Appendix A – Delta Plan Ecosystem Amendment Notice of Preparation and Scoping Meeting Materials

September 2021

Delta Stewardship Council

A CALIFORNIA STATE AGENCY

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Section 1 Introduction

1.1 Background

In November 2009, the California Legislature enacted Senate Bill X7 1, one of several bills passed at that time related to water supply reliability, ecosystem health, and the Sacramento–San Joaquin Delta and Suisun Marsh (Delta) (defined in Water Code [Wat. Code] section 85058). This new law took effect on February 3, 2010 and included the Sacramento–San Joaquin Delta Reform Act of 2009 (Delta Reform Act), codified in Wat. Code division 35, section 85000 et seq. The Delta Reform Act establishes the Delta Stewardship Council (Council) as an independent agency of the State of California (State) and requires the Council to develop and adopt the Delta Plan, a legally enforceable, comprehensive, long-term management plan for the Delta to achieve the coequal goals (Wat. Code sections 85001(c), 85059, and 85200(a)). As defined in Wat. Code section 85054:

> *Coequal goals means the two goals of providing a more reliable water supply for California and protecting, restoring and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource and agricultural values of the Delta as an evolving place.*

The Council adopted the Delta Plan in 2013. The Delta Reform Act requires the Council to review the Delta Plan at least once every 5 years and revise it as the Council deems appropriate (Wat. Code section 85300(c)). When the Delta Plan was adopted, the Council anticipated periodic reviews of the Delta Plan and potential need for updates in response to changing circumstances and conditions in the Delta.

The purpose of the proposed amendment to Chapter 4, *Protect Restore, and Enhance the Delta Ecosystem,* of the Delta Plan (proposed Ecosystem Amendment or Proposed Project) is to address a fundamental shift in how conservation is being planned and implemented in the Delta.

The Council, as the California Environmental Quality Act (CEQA) lead agency, has determined that an environmental impact report (EIR) is the appropriate CEQA document for the Proposed Project. Accordingly, this EIR has been prepared in compliance with CEQA (Public Resources Code [Pub. Resources Code] section 21000 et seq.) and the State CEQA Guidelines (California Code of Regulations [Cal. Code

Regs.] title 14, section 15000 et seq.). This EIR is a Program EIR (PEIR) and has been prepared pursuant to and consistent with the requirements of section 15168 of the State CEQA Guidelines. As an informational document, this Draft PEIR provides full disclosure to the public and Council regarding the potential significant environmental effects of the proposed Ecosystem Amendment, and is intended to provide sufficient information to foster informed decision-making by the Council.

The Council circulated a Notice of Preparation (Attachment A-1) on May 11, 2020 to seek input from agencies, organizations, and the public on the scope of the PEIR. A brief description of the proposed project and the purpose and organization of this appendix is provided below. Refer to the Notice of Preparation in Attachment A-1 for additional details about the proposed Ecosystem Amendment.

1.2 Summary of the Proposed Project and Planning Area

The proposed amendment to Chapter 4 of the Delta Plan, Protect, Restore, and Enhance the Delta Ecosystem (proposed Ecosystem Amendment or Proposed Project), consists of new and revised Delta Plan policies, recommendations, and performance measures related to ecosystem restoration in the Sacramento–San Joaquin Delta and Suisun Marsh (Delta) (Water Code [Wat. Code] section 85058). In addition, the Proposed Project includes removal of some existing recommendations and performance measures.

Chapter 4 of the Delta Plan implements Wat. Code section 85022(d) and sections 85302(a), 85302(b), 85302(c), 85302(d)(1), 85302(d)(3), and 85302(e), which provide direction on implementing specific measures to promote the coequal goal of protecting, restoring, and enhancing the Delta ecosystem (Wat. Code section 85054) and the inherent objectives of that coequal goal. The coequal goal of protecting, restoring, and enhancing the Delta ecosystem is consistent with the Public Trust Doctrine and, among other things, promotes and protects fishing, recreational, and ecological public trust uses in the Delta watershed.

In addition, pursuant to Wat. Code sections 85211 and 85308(b) through (d), ecosystem performance measures in Appendix E of the Delta Plan enable the Delta Stewardship Council (Council) to track progress in meeting the objectives of the Delta Plan. The Council proposes to amend Delta Plan Appendix E to refine or remove existing performance measures and add new performance measures associated with proposed new and revised policies and recommendations in Chapter 4 of the Delta Plan.

The location of the Proposed Project is the planning area to be considered in the PEIR as defined by the purposes and uses of the Delta Plan, which are described in the Delta Reform Act. The “Primary Planning Area” is the Delta, which is defined in the Delta Reform Act (Wat. Code section 85058) as “the Sacramento–San Joaquin Delta as defined in [Wat. Code] section 12220, and the Suisun Marsh, as defined in section 29101 of the Public Resources Code.” The “Extended Planning Area” is defined by the watersheds that contribute flows to the Delta (including areas within the Delta watershed upstream of the Delta, and the Trinity River watershed) and areas of California outside the Delta watershed with places of use receiving water from or conveyed through the Delta.

1.3 Purpose and Organization of Appendix

This appendix provides an overview of the proposed amendment, scoping process, and all comments received during the scoping period. This appendix is organized into the chapters described below.

- Chapter 1, Introduction: Chapter 1 describes the purpose, organization, and intended use of this appendix; and summarizes the Proposed Project and background information.
- Chapter 2, Scoping Process: Chapter 2 describes the activities that comprise the scoping period, the parties and individuals involved, and the number and types of comments received.
- Attachments: The attachments contain the Notice of Preparation (NOP) (Attachment A-1), Scoping Meeting Presentation and Materials (Attachment A-2), Scoping Meeting Transcript (Attachment A-3), and Scoping Comments (Attachment A-4).

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Section 2
Scoping Process

2.1 CEQA Requirements for Scoping

This section describes the scoping process for the Proposed Project, including the NOP, the public scoping meeting, and avenues for public comment during scoping. The objectives of the Scoping Process are to:

- provide an opportunity for agency, organization, and public involvement in defining the topics addressed during preparation of the PEIR,
- help identify the scope of environmental issues and potential impacts that should be discussed in the PEIR to adequately and accurately address potential significant environmental impacts of the proposed amendments, and
- help identify a reasonable range of alternatives to the proposed amendments.

2.1.1 Notice of Preparation and Scoping Meeting

The Council issued a Notice of Preparation (NOP) of a Draft PEIR on May 11, 2020, to satisfy the requirements of CEQA and the CEQA Guidelines. Governor's Executive Order N-54-20, issued on April 22, 2020 (now Executive Order N-8-21[1]), suspended the requirement to post certain CEQA notices, including NOPs, at the Office of the County Clerk, provided that the lead agency takes the following actions:

- Posts such materials on the lead agency's website for the same period of time that physical posting would otherwise be required;
- Submits all materials electronically to the State Clearinghouse's CEQAnet Web Portal; and
- Engages in outreach to any individuals and entities known by the lead agency, responsible agency, or project applicant to be parties interested in the project in the manner contemplated by Pub. Resources Code section 21100 et seq. and Cal. Code Regs. title 14, section 15000 et seq.

[1] Governor's Executive Order N-54-20 issued on April 22, 2020, was extended by Executive Order N-80-20 and then replaced with Executive Order N-8-21 on June 11, 2021.

In accordance with CEQA Guidelines section 15082 and Executive Order N-54-20 (now Executive Order N-8-21[2]), the NOP was circulated to obtain suggestions and information from responsible, trustee, and involved federal agencies and members of the public, including organizations and individuals, on the scope and content of the environmental analysis to be included in the proposed Ecosystem Amendment PEIR. A "responsible agency" is a public agency, other than the lead agency, that has responsibility for carrying out or approving a project (CEQA Guidelines section 15381). A "trustee agency" is a State agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California that could potentially be affected by implementation of the proposed Ecosystem Amendment (CEQA Guidelines section 15386).

In compliance with Executive Order N-54-20 (now Executive Order N-8-21), section 8(a), the Council posted the NOP on the Council's website on May 11, 2020; the notice remained posted beyond the required notice period. In compliance with Executive Order N-54-20 (now Executive Order N-8-21), section 8(b), the Council submitted the NOP electronically to the State Clearinghouse's CEQANet Web Portal (State Clearinghouse #2020050219). The Council requested that the State Clearinghouse notify 26 State agencies via CEQANet. In compliance with Executive Order N-54-20 (now Executive Order N-8-21), section 8(c), the Council engaged in outreach with individuals and entities known by the Council to be parties interested in the project in the manner contemplated by Pub. Resources Code section 21100 et seq. and Cal. Code Regs. title 14, section 15000 et seq. The Council sent the following notifications on May 11, 2020:

- Trustee agency NOP notification emails and letters (via FedEx), as required per CEQA Guidelines section 15082
- Coastal Zone Management Program agency NOP notification email and letter (via FedEx)
- Council listserv announcement of NOP availability to all individuals and entities included on the Council listserv
- Additional interested-parties' emails (sent to approximately 280 contacts) or hard-copy letters (for those without known email addresses, approximately 90 letters were sent via the U.S. Postal Service)

The executive order also encourages additional methods of public notice and outreach, as appropriate for the project. To address this, the Council distributed a notice of the NOP via the following newsletters:

- Delta ENews, published May 14, 2020
- Maven's Notebook, published May 11, 2020

[2] Governor's Executive Order N-54-20 issued on April 22, 2020, was extended by Executive Order N-80-20 and then replaced with Executive Order N-8-21 on June 11, 2021.

The issuance of the NOP began a 60-day public comment period, which closed on July 10, 2020. In addition, the NOP provided notification of the public scoping meeting that was conducted by the Council on May 28, 2020, during the comment period pursuant to CEQA Guidelines section 15082(c)(1) and applicable executive orders.

2.1.2 Public Scoping Meeting

The Council held a public scoping meeting during the 60-day public NOP comment period on Thursday, May 28, 2020, from 4 to 5:30 p.m. In accordance with Governor's Executive Order N-25-20 issued on March 12, 2020, Governor's Executive Order N-29-20 issued on March 17, 2020, and Governor's Executive Order N-8-21[3] issued on June 11, 2021, the meeting was conducted entirely remotely to provide opportunities for remote participation by councilmembers, staff, and the public due to the State of Emergency declared as a result of the threat of COVID-19.

The purpose of the scoping meeting was to solicit public comments on the scope of the PEIR and provide a brief overview of the proposed Ecosystem Amendment to the public. The scoping meeting presentation explained the public comment process, the CEQA environmental review process and schedule, and the procedure for submitting oral and written comments. Twenty-two non-Council attendees signed into the scoping meeting, and three people provided oral comments.

Comments during the 60-Day Comment Period

Written comments were accepted throughout the 60-day public NOP comment period and at the scoping meeting; oral comments were recorded at the scoping meeting and later transcribed by a court reporter from the meeting recording. Written comments were accepted by both mail and email. Table 1 provides the name, affiliation, and date received for all scoping comments received during the 60-day public NOP comment period.

[3] Governor's Executive Order N-54-20 issued on April 22, 2020, was extended by Executive Order N-80-20 and then replaced with Executive Order N-8-21 on June 11, 2021.

Table 1. Comments Received during the Notice of Preparation Period

Name of Author	Agency/Organization/ Individual	Date Received/ Post Marked
Coats, Francis E.	Coats, Francis E.	May 26, 2020
Douglas Environmental	Brown, Doug	May 28, 2020, Oral Comment Received During Scoping Meeting
Sierra Club	Dawson, Brandon	May 28, 2020, Oral Comment Received During Scoping Meeting
San Francisco Bay Conservation & Development Commission	Wigginton, Rachel	May 28, 2020. Oral Comment Received During Scoping Meeting
Hoopa Valley Tribe	Nelson, Byron Jr. (via Orcutt, Mike)	June 20, 2020
Delta Caucus (Contra Costa, Sacramento, San Joaquin, Solano and Yolo County Farm Bureau)	Liebig, Lindsey	June 24, 2020
California Department of Transportation	Bushong, Christian (via Kent, Steve)	July 9, 2020
Delta Counties Coalition	Drane, Natasha (via De Bord, Elisa)	July 10, 2020
Central Delta Water Agency	Nomellini Jr., Dante	July 10, 2020
Solano County Water Agency	Pate, Thomas L.	July 10, 2020
Sierra Club	Dawson, Brandon	July 10, 2020
California Sportfishing Protection Alliance, AquAlliance, California Water Impact Network, California Water Research	Des Jardins, Deirdre Jackson, Michael Shutes, Chris Vlamis, Barbara	July 10, 2020
Natural Resources Defense Council, Defenders of Wildlife, the Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, San Francisco Baykeeper, and The Bay Institute	Obegi, Doug Zwillinger, Rachel Rosenfield, Jon Bobker, Gary Conroy, Mike	July 10, 2020
MBK Engineers	Pappalardo, Emily	July 10, 2020
State Water Contractors	Pierre, Jennifer (via Benjamin, Elaine)	July 10, 2020
Restore the Delta	Stroshane, Tim Barrigan-Parrilla, Barbara	July 10, 2020
Pacific Coast Federation of Fishermen's Associations (PCFFA) on behalf of the Institute for Fisheries Resources, San Francisco Crab Boat Owners Association, and North Coast Rivers Alliance	Volker, Stephan C.	July 10, 2020
Douglas Environmental	Brown, Doug	July 13, 2020

2.1.3 Notification of California Native American Tribes

Assembly Bill (AB) 52 amended CEQA and created a separate resource category called "tribal cultural resources" (Pub. Resources Code section 21074). AB 52 provides that a substantial adverse change in the significance of a tribal cultural resource may be a significant effect on the environment (Pub. Resources Code section 21084.2). Subsequently, Appendix G of the CEQA Guidelines was amended to address tribal cultural resources.

