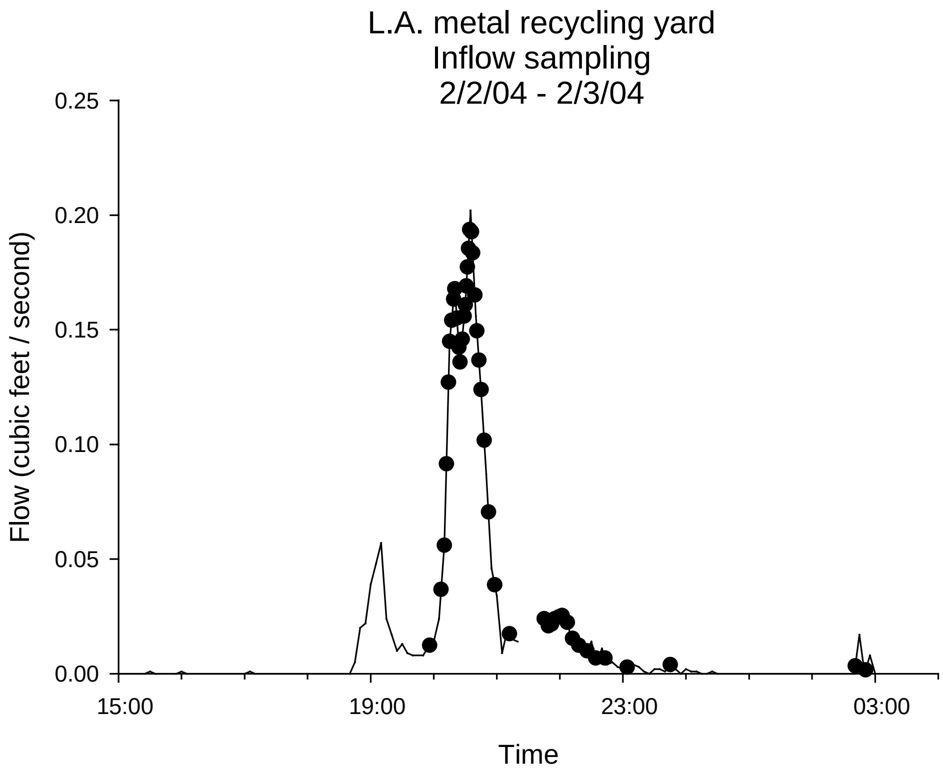


Figure A-17. Hydrograph at BC120 during the March 9-10, 2005 dry weather sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.



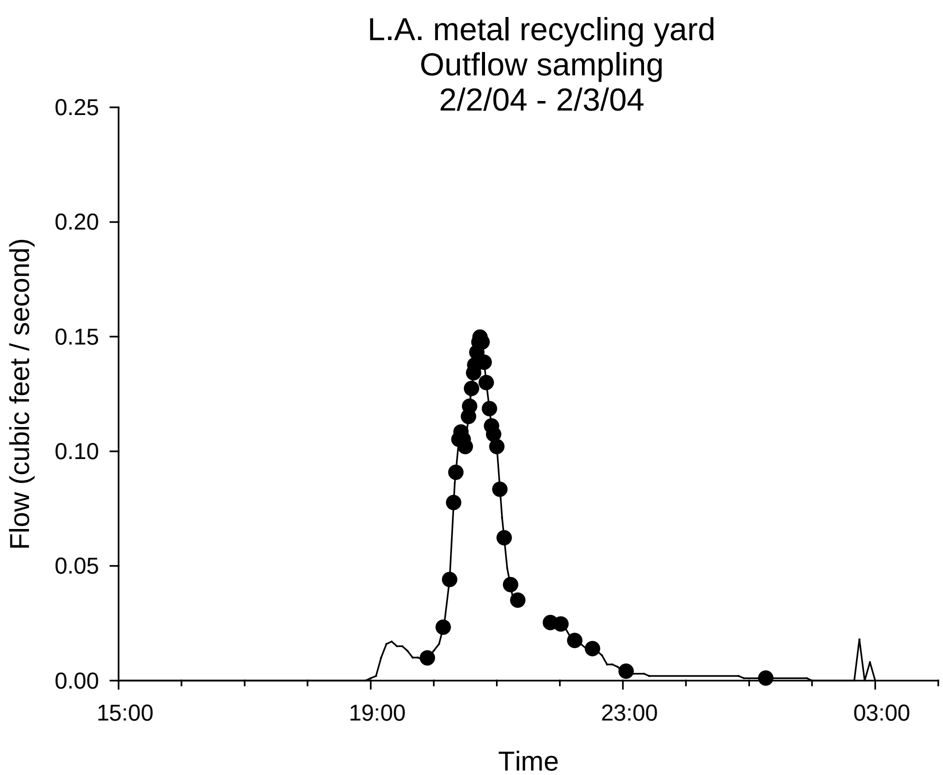
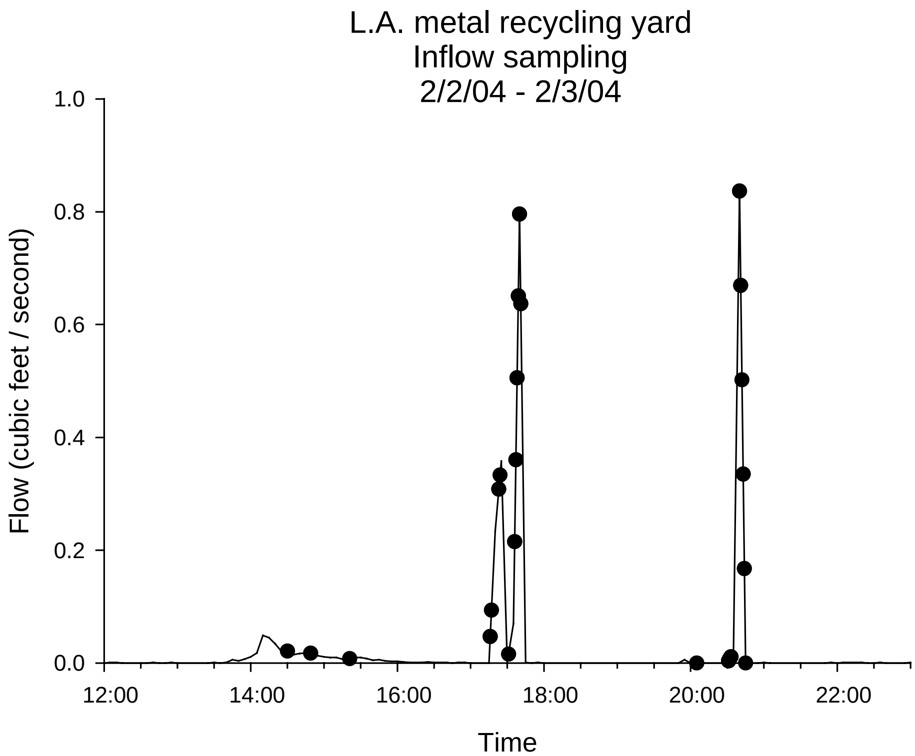