AB 52 requires lead agencies to provide notification and the opportunity to request consultation to California Native American tribes that are traditionally and culturally affiliated with the geographic area of a proposed project, if they have requested notice of projects proposed within that area. Pursuant to Pub. Resources Code section 21080.3.1, the tribe then has 30 days upon receipt of the notice to request consultation. Section 9 of Executive Order N-54-20, now Executive Order N-8-21,[4] requires that "[t]he timeframes set forth in Public Resources Code sections 21080.3.1 and 21082.3, within which a California Native American tribe must request consultation and the lead agency must begin the consultation process relating to an Environmental Impact Report […] under the California Environmental Quality Act, are suspended for 60 days."

Consultation may include discussing the type of environmental review necessary, the significance of tribal cultural resources, the significance of the project's impacts on the tribal cultural resources, and alternatives and mitigation measures recommended by the tribe. The parties must consult in good faith, and consultation is considered concluded either when the parties agree to measures to mitigate or avoid a significant effect on a tribal cultural resource (if such a significant effect exists) or when a party concludes that mutual agreement cannot be reached (Pub. Resources Code section 21080.3.2).

On May 15, 2020, the Council sent the AB 52 notice by email and FedEx to the 7 tribes that requested notification of all Council activities. That same day, the Council sent a separate letter containing the NOP to the same tribes by email and FedEx.

In addition to the AB 52 notices described above, the Council also requested a list of California Native American tribes within the Planning Area (see Figure 3-1 in Chapter 3, *Project Description*) from the Native American Heritage Commission (NAHC) in an effort to provide non–AB 52 notification of the proposed Ecosystem Amendment in the event that tribes would like to provide comments on the project. Based on the information received from the NAHC, the Council sent non–AB 52 notification letters by email to 120 tribal contacts and by U.S. mail to 21 contacts on May 15, 2020. Later, the NAHC provided additional tribal contacts and, accordingly, the Council sent non–AB 52 notification letters by email to an additional 34 contacts and by U.S. mail to 12 additional contacts on May 26, 2020.

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[4] Governor's Executive Order N-54-20 issued on April 22, 2020, was extended by Executive Order N-80-20 and then replaced with Executive Order N-8-21 on June 11, 2021.

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Attachment A-1
Draft Program Environmental Impact Report for Proposed Ecosystem Amendment Notice of Preparation

DELTA STEWARDSHIP COUNCIL
A California State Agency

Project: Delta Plan Ecosystem Amendment, Delta Stewardship Council
Date Issued: May 11, 2020

NOTICE OF PREPARATION

DRAFT PROGRAM ENVIRONMENTAL IMPACT REPORT FOR PROPOSED ECOSYSTEM AMENDMENT

For assistance interpreting the content of this document,
please contact Delta Stewardship Council staff.
Email: accessibility@deltacouncil.ca.gov
Phone: 916-445-5511

Notice is hereby given that the Delta Stewardship Council (Council) will prepare a Program Environmental Impact Report (PEIR) for the proposed Delta Plan Ecosystem Amendment (Proposed Project or Proposed Ecosystem Amendment), and will hold a public scoping meeting to receive comments on the scope of the PEIR, as detailed below. Consistent with California Environmental Quality Act (CEQA) Guidelines section 15206, the Proposed Project is considered a project of statewide, regional, or areawide significance. The Council, as the lead agency, determined that the Proposed Ecosystem Amendment may result in potentially significant environmental impacts, and that a PEIR is required.

ENVIRONMENTAL IMPACT REPORT SCOPING PROCESS

In accordance with CEQA Guidelines section 15082, this Notice of Preparation (NOP) is being circulated to obtain suggestions and information from responsible, trustee, and involved federal agencies and members of the public, including organizations and individuals, on the scope and content of the environmental analysis to be included in the proposed Delta Plan Ecosystem Amendment PEIR. A “responsible agency” is a public agency, other than the lead agency, that has the responsibility for carrying out or approving a project (CEQA Guidelines section 15381). A “trustee agency” is a state agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California and that could potentially be affected by implementation of the Proposed Ecosystem Amendment (CEQA Guidelines section 15386).

In accordance with CEQA Guidelines section 15082(b)(1), within 60 days of receiving the NOP, responsible and trustee agencies and involved federal agencies shall provide the Council with specific details about the scope and content of the environmental information to be included in the PEIR related to the agency’s area of statutory responsibility.

The Council will take into consideration comments received from responsible, trustee, and federal agencies and members of the public in preparing the PEIR, which will address the potential environmental impacts associated with the Proposed Project at a program level, consistent with CEQA Guidelines section 15168.

Written Comments

Written comments on the scope of the PEIR are due no later than 5:00 p.m. on Friday, July 10, 2020.

Send comments or requests to be added to the mailing list to:
Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814
Phone: 916-445-5511
Email address: ecosystemamendment@deltacouncil.ca.gov

All comments should include "Delta Plan Ecosystem Amendment NOP" as the subject and the name and email address of the contact person so that the contact information can be automatically added to the distribution list for future notices and information about the Proposed Project environmental review process.

All comments received, including names and addresses, will become part of the official administrative record and may be available to the public. Commenters may request the Council to withhold contact information from public disclosure, which will be honored to the extent allowable under California law. For the Council to consider withholding contact information, this request must be stated prominently at the beginning of the submitted comments.

Scoping Meeting

A remote public scoping meeting is scheduled at the following date and time:

Thursday, May 28, 2020 from 4:00 p.m. to 5:30 p.m.

In accordance with the Governor's Executive Order N-25-20 issued on March 12, 2020, and the Governor's Executive Order N-29-20 issued on March 17, 2020, the Delta Stewardship Council will continue to provide opportunities for remote participation by Councilmembers, staff, and the public with prudent measures to reduce community transmission of COVID-19.

The meeting's proceedings will be conducted entirely remotely. There will not be a public access location. Members of the public may participate in the scoping meeting via webcast or by calling into a teleconference line. The public scoping meeting will begin with a brief overview presentation of the proposed Delta Plan Ecosystem Amendment process with time for public comments on the scope and content of the PEIR to follow.

The meeting will be conducted with WebEx, which uses video accessed through the link below and audio from a teleconference line. To view the webcast, click the link (https://deltacouncil.webex.com/deltacouncil/onstage/g.php?MTID=e49ab085cfb30055ac6be63674a40de4a). To hear the audio portion of the meeting and provide comment, please call the following teleconference number: Call-in Number: 1-877-402-9757, access code 4450441. Additional scoping meeting details are available online at https://www.deltacouncil.ca.gov.

Mailing List

All comments received should include the name and email address of the contact person so that the contact information can be automatically added to the CEQA distribution list for the Proposed Ecosystem Amendment. Additional requests for persons to be added to the mailing list should include name and email address and be submitted to Harriet Ross at the address above or via email at ecosystemamendment@deltacouncil.ca.gov.

Online Availability

A copy of this NOP and other information about the Proposed Ecosystem Amendment, including the Proposed Ecosystem Amendment text and supporting documents, are available online at http://www.deltacouncil.ca.gov/delta-plan/amendments.

INTRODUCTION

The Sacramento-San Joaquin Delta Reform Act of 2009, California Water Code (Wat. Code) sections 85000, et seq., (Delta Reform Act or Act) requires the development of a legally enforceable, comprehensive, long-term management plan for the Delta, referred to as the Delta Plan, which the Council adopted in 2013. Since its adoption, several portions of the Delta Plan have required revisions due to changes in circumstances and conditions in the Delta.

The Proposed Project is an amendment to Chapter 4 of the Delta Plan (Protect, Restore, and Enhance the Delta Ecosystem) to address a fundamental shift in how conservation is being planned and implemented in the Delta.

PURPOSE OF THE NOTICE OF PREPARATION

Pursuant to CEQA, the Council is initiating preparation of a PEIR for the Proposed Ecosystem Amendment. This NOP has been prepared to satisfy the requirements of CEQA to notify the responsible, trustee, and involved federal agencies, and members of the public, including organizations and individuals, that the Council intends to prepare a PEIR for this Proposed Project and to solicit guidance from the public and those agencies as to the scope and content of the environmental information to be included in the PEIR. Additionally, the Council will conduct tribal consultation under Assembly Bill 52. The NOP is an important step in initiating the scoping process to determine the range of issues to be addressed in the PEIR. The objectives of the scoping process are to:

- Provide an opportunity for public and agency involvement in preparation of the PEIR,
- Help identify the scope of issues and potential impacts that must be discussed in the PEIR to adequately and accurately address potential impacts of the Proposed Project, and
- Help identify a reasonable range of alternatives to the Proposed Project.

BACKGROUND AND NEED FOR THE PROJECT

Background

As required by the Delta Reform Act, the Council created the Delta Plan, a comprehensive, long-term management plan for the Delta. Adopted by the Council in 2013, the Delta Plan created new regulatory policies and recommendations to further the “coequal goals” for the Delta set forth in Wat. Code section 85054:

> “Coequal goals” means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

When it was adopted in 2013, the Delta Plan anticipated the need for periodic reviews and updates in response to changing circumstances and conditions in the Delta. Five amendments have been made to the Delta Plan to date. The Proposed Ecosystem Amendment would be the sixth amendment to the Delta Plan.

Need for the Proposed Ecosystem Amendment

Pursuant to Wat. Code section 85054, the Council works to achieve the goal of protecting, restoring, and enhancing the Delta ecosystem. Inherent in that goal is the objective to “restore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem” (Wat. Code section 85020[c]). In addition, pursuant to Wat. Code sections 85211 and 85308, subds. (b)-(d), ecosystem performance measures enable the Council to track progress in meeting the objectives of the Delta Plan.

The Delta Plan was adopted in 2013, while the Bay Delta Conservation Plan (BDCP) planning process was underway. The BDCP proposed a large, landscape-scale restoration program and reserve system within the Delta.[1] In accordance with Wat. Code, section 85320(e), Chapter 4 of the Delta Plan was originally developed based on the expectation that the BDCP would be incorporated into the Delta Plan. As stated in the 2013 Delta Plan, “[s]uccess of ecosystem restoration depends on considering and addressing all stressor categories as well as completing and implementing the BDCP.”[2]

In May 2015, state and federal agencies shifted their approach from broad-based ecosystem protection and restoration strategies under the BDCP to a more focused set of mitigation projects required under the National Marine Fisheries Service and U.S. Fish and Wildlife Service Biological Opinions for operation of the State Water Project (SWP) and Central Valley Project (CVP). This effort, known as the EcoRestore initiative, has enabled significant progress in meeting implementation deadlines for projects that previously faced

[1] The Bay Delta Conservation Plan conservation measures were not limited to reserve establishment and ecosystem restoration, but also identified actions such as nonnative species control, storm water management, remediation of unscreened water diversions, and illegal fish harvest reduction through game warden support.
[2] Delta Stewardship Council. 2013. Protect, Restore, and Enhance the Delta Ecosystem, Chapter 4 in The Delta Plan. p. 148.

significant planning and permitting delays. Implementation of these projects is critical to offset impacts of the SWP and CVP to threatened and endangered fish species. These actions, however, do not fully address the impaired condition of the estuary, which is the cumulative result of past physical changes (e.g., reclamation of marshland for agricultural use, construction and operation of federal, state, and local water management infrastructure). A more comprehensive approach to protecting, restoring, and enhancing the Delta ecosystem is required to achieve the Delta Reform Act's goals.

After the shift from the BDCP to EcoRestore, the Council committed to revisit the Delta Plan to assess and address the need for an amendment to Chapter 4 of the Delta Plan.[3]

PROJECT LOCATION – PLANNING AREA

The location of the Proposed Project is the planning area to be considered in the PEIR as defined by the purposes and uses of the Delta Plan, which are described in the Delta Reform Act. The primary planning area is the Delta, which is defined in the Delta Reform Act and Wat. Code section 85058 as "the Sacramento-San Joaquin Delta as defined in [Wat. Code] section 12220, and the Suisun Marsh, as defined in section 29101 of the Public Resources Code." The extended planning area is defined by the watersheds that contribute flows to the Delta (including areas within the Delta watershed upstream of the Delta, and the Trinity River watershed) and areas of California with places of use receiving water from or conveyed through the Delta. The primary and extended planning areas are shown in Figure 1.

[3] In 2018, the Council separately adopted a Delta Plan amendment to address conveyance, storage, and operations of the water supply system, which had also been a component of the Bay Delta Conservation Plan.

Figure 1. Planning Area for Delta Plan Ecosystem Amendment Program Environmental Impact Report

Figure 1 is a statewide map of California. The map identifies the Planning Area for Delta Plan Ecosystem Amendment Program Environmental Impact Report. The primary planning area is the Sacramento-San Joaquin Delta (Delta) and Suisun Marsh. The extended planning area is defined by the watersheds that contribute flows to the Delta and areas outside the Delta watershed that receive water from or conveyed through the Delta.

Alternative formats of this map are available upon request.

Primary Planning Area

Wat. Code section 85300(a) states “The Delta Plan shall include subgoals and strategies to assist in guiding state and local agency actions related to the Delta.” One of the uses of these strategies will be for state or local public agencies that propose to undertake a covered action to determine if the covered action is consistent with the Delta Plan. The term “covered action” is defined in Wat. Code section 85057.5(a) generally as “a plan, program, or project as defined pursuant to section 21065 of the Public Resources Code that...[w]ill occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh.”

The Primary Planning Area will consist of the Delta, as defined in Wat. Code section 85058. The Delta lies roughly between the cities of Sacramento, Stockton, Tracy, and Antioch. It extends approximately 24 miles east to west and 48 miles north to south, and includes parts of five counties (Sacramento, San Joaquin, Contra Costa, Solano, and Yolo). The Suisun Marsh is located south of Fairfield and includes land adjacent to Carquinez Strait, Grizzly Bay, Suisun Bay, and Honker Bay (see Figure 1).

Extended Planning Area

The extended planning area will extend outside of the Delta, as defined in Wat. Code section 85058, to include areas that would be affected by the Proposed Project. The Act includes several provisions that require the Delta Plan to address issues outside of the Delta. Section 85302(b) states “The geographic scope of the ecosystem restoration projects and programs identified in the Delta Plan shall be the Delta, except that the Delta Plan may include recommended ecosystem projects outside the Delta that will contribute to achievement of the coequal goals.”

As shown in Figure 1 of this NOP, the Delta Watershed area includes a large portion of California north of Fresno and the San Joaquin River. This area includes more than two dozen counties and extends as far north as the California-Oregon border in Modoc County.

The Extended Planning Area outside the Delta Watershed Area includes areas extending from Napa County south to San Benito County, and the western half of California south of Fresno. This area extends along the coast from San Luis Obispo south to the California-Mexico border.

STUDY PERIOD

The study period to be considered in the PEIR is defined by the purposes and uses of the Delta Plan. The Delta Plan contains both “recommendations” and an integrated and legally enforceable set of “policies.” The policies will serve as the basis for future findings of consistency with the Delta Plan by state and local agencies regarding Delta-related projects that are “covered actions,” as defined in Wat. Code section 85057.5(a), and for subsequent evaluation of those findings by the Council on appeal, pursuant to Wat. Code section 85225 et seq. This regulatory arrangement requires a Delta Plan that has a long-term perspective, with the acknowledgement that the “Council shall review the Delta Plan at least once every five years and may revise it as the Council deems appropriate” (Wat. Code section 85300(c)).

The Delta Reform Act contains a long-term goal for implementation of Delta Plan ecosystem restoration subgoals and strategies, which is to “[r]estore large areas of interconnected habitats within the Delta and its watershed by 2100.” (Wat. Code section 85302(e)(1)). This 2100 timeframe provides a basis for consideration of a long-term vision for the Delta Plan. However, as stated in Chapter 1 of the Delta Plan:

> The Delta of 2100 likely will be very different from the Delta of today. Some of the changes will be intentional or predictable, and others will be unintended and surprising. Changes are likely or expected to result from population growth, climate change and sea-level rise, land subsidence, and earthquakes—most beyond human ability or willingness to control. Human-made changes in land use and water use are also expected to continue…. The law requires that the Delta Plan be [reviewed] every [five] years, [any resulting update] is intended to build on an evolving base of knowledge, directing near- and mid-term actions, and preserving and protecting longer-term opportunities as yet unknown.

The Delta Reform Act also includes references to numerous studies and programs, the results of which should be considered in development (and amendment) of the Delta Plan. At this time, those studies have not been completed and several are not anticipated to be completed before 2030. However, it is anticipated that many of the projects recommended by those studies would be implemented by 2050.

Consequently, because many of the actions that could be implemented by other agencies in response to the Delta Plan would be evaluated, designed, and implemented by 2050, this PEIR considers a study period that extends until 2050.

PROJECT DESCRIPTION

In accordance with section 15082 of the CEQA Guidelines, an NOP is required to describe the proposed project and its location. The project to be analyzed in the PEIR consists of the Proposed Ecosystem Amendment to the Delta Plan, as described below.

The Council is proposing to amend Chapter 4 of the Delta Plan (Protect, Restore, and Enhance the Delta) to address the shift from the BDCP to EcoRestore and provide a more comprehensive approach to ecosystem protection, restoration, and enhancement in the Delta, as required to achieve the goals and strategies described in the Delta Reform Act. The Proposed Ecosystem Amendment was developed based on robust stakeholder engagement and scientific synthesis. The Proposed Ecosystem Amendment consists of:

- Chapter 4 narrative which includes new and revised policies and recommendations;

- Three regulatory appendices (Appendices 3A and 4A and New Definitions; and Appendix 8A);
- Four technical appendices (Appendix Q1-Q4); and
- An appendix containing new and revised ecosystem performance measures pertinent to the coequal goal of protecting, restoring, and enhancing the Delta ecosystem (Appendix E).

The analysis in the PEIR will assume that the Proposed Ecosystem Amendment and the rest of the currently adopted Delta Plan are implemented and achieve their desired outcomes, regardless of whether the outcomes are expressed as policies or recommendations, and, accordingly, evaluate the potential impacts of the types of projects that the Proposed Ecosystem Amendment and the Delta Plan would encourage and promote in the Primary and Extended Planning Areas.

New and Revised Policies and Recommendations

The proposed new and revised policies and recommendations within Chapter 4 are:

- New Policy, ER Policy "A." Disclose Contributions to Restoring Ecosystem Function and Providing Social Benefits
- Revised Policies
  - ER P4. Expand Floodplains and Riparian Habitats in Levee Projects
  - ER P2. Restore Habitats at Appropriate Elevations
  - ER P3. Protect Opportunities to Restore Habitat
- New Recommendations
  - New ER Recommendation "A." Increase Public Funding for Restoring Ecosystem Function
  - New ER Recommendation "B." Use Good Neighbor Checklist to Coordinate Restoration with Adjacent Uses
  - New ER Recommendation "C." Fund Targeted Subsidence Reversal Actions
  - New ER Recommendation "D." Funding to Enhance Working Landscapes
  - New ER Recommendation "E." Develop and Update Management Plans to Halt or Reverse Subsidence on Public Lands
  - New ER Recommendation "F." Support Implementation of Ecosystem Restoration

- New ER Recommendation “G.” Align State Restoration Plans and Conservation Strategies with the Delta Plan
- New ER Recommendation “H.” Prioritize Unscreened Diversions within the Delta
- New ER Recommendation “I.” Fund Projects to Improve Survival of Juvenile Salmon

- Revised Recommendations
  - ER R1. Update Delta Flow Objectives
  - ER R5. Update the Suisun Marsh Protection Plan
  - ER R7. Prioritize and Implement Actions to Control Nonnative Invasive Species
  - ER R8. Manage Hatcheries to Reduce Risk of Adverse Effects
  - ER R9. Coordinate Fish Migration and Survival Research

The Proposed Project also includes removal of the following Delta Plan recommendations:

- ER R2. Prioritize and Implement Projects that Restore Delta Habitat – Recommendation removed as relevant components are addressed in New ER Policy “A.”
- ER R3. Complete and Implement Delta Conservancy Strategic Plan – Recommendation removed as relevant components are addressed in New ER Recommendations “F” and “G.”
- ER R6. Regulate Angling for Nonnative Sport Fish to Protect Native Fish – Recommendation removed as recommended proposals have been developed.

New and Revised Ecosystem Performance Measures

The Delta Plan’s performance measures are an integral component of the Delta Plan Adaptive Management framework and enable the Council to track progress in meeting the objectives of the Delta Plan. The performance measures are quantified or otherwise measurable targets to be used as indicators of whether specific actions are producing expected results. Five-year assessments of performance measures, completed in accordance with Delta Reform Act requirements for the Council to review the Delta Plan at least once every five years, are based on evaluation of interim milestones set for each measure. The Five-Year Review process also sets a framework for conducting an evaluation of performance measures for their effectiveness. Assessments of performance measures will inform the adaptive management of the Delta Plan.

The Council proposes to amend Appendix E of the Delta Plan to refine performance measure targets, metrics, and baseline conditions associated with proposed new and revised policies and recommendations within Delta Plan Chapter 4.

The proposed new and revised ecosystem performance measures are:

- New Performance Measures
    - Performance Measure 4.12: Subsidence Reversal for Tidal Reconnection, with target met by 2030
    - Performance Measure 4.13: Barriers to Migratory Fish Passage, with some targets met by 2030 and others met by 2050
    - Performance Measure 4.14: Increased Funding for Restoring Ecosystem Function, with target met by 2030
    - Performance Measure 4.15: Seasonal Inundation, with target met by 2030
    - Performance Measure 4.16: Acres of Natural Communities Restored, with target met by 2050
- Revised Performance Measure 4.6: Doubling Goal for Wild Central Valley Salmon, within interim targets for the period of 2035-2065, with target met by 2065

The Proposed Project also includes removal of the following performance measures:

- Performance Measure 4.4: Acres of Habitat Restored
- Performance Measure 4.8: Landscape Metrics to Assess Ecological Functions
- Performance Measure 4.7: Progress Toward Native Species in Protected and Restored Habitats and Migratory Corridors
- Performance Measure 4.11: Percent of Hatchery Fish that are Marked and Tagged

General Types of Activities for Implementation of the Proposed Ecosystem Amendment

Projects or actions taken by other public agencies in response to the Proposed Ecosystem Amendment could include: changes in water flows; restoration of natural communities, including but not limited to wetland, upland, or riparian habitat; subsidence reversal activities; protection of native species and reduction of nonnative invasive species impacts; construction of new infrastructure and improvements to existing infrastructure, including screened diversions and improvements to fish passage, and modifications to improve hydrologic surface water connectivity and increase frequency of seasonal inundation.

The PEIR will consider the environmental impacts of reasonably foreseeable projects that could be undertaken in compliance with the Proposed Ecosystem Amendment. Given both the plan-level nature of the Proposed Project policies and recommendations and new or revised performance measures, as well as the uncertainty concerning the extent to which the Proposed Project would result in any particular action, it is difficult to identify all specific activities or projects for implementation of the Proposed Project and when, where, or how they could be implemented as a result of the Proposed Project. Because specific project details such as project size, configuration, location, and operation for potential projects that may be implemented by a variety of project proponents are not known at this time, the PEIR will assess the potential effects of different types of projects and activities that could be undertaken by other public agencies in response to the Proposed Ecosystem Amendment. Therefore, analyses of similar, "example" projects that are representative of the types of impacts that could occur as a result of the actions by other public agencies undertaken in compliance with the Proposed Ecosystem Amendment will be reviewed for the analysis in the PEIR.

Alternatives to the Proposed Ecosystem Amendment

In accordance with CEQA Guidelines section 15126.6, the PEIR will describe a range of reasonable alternatives to the project that are capable of meeting most of the basic objectives of the project, and that would avoid or substantially lessen any of the significant effects of the project. The PEIR will also identify any alternatives that were considered by the lead agency but rejected as infeasible, and briefly explain the reasons why. The PEIR will provide an analysis of the No-Project Alternative and will also identify the environmentally superior alternative.

POTENTIAL ENVIRONMENTAL EFFECTS OF THE PROPOSED PROJECT

The Council has determined that a PEIR is required for the Proposed Ecosystem Amendment. The PEIR will identify the potentially significant environmental effects ("impacts") of the Proposed Ecosystem Amendment and alternatives in accordance with CEQA and the CEQA Guidelines. Mitigation measures or approaches to future mitigation programs will be described to reduce significant impacts or potentially significant impacts to a less-than-significant level.

The PEIR will examine the potential significant environmental effects of the Proposed Ecosystem Amendment. The Proposed Project does not involve construction or operation of specific facilities or other specific physical actions by the Council. That is because the Council does not construct or operate facilities or undertake other specific physical actions in the Delta. Rather, pursuant to the Delta Reform Act, the Delta Plan is a comprehensive plan that includes policies with regulatory effect setting specific parameters and requirements with which the "covered actions" (as defined in Wat. Code section 85057.5(a)) of state and local agencies must comply. It also contains recommendations to federal, state, and local agencies to take other actions to help achieve the coequal goals.