Figure A-18. Hydrographs at L.A. metal recycling yard during the February 2-3, 2005 wet weather sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.



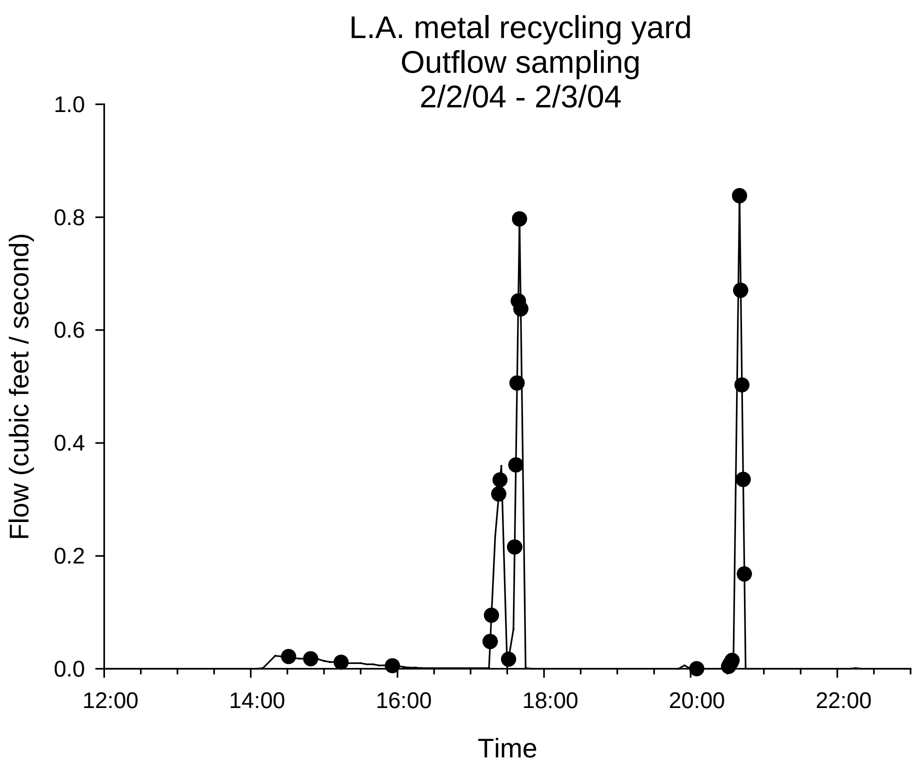


Figure A-19. Hydrographs at L.A. metal recycling yard during the February 18, 2005 wet weather sampling event. Dots (●) indicate when the samples were collected for the toxicity and chemistry composite samples.