The potential environmental impacts resulting from the implementation of the Proposed Project would assume that the Proposed Ecosystem Amendment and the rest of the currently adopted Delta Plan are implemented and achieve their desired outcomes. Additionally, the analysis will evaluate the potential impacts of types of projects that the Proposed Ecosystem Amendment and the Delta Plan would encourage and promote. Once proposals for specific projects consistent with the Proposed Ecosystem Amendment are developed, their impacts will be more fully evaluated in future project-level CEQA documents prepared by the lead agencies for the proposed projects.

The Proposed Ecosystem Amendment PEIR will consider all resource areas identified in CEQA Guidelines Appendix G, Environmental Checklist, in the evaluation of environmental effects. The PEIR will provide a program-level evaluation of the potential impacts, addressing potential adverse effects at both the local and regional levels. The PEIR will include evaluation of the cumulative effects of the Proposed Ecosystem Amendment. The PEIR will describe thresholds of significance to determine the significance of potential impacts, and will identify program-level mitigation measures, including performance-based approaches or policies.

For covered actions constructed or otherwise implemented in response to the proposed amendments, other public agencies would be required to implement all applicable Delta Plan mitigation measures or equally effective measures, if feasible, as required by Delta Plan policy G P1 (b)(2) (California Code of Regulations title 23 section 5002 (b)(2)).

Due to the wide range of actions that could be undertaken by other public agencies in response to the Proposed Ecosystem Amendment in the Primary Planning Area and the Extended Planning Area, it is anticipated that significant effects could occur for the resources summarized below.

- **Aesthetics**: The analysis of aesthetic resources will evaluate potential changes to existing visual resources that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects on scenic vistas; potential to damage scenic resources; changes to visual character and public views; and new sources of light and glare.

- **Agriculture and Forestry Resources**: The analysis of agricultural and forestry resources will evaluate farmland and forestland conversion and other related effects potentially resulting from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to the conversion of designated farmland to nonagricultural use; conflicts with agricultural use zoning and Williamson Act contract lands; conflicts with zoning of forestland, and/or conversion of forestland to non-forest use.

- **Air Quality and Greenhouse Gas Emissions**: The analysis of air quality and greenhouse gas emissions will evaluate related effects of any increased emissions potentially resulting from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include those associated with temporary (during construction activities) and long-term (operational) emissions and the potential for those emissions to conflict with applicable plans (air quality plans and/or plans adopted to reduce greenhouse gas emissions); exceed applicable standards; expose sensitive receptors; create objectionable odors; and/or result in a significant impact on the environment.

- **Biological Resources – Aquatic**: The analysis of aquatic biological resources will evaluate potential changes to water resources that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Aquatic biological resource impacts will be evaluated in terms of how physical and operational project components would result in adverse environmental impacts based on information developed for the potential operational changes that will be conducted.

Specific topics to be addressed include those associated with temporary (during construction activities) and long-term (operational) impacts to habitat associated with special-status fish species; direct effects on special-status fish species; and interference with the movement of native resident fish species.

- **Biological Resources – Terrestrial**: The analysis of effects on natural communities and terrestrial wildlife habitats will evaluate potential changes that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include those associated with temporary (during construction activities) and long-term (operational) impacts associated with the loss or degradation of terrestrial habitats, including wetlands (e.g., tidal wetlands) for special-status species, including sensitive natural communities, and designated critical habitat. The assessment will consider current habitats in the Primary Planning Area and the Extended Planning Area that could be affected by projects undertaken by other public agencies in response to the Proposed Ecosystem Amendment. Impacts on special-status species, including plants and wildlife, will be assessed based on potential effects on their habitats. The analysis will also assess the potential for the Proposed Ecosystem Amendment to conflict with existing regional and local policies, ordinances, and plans, including habitat conservation plans and natural community conservation plans.

- **Cultural Resources and Paleontological Resources**: The analysis of cultural and paleontological resources will evaluate potential changes to cultural resources that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to changes to significant historic buildings, structures, or linear features; disturbance or destruction of prehistoric and historic-era archaeological resources, including submerged resources; disturbance or destruction of buried human remains; and disturbance or destruction of paleontological resources.

- **Energy Resources**: The analysis of energy resources will evaluate potential changes to existing energy resources that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to conflicts with applicable plans, policies, or regulations of local county and/or state energy standards that have been adopted for the purpose of improving energy efficiency; and the potential for inefficient, wasteful, or unnecessary long-term consumption of energy or changes to hydropower generation.

- **Geology, Soils, Seismicity, and Mineral Resources**: The analysis of geology and soils will evaluate potential impacts that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects concerning risks associated with seismic fault rupture and groundshaking; unstable soil and underlying geologic conditions. The analysis will also consider effects associated with increased rates of soil erosion; use of septic tanks; and the potential to destroy unique geological features.

- **Hazards and Hazardous Materials**: The analysis of hazards and hazardous materials will evaluate potential exposure to hazardous materials that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects associated with the use, storage, transportation and disposal of hazardous materials; creation of hazardous conditions associated with accidental release; safety hazards for projects located near a public airport, public-use airport, or private airstrip; conflicts with emergency response access and/or evacuation plans; and exposure to wildfires.

- **Hydrology and Water Quality**: The analysis of hydrology and water quality will evaluate potential effects in hydrologic and water quality conditions that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to: violations of water quality standards or waste discharge requirements or substantial water quality degradation; groundwater supply interference; substantial alteration of site drainage patterns resulting in substantial erosion, siltation, or flooding; creation of runoff that would exceed capacity of stormwater drainage systems; and potential flood risk.

- **Land Use and Planning**: The analysis of land use and planning will evaluate potential land use conflicts resulting from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to conflicts with applicable land use plans and regulations adopted to avoid or mitigate environmental effects.

- **Noise**: The analysis of noise will evaluate potential increases in noise and vibration levels that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to exposure of sensitive receptors to increased noise and groundborne vibration levels; and the potential for noise levels to exceed applicable local ordinances.

- **Population, Employment, and Housing**: The analysis of impacts to population and housing will describe the potential causes of growth and housing displacement resulting from actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to unplanned population growth and demand for housing; and displacement of housing or people.

- **Recreation**: The analysis of recreation will evaluate potential impacts to recreation facilities and opportunities resulting from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to the impairment, degradation, or elimination of recreational resources, facilities, and opportunities.

- **Transportation, Traffic, and Circulation**: The analysis of transportation, traffic, and circulation will evaluate potential changes to transportation patterns and facilities resulting from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to conflicts with applicable programs, plans, ordinances or policies; increased hazards due to geometric design features or incompatible uses; and interference with emergency access. The analysis will also qualitatively discuss potential conflicts or inconsistencies with vehicle miles traveled considerations described in CEQA Guidelines section 15064.3 subsection b.

- **Tribal Cultural Resources**: The analysis of impacts to tribal cultural resources will evaluate potential changes to cultural resources that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to disturbance or destruction of tribal cultural resources.

- **Utilities and Public Services**: The analysis of utilities and public services will evaluate potential impacts to capacity to serve demand associated with actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects to water supply sources, treatment, and distribution systems; wastewater collection and treatment systems; storm drainage collection systems; electrical and natural gas distribution systems; solid waste collection and disposal; law enforcement; fire protection and emergency medical services; schools; and libraries.

- **Wildfire**: The analysis of wildfire hazards will evaluate potential exposure to wildfire risk that would result from implementation of actions by other public agencies in response to the Proposed Ecosystem Amendment. Specific topics to be addressed include temporary (during construction activities) and long-term (operational) effects related to impairment of an adopted emergency response or evacuation plan; and potential to exacerbate wildfire risks.

Attachment A-2
May 28, 2020 Scoping Meeting
Presentation and Materials

DELTA STEWARDSHIP COUNCIL
A California State Agency

– AGENDA –

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) SCOPING MEETING FOR DRAFT PROGRAM ENVIRONMENTAL IMPACT REPORT FOR PROPOSED DELTA PLAN CHAPTER 4 (PROTECT, RESTORE, AND ENHANCE THE DELTA ECOSYSTEM) AMENDMENT

Thursday, May 28, 2020

4:00 p.m. to 5:30 p.m.

To view the webcast, click the link:

https://deltacouncil.webex.com/deltacouncil/onstage/g.php?MTID=e49ab085cfb30055ac6be63674a40de4a

To provide comment, call the following teleconference number: 1-877-402-9757, Access Code 4450441. If calling in, please turn off your computer's audio to avoid interference. **In addition, please email engage@deltacouncil.ca.gov or text/call (916) 798-9817 with your name and phone number that you will be calling in from so that you can be unmuted when appropriate.**

Please contact the Council at engage@deltacouncil.ca.gov or (916) 798-9817 with questions, concerns, or issues with the webcast or public participation during this scoping meeting.

4:00 p.m.	Welcome
4:05 p.m.	Presentation on the proposed amendment to Chapter 4 (Protect, Restore, and Enhance the Delta Ecosystem) of the Delta Plan (Proposed Delta Plan Ecosystem Amendment) and Potential Environmental Impacts
4:20 p.m.	Oral Comment Period *Those who wish to provide oral scoping comments on the scope of the Program Environmental Impact Report for the Proposed Delta Plan Ecosystem Amendment may do so by calling the teleconference number above and turning off the WebEx audio. Please email engage@deltacouncil.ca.gov or call/text (916) 798-9817 to let Council staff know that you wish to share oral*

	comments and to provide the phone number that you will be calling in from so that you can be unmuted when called upon. *Those who wish to provide written comments may also provide their comment(s) to ecosystemamendment@deltacouncil.ca.gov by 5:00 p.m. July 10, 2020.*[1] ***All comments received, including names, affiliations, and addresses, will become part of the official administrative record and may be available to the public. Commenters may request the Council to withhold contact information from public disclosure, which will be honored to the extent allowable under California law. For the Council to consider withholding contact information, this request must be stated prominently at the beginning of the submitted written comments or when contacting the above for oral comments.***
5:30 p.m.	Adjourn Scoping Meeting

[1] Send comments to: Harriet Ross, Assistant Planning Director, Delta Stewardship Council, 980 9th Street, Suite 1500, Sacramento, CA 95814; Phone: 916-445-5511; Email address: ecosystemamendment@deltacouncil.ca.gov

All comments should include "Delta Plan Ecosystem Amendment NOP" as the subject and the name and email address of the contact person so that the contact information can be automatically added to the distribution list for future notices and information about the Proposed Project environmental review process.

Figure 1. Planning Area for Delta Plan Ecosystem Amendment Program Environmental Impact Report

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Figure 1 is a statewide map of California. The map identifies the Planning Area for Delta Plan Ecosystem Amendment Program Environmental Impact Report. The primary planning area is the Sacramento-San Joaquin Delta (Delta) and Suisun Marsh. The extended planning area is defined by the watersheds that contribute flows to the Delta (Delta Watershed Area) and areas outside the Delta watershed that receive water from or conveyed through the Delta.

Alternative formats of this map are available upon request.

Proposed Delta Plan Chapter 4 (Protect, Restore, and Enhance the Delta Ecosystem) Amendment Program Environmental Impact Report CEQA Scoping Meeting

DELTA STEWARDSHIP COUNCIL

A California State Agency

May 28, 2020

Remote – WebEx and Teleconference

Today's Presentation

- Purpose of meeting
- Background
- Proposed Project - Proposed Delta Plan Chapter 4 (Protect, Restore, and Enhance the Delta Ecosystem) Amendment
- CEQA process
- Public comment
- Closing

Purpose of Today's Meeting

- Provide background on the Delta Plan and proposed Ecosystem Amendment

- Receive public and agency input on scope and content of the Program Environmental Impact Report (PEIR)

How to Comment Today

- In order to provide oral comments during the webcast, call the following teleconference number:
  1-877-402-9757, Access Code 4450441

- Those who wish to provide oral comments on scope of the Draft PEIR are requested to ***email engage@deltacouncil.ca.gov*** or ***call/text (916) 798-9817*** to let Council staff know that you wish to share oral comments and to provide the phone number that you will be calling in from so that you may be unmuted when called upon.

- All comments will become part of the official administrative record and may be available to the public. You may request withholding of contact information when calling in.

DELTA STEWARDSHIP COUNCIL
A California State Agency

The Delta Stewardship Council

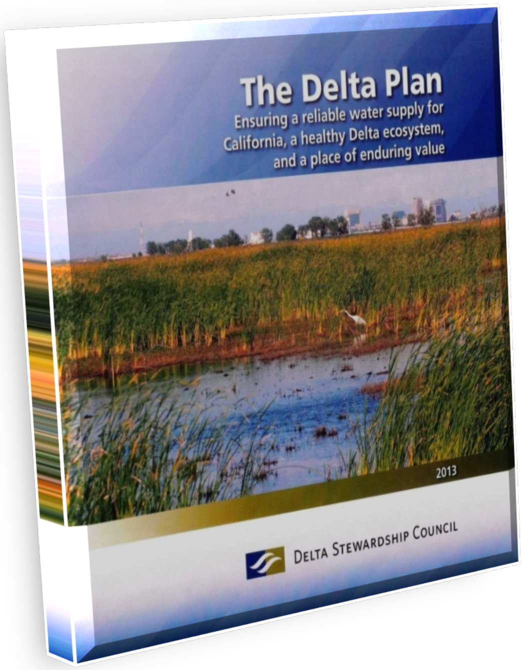
- The Council was formed by the **Delta Reform Act** in 2009
- Created to:
  - Achieve the state mandated **coequal goals for the Delta**: a more reliable water supply and a healthy and protected ecosystem
  - In a manner that **protects and enhances** the unique cultural, recreational, natural resource, and agricultural values of **the Delta as an evolving place**



CA Water Code §85054

The Delta Plan and Amendments

- The **Delta Plan** was adopted by the Council in 2013
- Proposed project would **amend** Delta Plan Chapter 4
- The Council is preparing a **Program Environmental Impact Report** for the proposed project



Ecosystem Amendment

2015 shift from BDCP to EcoRestore necessitated update of Delta Plan Chapter 4 to achieve Delta Reform Act goals

Photo courtesy of DWR

Vision for a Restored Delta Ecosystem

Vision for a Restored Delta Ecosystem (cont. - 1)

The Council envisions a future in which the Delta ecosystem has the following characteristics:

- *Native species, including algae and other plants, invertebrates, fish, birds, and other wildlife, are self-sustaining and persistent.*
- *The tidal channels and bays in the Delta and Suisun Marsh connect with freshwater creeks, upland grasslands, and woodlands.*
- *The Sacramento and San Joaquin Rivers and Delta tributaries include reaches where streams are free to meander and connect seasonally to floodplains…*
- *Habitats for resident and rearing migratory fish, birds, and upland wildlife are connected by migratory corridors…*

Vision for a Restored Delta Ecosystem (cont. - 2)

The Council envisions a future in which the Delta ecosystem has the following characteristics (cont'd):

- *More natural variations in water flows and conditions make aquatic habitats, tidal marshes, and floodplains more dynamic, encourage survival of native species, and resist invasions by weeds and animal pests.*
- *The ecosystem is resilient enough to absorb and adapt to current and future effects of multiple stressors…*
- *The Delta will provide more reliable water supplies...*
- *Californians recognize and celebrate the Delta's unique natural resource values…*

Proposed Project

1. Create more natural, functional flows
2. Restore ecosystem function
3. Protect land for restoration and safeguard against land loss
4. Protect native species and reduce the impact of nonnative invasive species
5. Improve institutional coordination to support implementation of ecosystem protection, restoration, and enhancement

Photo courtesy of DWR

CEQA Process Summary

Notice of Preparation issued and **scoping period** begins

→

Draft EIR issued for public and agency review

→

Final EIR issued with responses to comments on Draft EIR

→

Decision made on project

Program EIR Planning Areas

- Primary Planning Area
- Extended Planning Area

Program EIR Impact Analysis

- Delta Plan is a comprehensive plan designed to guide the actions and projects of other federal, state, and local agencies that are related to the Delta

- Council does not propose to construct or operate facilities or undertake other specific physical actions following adoption of the proposed amendments

- PEIR analysis considers potential environmental impacts of general types of activities and potential projects that could be undertaken by other public agencies in response to the proposed Ecosystem Amendment

Covered Actions Impact Analysis

- A *covered action* is "a plan, program, or project as defined pursuant to section 21065 of the Public Resources Code that...[w]ill occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh"(Wat. Code section 85057.5(a))
- For covered actions subject to the proposed amendment in the Delta and Delta Watershed Area, lead agencies would be required to implement all applicable feasible mitigation measures adopted and incorporated into the Delta Plan or equally effective measures
- Specific details of potential covered actions that will be subject to the proposed amendments, such as project size, configuration, location, and operation, are not known at this time
- The impacts of specific covered actions that will be subject to the proposed amendment will be fully evaluated in project-level documents under CEQA by the lead agency for the project

Types of Activities and Potential Projects That Could be Undertaken in Response to the Proposed Ecosystem Amendment

- Changes in water flows
- Restoration of natural communities, including but not limited to wetland, upland, or riparian habitat
- Subsidence reversal activities

Types of Activities and Potential Projects That Could be Undertaken in Response to the Proposed Ecosystem Amendment (cont.)

- Protection of native species and reduction of nonnative invasive species impacts

- Construction of new infrastructure and improvements to existing infrastructure, including screened diversions and improvements to fish passage, and modifications to improve hydrologic surface water connectivity and increase frequency of seasonal inundation

Resource Areas Considered

- Aesthetics
- Agricultural and Forestry Resources
- Air Quality and Greenhouse Gas Emissions
- Biological Resources
- Climate Change
- Cultural and Paleontological Resources
- Energy Resources
- Geology, Soils, Seismicity, and Mineral Resources
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Population, Employment, and Housing
- Recreation
- Transportation, Traffic, and Circulation
- Tribal Cultural Resources
- Utilities and Public Services
- Wildfire

CEQA Process Next Steps

- Council will consider comments received on the NOP and during scoping in preparing the Draft PEIR
- Draft PEIR will be circulated for public and agency review
- Written responses to comment received on the Draft PEIR will be prepared
- Final PEIR
  - Responses to comments
  - Any text changes to Draft PEIR
  - Mitigation Monitoring and Reporting Program
- Council will consider certifying PEIR
- Council will consider approving the proposed Ecosystem Amendment

CEQA Anticipated Schedule

Notice of Preparation Scoping ★	• Notice of Preparation comment and scoping period • *Schedule: May 11 to July 10, 2020*
Draft Program EIR Public Review ★	• Council releases Draft PEIR for public and agency review and comment • *Schedule: Spring 2021*
Final Program EIR Response to Comments	• Council releases Final PEIR, which contains responses to comments on the Draft PEIR • *Schedule: Summer/Fall 2021*
Delta Stewardship Council Decision ★	• Council decides whether to certify PEIR and adopt proposed Delta Plan Ecosystem Amendment • *Schedule: Summer/Fall 2021*

★ Opportunity for public review and comment under CEQA

Public Comment

Providing Oral Scoping Comments Today

- We are here to listen and record your input about the scope and content of the Program EIR
- We will call on you in the order that speaker requests are received
- Please state your name and organization
- All comments received will be taken into consideration in preparing the Draft PEIR

How to Submit Comments after Today

- Mail: Harriet Ross
  Delta Stewardship Council
  980 9th Street, Suite 1500
  Sacramento, CA 95814

  Postmarked by Friday, July 10, 2020

- Email:
  ecosystemamendment@deltacouncil.ca.gov

  Received by 5:00 p.m. on Friday, July 10, 2020

For More Information

- For updated information on the progress of the Delta Plan Ecosystem Amendment PEIR:
  - Website: https://deltacouncil.ca.gov/delta-plan/amendments
- Sign up for the Council's Delta Plan Amendments email list:
  - Email: ecosystemamendment@deltacouncil.ca.gov
  - Write: Harriet Ross
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Oral Comment Period Open - How to Comment Today

- To provide oral comments, call the following teleconference number:
  1-877-402-9757, Access Code 4450441
- Those who wish to provide oral comments on the scope of the Draft PEIR are requested to ***email engage@deltacouncil.ca.gov*** or ***call/text (916) 798-9817*** to let Council staff know that you wish to share oral comments and to provide the phone number that you will be calling in from so that you can be unmuted when called upon.
- All comments will become part of the official administrative record and may be available to the public. You may request withholding of contact information when calling in.

How to Comment Today

- In order to provide oral comments during the webcast, call the following teleconference number:
  1-877-402-9757, Access Code 4450441

- Those who wish to provide oral comments on scope of the Draft PEIR are requested to ***email engage@deltacouncil.ca.gov*** or ***call/text (916) 798-9817*** to let Council staff know that you wish to share oral comments and to provide the phone number that you will be calling in from so that you may be unmuted when called upon.

- All comments will become part of the official administrative record and may be available to the public. You may request withholding of contact information when calling in.

DELTA STEWARDSHIP COUNCIL
A California State Agency

Thank You!

We appreciate your time and thank you for your input!

Delta Stewardship Council

A California State Agency

Attachment A-3
Scoping Meeting Transcript

STATE OF CALIFORNIA

DELTA STEWARDSHIP COUNCIL

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) SCOPING MEETING FOR DRAFT PROGRAM ENVIRONMENTAL IMPACT REPORT FOR PROPOSED DELTA PLAN CHAPTER 4 (PROTECT, RESTORE AND ENHANCE THE DELTA ECOSYSTEM) AMENDMENT

THURSDAY, MAY 28, 2020

MEETING HELD

VIA WEBEX VIDEOCONFERENCE

and

LATER TRANSCRIBED FROM A VIDEO/AUDIO RECORDING

TRANSCRIBER'S TRANSCRIPT OF PROCEEDINGS

Transcribed from audio/video file by:
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BRANDON CHAPIN
Public Participation Manager

---o0o---

OTHERS PRESENT

KATHY McEFEE
Environmental Science Associates

BRANDON DAWSON
Sierra Club California

DOUG BROWN
Douglas Environmental

RACHEL WIGGINGTON
San Francisco Bay
Conservation and Development
Commission

---o0o---

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Thursday, May 28, 2020

Webex Videoconference

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(The transcriber was not present for the live scoping meeting; this record is typed from a video/audio recording of the Webex scoping meeting provided to the transcriber on September 16, 2020.)

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MS. ROSS: Okay. Well, with that, it looks like it's a couple minutes before 4:00 o'clock. So let's go ahead and begin.

I'm trying to figure out how to advance my slides here.

Okay. Good afternoon. I want to welcome you all to the CEQA scoping meeting for the Proposed Delta Plan Chapter 4 Program Environmental Impact Report.

Thank you for joining us today at our virtual meeting. This is my first scoping meeting done all virtually, so probably a sign of the times.

My name is Harriet Ross. I'm the assistant planning director for the Delta Stewardship Council, and I'll be serving as your moderator for today's scoping meeting and facilitating comments and questions.

With me today is Jessica Law. She's the chief deputy executive director at the Council.

We also have Jeff Henderson, the deputy executive officer of planning.

We also have Avery Livengood and Kaylee Griffith, Stewardship Council staff to the project. And Brandon Chapin and Lita Brydie will be helping us facilitate public comments, and they are also with the Council.

We also have our consulting team with us, Stantec. We have Jamil Ibrahim and Rina Buck-Macleod. And we also have Kathy McEfee with Environmental Science Associates.

So with those brief introductions, I will go ahead and turn off -- turn it over to Jessica Law to make some welcoming remarks.

Jessica?

MS. LAW: Thanks, Harriet.

Good afternoon, everyone. I wanted to just send out a warm welcome to our first fully virtual meeting. As many of you know, we usually have a webcast option for our public meetings, but this is our first fully virtual scoping meeting. So it's good to see some familiar names on the list, and we look forward to seeing you again in person at some point in the near future.

But thank you for your patience while we are online and we have -- as many of you know, we have closed our offices due to COVID-19, to protect public health and safety. But that by no means, means that we're not available for public input and feedback. And we're really looking forward to this discussion today and to hearing your questions and your input on this process.

Many of you know that this has been a process that has gone on for a few years and we are excited to be at this point in the project and look forward to moving forward with you and working with you through the rest of it.

So that's it for me. We will be here for the next hour and a half or so.

And Harriet, I will turn it back over to you.

MS. ROSS: Great. Okay. It seems like there's a bit of a lag on the PowerPoint. There we go.

Okay. Thank you, Jessica.

The agenda for today's meeting is, we're going to start off with a short presentation where we will review the purpose of the meeting, provide a brief background of the Delta Stewardship Council and the Delta Plan itself.

We'll also be reviewing the Proposed Delta Plan Chapter 4 Amendment, which is, we're also calling the "proposed project."

We'll be reviewing the CEQA process and the approach to the environmental document.

We will then spend the majority of our time today really hearing from all of you on any comments you would like to provide.

So, again, the purpose of today's meeting is mandated by the California Environmental Quality Act. We'll be providing a background on the Delta Plan and proposed ecosystem amendment, and really, again, we will want to spend the majority of our time to receive public and agency input on the scope and content of the Program Environmental Impact Report.

So just a couple of housekeeping items before we launch into the presentation itself: I think most of you are probably listening to this scoping meeting through the Webex platform, and you can hear me through your computer's audio.

If you wish to make any comments during this time, during this meeting, you will also have to call our teleconference call number to make any oral comments. And that number is shown on the slide, but just in case, for those that are not on the laptop or computer, that number is 1-877-402-9757, access code 4450441. So if you do call in, you will have to turn off the audio on your computer or stop the audio broadcast through Webex to reduce any sound feedback. So if you want to make comments, you have to call that number.

And in addition, please e-mail, text, or call us with your name and number so that when it's your turn to speak, we can unmute you. And our e-mail address for this scoping meeting, to be -- to make any comments is engage@deltacouncil.ca.gov.

And like I said, you can also call or text us at (916) 798-9817. And when you do e-mail, call, or text, again, please let us know that you wish to make comments today and the number that you are calling in from so we know which number to unmute to call upon you when it's your turn.

So I also want to be clear that all comments today will become part of the official administrative record and may be available to the public.

You may request withholding your contact information when calling in, but you just need to let us know upfront.

And we will be recording the meeting and it will be transcribed by a court reporter and will be available on the Delta Stewardship Council website.

So with that -- and I will repeat this again after the presentation.

But with that, I'm going to turn it over to Jeff Henderson of the Council to provide a background of the Council and the proposed project.

Jeff?

MR. HENDERSON: Thanks, Harriet.

Good afternoon, everyone. Thank you for joining us on this afternoon to review some of the components of the proposed project for this CEQA scoping meeting, which is the ecosystem amendment to the Delta Plan.

As many of you know, the Delta Stewardship Council was formed in 2009 under the Delta Reform Act. And the Council was created to advance the State's coequal goals for the Delta: Mainly a more reliable water supply and a healthy and protected ecosystem.

And importantly, the act charged the Council and -- and all of us in California to do that in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. A very important consideration in the context of the coequal goals.

Next slide, please.

So the Delta Reform Act required, in addition, that the Council develop an enforceable plan for the Delta to ensure coordinated action at the federal, state, and local levels. And the Council adopted that plan, named the Delta Plan, in May 2013.

And from time to time, updates or reviews are made to that plan in response to changing circumstances and conditions. And at this time, the Council is proposing amendments to the Delta Plan due to those changes in circumstances and conditions in the Delta, which we'll describe in a moment, from an ecosystem perspective.

In the proposed amendment to the Delta Plan is the proposed project for CEQA. And as many of you may know, the Council previously amended the Delta Plan in February 2016 for new performance measures, inputs; single-year water transfers amendments were completed in September of 2016; and a major set of amendments for performance measures, conveyance storage and operations, and the Delta Levee Investment and Risk Reduction Strategy, or DLIS, was completed in April of 2018.

The Delta Plan is important because it governs any action in the Delta through 14 regulatory policies and makes 73 representations in several key areas. The Council is now preparing the Program EIR, Program Environmental Impact Report, for the project. That impact report will address the potential environmental impacts associated with this ecosystem amendment at a program level.

And I should note, if you have not yet read the

Notice of Preparation that was released for this project, please do obtain a copy from the Council's website. And the NOP includes explanations that describes the project, the probable environmental impacts, and our process to complete the EIR for the ecosystem amendment.

Next slide, please.

So the Delta Reform Act charges the Council with furthering California's coequal goals, of providing a more reliable water supply for California, and protecting, restoring, and enhancing the Sacramento-San Joaquin River Delta and the Suisun Marsh ecosystem, again, in a manner that protects and enhances the unique characteristics of the Delta as an evolving place.

And the Council does this through the Delta Plan. The ecosystem amendment to this plan really reflects a shift that occurred in 2015, from what was known, at the time, as the Bay-Delta Conservation Plan, to EcoRestore, which has been a program of the Department of Water Resources to restore several thousand acres of Delta habitat in a manner that advances goals of the ecosystem.

And Chapter 4 of the Delta Plan really required an update to move from the perspectives offered in the Bay-Delta Conservation Program to those of the

EcoRestore objectives, and then to look beyond those objectives toward what's really needed to accomplish several subgoals of the Reform Act, with regard to ecosystem.

Next slide, please.

So the vision for restored Delta ecosystem, that's present in Chapter 4 of the plan, was derived from the Delta Reform Act itself, and it was approved by the Council through previous iterations of the Delta Plan; and, again, in April of 2019. And it's really demonstrated, in some ways, by the conceptual image that's in this slide present here.

And the goal of restoring the Delta ecosystem isn't really to return to the, sort of, 1850s, unaltered tidal wetland landscape, but, rather, to find opportunities to create some of the historical conditions that make a little more room in the Delta for fish and wildlife while simultaneously balancing that with human land use needs.

And the intended outcome is a healthy, thriving and sustainable ecosystem that's capable of supporting the Delta's many competing goals.

Next slide.

So in -- in Chapter 4 of the Delta Plan, there's the vision for restored Delta ecosystem. And as I mentioned on a previous slide, this is essentially unchanged from the existing version of the Delta Plan, and it's drawn, in large part, off of key concepts that are expressed in the subgoals for ecosystem that are a part of the Reform Act itself.

And I won't read through each of the individual subgoals, but it's important to kind of take stock of the range of activities -- next slide, please -- that the Council envisions as part of the future Delta ecosystem and the characteristics that are included in that, which, again, are sourced from the Reform Act itself.

Next slide. So we're now on slide 12.

I'm going to take a minute here and talk about that organization of the proposed project. In other words, the organization of the ecosystem amendment itself. And the ecosystem amendment is organized around five core strategies, and I will just spend a quick minute on each of these strategies, because they are really the core for how the plan is organized.

The first core strategy -- create more natural, functional flows -- is really focused on the use of best available science to manage flows to support the needs of native species throughout their life cycle.

The strategy describes components of functional flows that mimic portions of the natural hydrograph that are critical for species' life cycles. That core strategy discusses the role of the State Water Resources Control Board in setting flow objectives via the Bay-Delta Water Quality Control Plan, as well as the Council's role to ensure that covered actions, subject to the Delta Plan regulations, are consistent with those flow objectives.

The second core strategy, core strategy 2 -- restore ecosystem function -- is something that identifies five priority attributes for projects to restore ecosystem function.

A new policy is proposed under that core strategy that would require proponents to identify priority attributes that contribute to the ecosystem goals outlined in the previous slides, that are associated with a covered action, that would then assign that project to a ecosystem restoration tier. Proponents would also be required to disclose social benefits provided by the project.

Core strategy 3 -- protect land for restoration and safeguard against land loss -- focuses on addressing challenges that are opposed by land subsidence and sea level rise in the Delta.

This strategy is organized around two objectives:

Protecting the existing but limited opportunities for tidal marsh restoration; and then also halting and reversing subsidence and considering sea level rise in restoration planning activities.

The fourth core strategy -- protect native species and reduce the impact of nonnative invasive species -- seeks to protect native species in the Delta. Nonnative invasive species take over physical space, compete for food, alter food webs, modify habitat structure, and prey on native species.

So the policies and recommendations in this core strategy are really aimed at minimizing or mitigating the establishment or expansion of habitat conditions for those invasive species.

And then, lastly, core strategy 5 -- improve institutional coordination to support implementation of ecosystem protection, restoration, and enhancement -- this core strategy seeks to improve coordination among local, state, and federal agencies responsible for protecting, restoring, and enhancing the ecosystem.

And the policies and recommendations here support activities such as coordinated funding and coordinated permitting that would advance restoration projects that best support the Reform Act objectives.

So that gives you a sense of the range of

strategies that are a part of the proposed project.
     And I will now turn it over to Kathy McEfee, who will walk us through our CEQA process and talk a little bit more about the content and context of the Program EIR.
     MS. McEFEE: Thanks, Jeff.
     As Harriet mentioned at the beginning, I'm part of the consulting team who are preparing the ecosystem amendment Program EIR. And I'm going to cover the CEQA process and where we're at in the process, describe the planning area for the analysis, summarize the approach to be used for assessing impacts, the resource topics to be addressed, and then the next steps and anticipated schedule for completing the Program EIR.
     Next.
     The proposed project location is defined as the planning area where the actions in response to the ecosystem amendment could take place. The primary planning area, shown here in purple, is defined as the legal boundaries of the Delta and Suisun Marsh that are defined in the Water Code section 85085.
     The extended planning area includes two components: One is the watershed that contribute flows to the Delta, and those are the areas shown in green; and then areas of California where -- with places of use receiving

water from or that is conveyed through the Delta, and those are the areas that are shown in tan.

Because the amendments address restoring the Delta ecosystem, it's anticipated that the analysis in the Program EIR will (audio interruption) --

MR. CHAPIN: Sorry about that.

MS. McEFEE: That's okay.

-- will focus on actions that occur in the primary planning area and in the Delta watershed area of the extended planning area.

Next.

As required by the Delta Reform Act, the Delta Plan is a comprehensive plan designed to guide the actions and projects of federal, state, and local agencies that are related to the Delta and Suisun Marsh.

The Council does not propose to construct or operate any facility or undertake other specific physical actions, following adoption of the proposed amendment, that would be subject to analysis in this Program EIR.

Instead, the Program EIR analysis considers potential environmental impacts of general types of activities and potential projects that could be taken -- undertaken by other public agencies in response to the proposed amendment.

Next.

The Program EIR will evaluate actions or projects that are considered covered actions. A "covered action" is a plan, program, or project, as defined pursuant to section 21065 of the Public Resource Code, and it is an action that will occur in whole or in part within the boundaries of the Delta or Suisun Marsh.

For covered actions to be undertaken in response to the proposed amendment, lead agencies are required to implement all applicable feasible mitigation measures adopted and incorporated into the Delta Plan or equally effective measures.

As a broad programmatic analysis, environmental impacts will generally be described as reasonably expected types of impacts, because the details of potential covered actions, such as project size, the configuration, the location, the operation, those are not known at this time. Therefore, the impacts of specific covered actions will be subject to proposed -- that are subject to the proposed amendment will be fully evaluated in project-level documents under CEQA, undertaken by lead agencies who propose those projects at the time they are proposed.

The later activities that are consistent with the proposed amendment and evaluation in this Program EIR may rely on the environmental analysis and mitigation in this Program EIR, in part or in whole, allowing for a more streamlined, efficient CEQA process at the stages-specific project approval.

Next slide.

For the purpose of the analysis, there are a wide range of types of ecosystem projects that will be assumed to be potentially undertaken, including projects that would modify flows, restore natural communities, including but not limited to wetlands, uplands, or riparian habitats, include subsidence reversal activities.

Next.

Protect native species and reduce impacts attributed to nonnative species, improve hydraulic surface water connectivity and increase the frequency of seasonal inundation, including screened diversions and fish passage facilities.

A more detailed of summary of the range of activities will be presented in the Program EIR. The types of activities to be identified are not intended to be an exhaustive list but, instead, a representation of the possible activities or projects that will allow the potential range of environmental impacts to be bracketed.

Next.

Due to the wide range of potential activities that could be undertaken in response to the proposed amendment, anticipate that significant effects can occur in the following resource topics:

Additional information about anticipated significant effects to be evaluated in the Program EIR is provided in the Notice of Preparation.

Next.

So what is the next steps in the CEQA process?

The Council will consider all the comments received on the NOP and during today's scoping meeting in preparation of the EIR. That Draft Program EIR will be circulated for public and agency review. Written responses to comments received on the Draft Program EIR will be prepared, and that Final Program EIR will include those responses to comments, any text changes to the Draft Program EIR, and the mitigation, monitoring, and reporting program.

The Council will consider certifying the Program EIR as adequate under CEQA, and following that action, will consider approving the proposed ecosystem amendment.

Next.

So these are the major CEQA milestones, along with the tentative schedule for each. Right now, we are in the scoping period, and that will go through July 10th, 2020. Your scoping comments will inform the scope of the discussion in the Draft Program EIR, and we anticipate that that Draft Program EIR will be released in the spring of 2021, at which point, the public will have an additional opportunity to review and to comment on the content of the draft.

The Final Program EIR will contain responses to comments received on the Draft Program EIR and expect it to be released in the summer or fall of 2021.

Also in the fall of 2021, the Council expects to make its decision on approval of the ecosystem amendment.

With that, I'm going to turn it back to Harriet.

MS. ROSS: Great. Thank you, Kathy.

Okay. So we just went through a lot of information in a relatively short time, so please feel free to refer to the Notice of Preparation itself for any additional information and detail on the project, potential impacts to be evaluated, and the CEQA process itself. And the NOP is posted at the Delta Stewardship Council website.

Also, this meeting is being recorded, so you can go back and listen to any part of the meeting you wish to at a later date.

So we're now going to begin the oral comment period. We're here to listen and make note of your input for helping us determine the scope of the Draft EIR, and we do appreciate your understanding that we don't know the environmental impacts at this point.

Again, as a reminder, all comments, including names, will become part of the administrative record and may be available to the public. So commenters may request that the Council withhold any of your contact information from public disclosure, which will be honored to the extent allowable under California law. And for the Council to consider withholding that contact information, the request must be stated prominently at the beginning of the submitted comments.

So, again, we're here to listen and record your input about the scope and contents of the Program EIR today. We will call on you in the order that the speaker requests are received. And when we do call on you, we will unmute your line. Please state your name and organization that you are with. Please also limit your comments to about three minutes to ensure that everyone who wishes to speak does have the opportunity to do so. And, again, all comments received will be taken into consideration in preparing the Draft EIR.

And before we begin, I just also wanted to remind folks that we are accepting written comments over regular mail or over e-mail by July 10th. Regular mail has to be postmarked by July 10th, and e-mails have to be received by 5:00 p.m. on July 10th.

For those of you that don't have access to a computer, the hard copy comment letters can go to 980 Ninth Street, Suite 1500. That's in Sacramento, California 95814, and those are the Delta Stewardship Council offices.

For e-mail, that e-mail address is ecosystemamendment@deltacouncil.ca.gov.

And for more information on the project, should you ever wish to read much -- read more about it, please visit the Delta Stewardship Council website itself, under "Delta Plan," under "Amendments." There's a lot more information. And you can always e-mail or write us a letter, address it to the Council offices, and e-mail ecosystemamendment@deltacouncil.ca.gov to be added to the list of information. We do e-mail blasts on major milestones of our project.

Okay. So I know this was a little bit redundant, again, but I want to be clear for those of you that want to make comments: You have to call into the teleconference number in addition to being on the Webex. Again, the number is 1887 -- 1-877-402-9757, and that access code is 4450441. And you have to follow up, joining on the teleconference, by either e-mailing us or calling and texting to let us know that you want to speak. And our e-mail address is engage@deltacouncil.ca.gov or call or text us at (916) 798-9817. And, again, all comments will become a part of the administrative record and may be available to the public.

So let's see. With that, Brandon, can you provide us with an initial list of commenters?

MR. CHAPIN: Yes. We right now have one commenter. We have Brandon Dawson, and I will go ahead and unmute him.

MS. ROSS: Okay. Great.

MR. DAWSON: Hello?

MS. ROSS: Yes. We can hear you.

MR. DAWSON: Oh, hi. Sorry.

Brandon Dawson on behalf of Sierra Club California. Appreciate the comment -- the opportunity to comment today.

We believe that the plan amendment programmatic EIR should diligently and thoughtfully consider ecosystem impacts resulting from the operation of different projects that propose to export water from, transfer water through, or use water in the Delta, and projects that don't adequately show how doing so will comport with the state policy of reducing reliance on the Delta.

Some of these projects also have impacts that alter Delta flows, and they also impact how the Delta flows are maintained, and they are -- that have been subject, historically, to the Bay-Delta Plan follow objectives that are both within the Delta Plan, but also within the State Water Board Resource Use Bay-Delta Water Quality Control Plan.

And then we also ask that the drafting of the programmatic EIR use the best available science (unintelligible) by the necessary amounts of water but also ecosystem restoration projects that the Water Board has been using over the past couple years to dictate how much flow is necessary to sustain the region.

So that's all we have today. Thank you.

MS. ROSS: Thank you.

And Brandon, are there any other speakers at this point?

MR. CHAPIN: At this point, no.

MS. ROSS: Oh, okay.

Well, we're here until 5:30. So anybody that wishes to speak, this is a good time.

MR. CHAPIN: Harriet, maybe we can give about maybe five minutes so everyone can send in and then we can start another list of anyone we get?

MS. ROSS: Yeah. So kind of put it on hold until -- for five minutes?

MR. CHAPIN: Yes.

MR. BROWN: Can you hear me?

MS. ROSS: Yes.

MR. BROWN: Hi. This is Doug Brown, Douglas Environmental. I was hoping to provide a comment.

MS. ROSS: Okay. Sure. Go ahead.

MR. BROWN: Mainly because I was (unintelligible) no one else was commenting. So I felt like I would keep this going a little bit.

So just a quick one: Just -- in looking at the NOP, and what Kathy talked about, as far as the types of projects that could occur, it seemed like the types of projects you are evaluating are primarily habitat improvement projects. Those are the covered actions. Wetland and riparian habitat improvements.

There is some discussion about new infrastructure improvements, but it's connected with screening diversions and improvements to fish passage.

So I'm curious if you will be looking at any projects, infrastructure projects, levee repair projects, that don't include ecosystem components, because they may be just limited to, say, repairs of a levee failure or something along those lines.

Will you be evaluating any of those types of projects, anything that isn't ecosystem-focused in the EIR analysis?

MS. ROSS: I -- Jeff, is that something that you can answer? Or Kathy? Should I go back to the list of the potential projects you are looking at?

MS. McEFEE: Well, I think, you know, that the list of projects is -- that's just an example of particular types of projects.

So as we go through and assess the nature of the amendment, the objectives of the amendment, that's when we will have a more detailed list of types of activities.

MR. BROWN: I guess -- go ahead.

MS. McEFEE: At this point -- Doug, what I would say is, if you have anything in mind or in thought, just -- if you want to provide a comment on, that -- you know, the content for the Draft EIR and submit that, that would be great.

MR. BROWN: I -- I'm assuming I'm doing that now.

But what I would say is, just my sense is that covered actions can cover a pretty broad spectrum of activities that could occur within the Delta, and that there should be some analysis of that broad spectrum.

Right now, the impression I'm getting from the NOP is that it's just focused on restoration or stressor removal or habitat enhancement-type projects.

MS. ROSS: Yeah. As I think as Kathy has indicated, we haven't come up with all of the project types that will be analyzed in the EIR, at this point. So, definitely, your comment is a good one. And we'll have to look into it, whether we would consider other types of infrastructure projects with no ecosystem improvement component added on it. We'd have to do a little bit of thinking on that, but we have got your comment here.

MR. BROWN: Okay. And I guess I would -- just to get clarity, is the analysis intended to address the policies of the ecosystem chapter, or is it intended to address covered actions and how the change in the ecosystem chapter affects those covered actions? I'm trying to get my head around what the EIR is going to be actually assessing.

And if you can't answer that, I understand. I'm just throwing that out there.

MS. McEFEE: Harriet, may -- I think -- sorry, I will try.

If the EIR is going to evaluate, at a program level, potential actions or projects to be undertaken by others in response to the proposed amendment -- I know that may not be a very gratifying response. But I think if you read -- you haven't done so already, if you look at the previous amendments, the Program EIR that Jeff mentioned, on the previous set of amendments, you will get, maybe -- hopefully, it will help clarify the nature and the approach to the analysis that is also going to be the one used for this Program EIR.

MR. BROWN: Okay. I will do that.

So it sounds like it's just people proposing covered actions that -- in response to the changes to the ecosystem chapter that you will be evaluating in the Draft EIR. So maybe not covered actions that are not responding to those ecosystem chapter changes.

MS. ROSS: Not necessarily.

So where those ecosystem policies would be triggered under certain types of covered actions would be analyzed. And so what we have come up with is a generalized list of types of projects for which the EIR -- that could occur and would be applicable to these ecosystem policies that would be analyzed in the EIR.

And that's what we're looking at right now. We haven't fully defined that list, but we do have an initial list that we're starting with, which we went -- which Kathy went over today.

MR. BROWN: Okay. I guess that's where I get confused.

And that will be my comment, is that it's unclear exactly -- I would think most projects that are covered actions would trigger those regulations or would be subject to those -- the changed policies in the ecosystem chapter. So it would be most, if not all, covered actions that would be affected and should be evaluated in the Draft EIR.

But I -- I will leave it at that.

MS. ROSS: Okay. Thank you.

MR. BROWN: Sure.

MR. CHAPIN: Harriet, we have another comment if you are ready.

MS. ROSS: Okay. Yep.

MR. CHAPIN: It's Rachel Wiggington with GGE.

MS. ROSS: Okay. Hi, Rachel.

MS. WIGGINGTON: Hello.

Thank you all for organizing this and for the presentation. This is really useful and interesting.

I had, I think, two questions, rather than comments, so maybe it can just be a point of clarification.

So my first question was about the planning horizon, the PEIR that goes to 2050. And there's a little bit of justification in the document about why that planning horizon was chosen, as opposed to maybe a longer-term planning horizon. So I would be interested to hear a little bit more about that reasoning.

And then, additionally, I'm interested in the planning area that's shown in the PEIR. And I know that there's this green section of the map that is the Delta watershed, and then the areas that are receiving Delta water for use.

But I was curious if there have been consideration of impacts beyond the Suisun Marsh, so coming into the Bay, of potential ecosystem projects in the Delta and Suisun, that would be related to this amendment.

MS. ROSS: Kathy --

MS. WIGGINGTON: That's it. Thank you.

MS. ROSS: Yeah. No. Thank you.

Kathy, Jeff, can you shed a little bit of light on the selection of the planning horizon 2050 and why that was selected, and not something further out?

MS. McEFEE: Yeah. I'm going to ask Jeff to take that one, and then I can take the planning area question.

MR. HENDERSON: Okay. My understanding of the 2050 timeline is, as it's stated, I think, in the NOP, that that's the alignment of the completion date of a number of infrastructure projects that were envisioned at the time of the Reform Act adoption and the formulation, therefore, of the Delta Plan.

And so while the Delta Plan looks ahead to 2100 in large -- in a large way, we look ahead toward 2100 as the ultimate planning horizon.

The effects of the proposed types of covered actions that could occur are going to be much more understood in the nearer term, for 2050. And that also aligns with those infrastructure projects that were outlined in the Reform Act or anticipated to occur as part of the Reform Act, many of which were underway at the point in time the Reform Act was drafted, and that aligns to the 2050 time frame.

MS. WIGGINGTON: Yeah. And I should point out, with these long-term plans, such as the Delta Plan itself, it's typical to look out at a -- to a 25- to 30-year planning horizon. It's much more -- it's much less common to look beyond that, just simply because, you know, it becomes much more speculative and a lot less detail is known. You know, past horizons are far away, so 2050 is what we're looking at.

MS. ROSS: Okay. And then Kathy, did you -- I pulled up the map here, so everyone can see it.

MS. McEFEE: Yeah.

MS. ROSS: Maybe that will help you facilitate the answer to that.

MS. McEFEE: Yeah. I think what I will say in response to this question, is what we have here is the total planning area. And the purple, the primary planning area, that does represent the legal limits, so to speak, of the Delta, that which is to be addressed as part of the -- you know, as part of the Delta Plan.

And then the extended plan area does, in fact, kind of -- if you look at the tan, it does kind of move over into the Bay.

In thinking through, right now, the nature of the types of projects or activities that may be undertaken, we were thinking it might be that it is really Delta watershed area and the primary planning area that are going to be where these activities occur.

However, as we get through the analysis, we may find that we need to expand that planning area into more. So I think, as we move through the analysis, and we start seeing what the types of -- you know, refine the projects, the types of impacts we may -- we will be open to expanding the planning area.

So hopefully that answers your question.

MS. WIGGINGTON: This is Rachel.

Those were both very clarifying answers. Thank you very much.

MS. ROSS: Thank you.

Brandon, do we have any other commenters at this point?

MR. CHAPIN: At this point, we do not.

MS. ROSS: Okay. Well, this meeting is going to go until 5:30. I know sometimes folks join at -- towards the end to provide their comments. So we're going to stay on the line. We will essentially suspend the comment period until someone else decides or indicates that they want to speak. So we're just going to sit here in silence.

So, again, in the meantime, if anybody else has any other questions, please let us know, or any other comments to make on the scope of the EIR, we are happy to listen to them.

But otherwise, I'm going to suspend that comment period until someone else indicates they want to speak. So we will be here till 5:30.

(No additional public comment)

MS. ROSS: Okay. Well, we just have a few minutes left. So I think -- since we have not received any more speakers, I think we're going to go ahead and close the comment period for today's scoping meeting.

Again, this does not represent the only time you can let us know your thoughts on scoping for the Program EIR. After today, you are welcome to, via regular mail, send us your comments. Just has to be postmarked by July 10th, the end of our comment period; as well as e-mailing us at ecosystemamendment@deltacouncil.ca.gov. Again, that has to be received by 5:00 p.m. on July 10th.

And as we mentioned we did -- we are recording this entire scoping meeting, even the silent parts. And we will be posting that on the Council website sometime next week, so you can always go back and listen to it again.

And as I mentioned before, take a look at The Notice of Preparation itself for more detail on the project and the CEQA project.

So with that, I thank you all for joining us today, virtually. So thanks again. Have a good day. Thank you.

(End of video/audio recording.)

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TRANSCRIBER'S CERTIFICATE

I, Kathryn S. Swank, certify that the foregoing transcript of a pre-recorded audio and video recording of a public scoping meeting held by the Delta Stewardship Council was prepared using standard electronic transcript equipment and is a true and accurate record of the proceedings to the best of my knowledge and ability.

DATED: September 25, 2020

Kathryn S. Swank, CSR 13061

Attachment A-4
Scoping Comments

From:	Francis Coats
To:	ecosystemamendment@deltaconcil.ca.gov
Subject:	Public Trust and Public Rights for recreation and fishing
Date:	Tuesday, May 26, 2020 11:39:52 AM
Attachments:	2020-05-26 DeltaSCecosystemamendment.docx

Please find attached my comments on the proposed amendment to chapter 4 of the Delta Plan

Sent from Mail for Windows 10

Francis E. Coats
3392 Caminito Avenue
Yuba City, CA 95991
(530) 701-6116
fecoats@msn.com

May 26, 2020

Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 Ninth Street, Suite 500
Sacrmento. CA 95814
By email to "ecosytemamendment@deltacouncil.ca.gov

Re: Preparation of environmental documents for the draft Amendments to the Delta Plan: Chapter 4: Protect, Restore, Enhance, the Delta Ecosystem

To the Delta Stewardship Council:

In the course of the preparation of environmental documents for the draft Amendments to the Delta Plan: Chapter 4: Protect, Restore, Enhance, the Delta Ecosystem, please consider the effect of the document on Public Trust Interests, and particularly on public access to and use of the Public Trust Lands for recreational purposes; and, on the effect of the document on the public's exercise of its constitutional right to fish on state-owned land and on land formerly owned by the state and transferred out after November 8, 1910.

Under the navigable easement and the Public Trust Doctrine, each member of the public has the right to be on the navigable water s of the state and on the temporarily dry bed or banks of the waters up to the ordinary high water mark, and there engage in recreational activity (*State of California v. Superior Court (Lyon*) (1981) 29 Cal.3d 210 [172 Cal.Rptr. 696, 625 P.2d 239] (Clear Lake)). Navigable waters for these purposes are waters susceptible to use for navigation, even if only by oar or motor propelled small craft and even if only for recreational purposes (*People* ex rel. *Baker* v. *Mack* (1971) 19 Cal.App.3d 1040 [97 Cal.Rptr. 448] (Fall River); see also footnote 17 of Natio*nal Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 441-443 [189 Cal. Rptr. 346, 658 P.2d 709]82; 1978 Cal. LEXIS 297; 9 ELR 20012, October 13, 1978).

Public agencies must consider the effects of their actions on these interests, and refrain from interfering with these interests when feasible, to the extent feasible. The consideration should be given in a organized public manner (Natio*nal Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 441-443 [189 Cal. Rptr. 346, 658 P.2d 709]82; 1978 Cal. LEXIS 297; 9 ELR 20012, October 13, 1978; *San Francisco Baykeeper, Inc., v. State Lands Commission, Hanson Marine Operations, Inc.,* (November 2015) 242 Cal. App. 4th 202; 194 Cal. Rptr. 3d 880; 2015 Cal. App. LEXIS 1024).

The flood plains are Public Trust Lands to the extent they were subject to inundation in an average year, and so the rights of the public to engage in recreation extends over the flood plains.

Under section 25 of article I of the California Constitution, the public is entitled to fish and state-owned land, excepting only lands set aside as fish hatcheries and lands in use by the government for a governmental purpose incompatible with public fishing, for example prisons and mental institutions

(*California v. San Luis Obispo Sportsmans's Assc*., 22 Cal. 3d 440; 584 P.2d 1088; 149 Cal. Rptr. 4 (1978)). In addition, section 25 requires the state to reserve in the people the absolute right to fish upon the sale or transfer of state-owned land. This provision is incorporated or read into any grant by the state, so that the public has an absolute right to fish on any land transferred out by the state since the adoption of section 25 on November 8, 1910 (*Forestier v. Johnson* (1913) 164 Cal. 30 127 P. 156 ("Fly's Bay") *Boone v. Kingsbury*, 206 Cal. 148, 273 P. 797 (1928)).

Section 25 is a popularly adopted constitutional provision, and may not be altered limited or restricted by legislation through the ordinary legislative process, nor by administrative actions.

These rights or subject to reasonable regulation, but reasonable regulation requires an appropriately authorized rule-making body, a rational and not arbitrary decision basis, and compliance with appropriate rule-making procedures.

Too often plans are made for water and Public Trust Lands without considering the effect of those plans on the interest of the public in accessing and using the public trust lands, an in fishing on state-owned lands and lands formerly owned by the state and transferred after November 8, 1910. Please make sure this does not happen in the current project.

Sincerely, Francis Coats

From:	Mike Orcutt
To:	Delta Council Ecosystem Amendment
Subject:	Admin Scan_20200619_122712.pdf
Date:	Saturday, June 20, 2020 8:45:16 AM
Attachments:	Admin Scan_20200619_122712.pdf

Attention: Harriet Ross: please find attached letter from Hoopa Tribal
Chairmen Byron Nelson Jr. regarding proposed delta tunnel project. Regards, Mike Orcutt, Hoopa Valley Tribe

Sent from my iPhone

HOOPA VALLEY TRIBAL COUNCIL
Hoopa Valley Tribe
Post Office Box 1348 Hoopa, California 95546
PH (530) 625-4211 • FX (530) 625-4594
www.hoopa-nsn.gov

Chairman Byron Nelson, Jr.

June 19, 2020

Via E-mail (ecosystemamendment@deltacouncil.ca.gov)

Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Re: Scoping Comments of Hoopa Valley Tribe on Notice of Preparation of an Environmental Impact Report (EIR) on the proposed Delta Plan Ecosystem Amendment PEIR.

Dear Ms. Ross:

On behalf of the Hoopa Valley Tribe (Tribe), we submit the following scoping comments on the Council's Notice of Preparations of a proposed Delta Plan Ecosystem Amendment PEIR., which was published on May 11, 2020. Our intent is to provide the Council, as the lead agency, with specific detail about the scope, significant environmental issues, reasonable alternatives, and mitigation measures related to the Tribe's area of statutory responsibility that will need to be explored in the EIR.

As shown in the NOP, the "Trinity System" is part of the Delta Watershed Area, north of the Delta. Briefly, the significant issues of concern to us are centered on (1) protection of the water reserved to the Trinity River by federal law and the 2000 Trinity River Fisheries Restoration Record of Decision (ROD); (2) protection of water quality, particularly temperature, of that reserved Trinity River water; and (3) protection of other water reserved to the Trinity River by the Trinity River Division Act of 1955, (Pub. L. No. 84-386) (1955 Act). These issues directly affect the timing and amount of water available to the Delta, and hence, its benefits.

Interest of the Hoopa Valley Tribe

The Hoopa Valley Tribe ("Tribe"), a federally recognized Indian tribe, is located on the Hoopa Valley Reservation, which was established for the Tribe by the United States in 1864. *Parravano v. Babbitt*, 70 F.3d 539, 542 (9th Cir. 1995), *cert. denied*, 518 U.S.1016 (1996). The lower twelve miles of the Trinity River, and a stretch of the Klamath River near the Trinity confluence, flow through the Tribe's Reservation. Since time immemorial, the fishery resources of the Trinity and Klamath Rivers have been the mainstay of the life and culture of the Hoopa Valley Tribe. The principal purpose of the Tribe's Reservation was to set aside sufficient resources of these rivers for the Indians to be self-sufficient and achieve a moderate standard of living based on fish. Memorandum from John D. Leshy (M-36979), Solicitor of the Department of the Interior to the Secretary of the Interior (Oct. 4, 1993), *cited with approval, Parravano*, 70 F.3d at 542. The United States, as trustee for the Tribe, has a fiduciary responsibility to protect and preserve the Tribe's trust resources. *Klamath Water Users Ass'n v. Patterson*, 204 F.3d 1206, 1213 (9th Cir. 2000); Memorandum to Regional Director, Bureau of Reclamation from Regional Solicitor, Pacific Southwest Region (July 25, 1995) ("Reclamation must exercise its statutory and contractual authority to the fullest extent to protect the tribal fisheries and tribal water rights").

When Congress authorized the Trinity River Division (TRD) of the Central Valley Project (CVP) in 1955, Congress recognized that "an asset to the Trinity River Basin, as well as to the whole north coastal area, are the fishery resources of the Trinity River." S. Rep. No. 1154, 84 Cong., 1st Sess. (1955 Senate Report) at 5; H.R. Rep. No. 602, 84th Cong., 1st Sess. (1955 House Report) at 4. Congress accordingly limited the integration of the TRD into the CVP and required the Secretary of the Interior to exercise a priority for use of all TRD water necessary to protect fish and other in-basin needs. 1955 Trinity River Division Central Valley Project Act, Pub. L. No. 84-386, 69 Stat. 719 ("1955 Act"), § 2 (provisos); Memorandum from Solicitor to Assistant Secretary, Land and Water Resources, Dec. 7, 1979. S*ee also* Memorandum from Solicitor to Secretary (M-37030) re Trinity River Division Authorization's 50,000 Acre-Foot Proviso and the 1959 Contract between the Bureau of Reclamation and Humboldt County, December 23, 2014.[1]

Nonetheless, development and operation of the TRD without faithful adherence to the foregoing legal and fiduciary obligations took a devastating toll on the Hoopa Valley Tribe, the Trinity and Klamath Rivers, and the fish species that rely on those rivers. Between 1963 and 1981, Chinook salmon runs in the Trinity River declined by 80%. Eighty to ninety percent of total salmonid habitat in the Trinity Basin was lost during that time. In 1981, relying on an environmental study, the authority provided by the 1955 Act, § 2, and the trust obligation to protect tribal resources, the Secretary ordered an increase of annual flows released from the TRD to the Trinity River downstream of Lewiston Dam to 340,000 acre-feet annually and further directed initiation of a Trinity River Flow Evaluation Study ("TRFES") to study and develop a flow regime and other measures to improve habitat conditions in the Trinity River. The Secretary concluded "there are responsibilities arising from congressional enactments, which are augmented by the federal trust responsibility to the Hupa and Yurok tribes, that compel restoration of the river's salmon and steelhead resources to pre-project levels." 1981 Secretarial Order.

In 1984, Congress affirmed and authorized the Secretary's restoration directive in the Trinity River Basin Fish and Wildlife Management Act ("1984 Act"), Pub. L. No. 98-541, 98 Stat. 2721. Congress extended the scope of the restoration mandate to the Klamath River in the

[1] The first proviso of Section 2 of the 1955 Act provides that ". . . the Secretary is authorized and directed to adopt appropriate measures to insure the preservation and propagation of fish and wildlife . . . ." The second proviso of Section 2 of the 1955 Act provides that ". . . not less than 50,000 acre-feet shall be released annually from the Trinity Reservoir and made available to Humboldt County and downstream water users." These two provisos "represent separate and independent limitations on the TRD's integration with, and thus diversion of water to, the CVP." Memorandum M-37030, December 23, 2014.

Klamath River Basin Conservation Restoration Area Act ("1986 Act"), Pub. L. No. 99-552, 100 Stat. 3080. The express goal and directive of these acts was to restore anadromous fish populations to optimum levels in both the Klamath and Trinity River Basins. Congress reauthorized and amended the 1984 Act in the Trinity River Basin Fish and Wildlife Management Act of 1996 ("1996 Act"), Pub. L. No. 104-143, 110 Stat. 1339 (1996). The 1996 Act amended and expanded the scope of the 1984 Act's mandate to include rehabilitation of fish habitat "in the Klamath River downstream of the confluence with the Trinity River." 1996 Act, § 3(b).

In 1992, Congress passed the Central Valley Project Improvement Act ("CVPIA"), Pub. L. No. 102-575, § § 3401-12, 106. Stat. 4600, 4706-31 (1992). Section 3406(a) of the CVPIA modified the purposes of the CVP to include the mitigation, protection, and restoration of fish and wildlife. Section 3406(b)(23) of the CVPIA expressly confirmed the Bureau of Reclamation's trust responsibility to the Hoopa Valley Tribe and its fishery. The CVPIA required the Secretary to take specific actions "in order to meet Federal trust responsibilities to protect the fishery resources of the Hoopa Valley Tribe, and to meet the fishery restoration goals of the [1984 Act]." CVPIA, § 3406(b)(23). Congress directed the Secretary to complete the TRFES and, if the Secretary and the Tribe concurred in the TRFES' recommendations once completed, directed the Secretary to implement any increase in flow and CVP operations accordingly. *Id.*, § 3406(b)(23)(B).

The U.S. Fish and Wildlife Service, the Hoopa Valley Tribe and other agencies completed the TRFES in 1999. The TRFES recommended a flow regime and management actions to rehabilitate habitat in the mainstem channel of the Trinity River between Lewiston Dam and the Klamath confluence at Weitchpec. The TRFES did not address restoration issues downstream of the Trinity-Klamath confluence. Following completion of the TRFES and an EIS under NEPA, the Secretary, with the Tribe's concurrence as required by section 3406(b)(23) of the CVPIA, executed the Trinity River Mainstem Fishery Restoration Record of Decision ("ROD") in December 2000. The 2000 Trinity ROD adopted the TRFES' recommendations to restore physical fishery habitat in the mainstem Trinity River pursuant to Congress' direction in the 1984 Act and the CVPIA. The Tribe has been and remains an active leader in implementation of habitat rehabilitation projects pursuant to the ROD.

In September 2002, thousands of fall-run Chinook salmon died in the lower-Klamath River during their migration upstream when a combination of unusually low flows, warm water temperatures, and a large number of returning fish led to a severe disease outbreak. In certain recent years (2003-2004, 2012-2015), the Secretary has scheduled extra releases of water from Trinity Reservoir during the late summer when fishery managers and scientists determined that fish returns and low flow conditions were expected to duplicate conditions present in 2002. The Ninth Circuit affirmed the Secretary's authority to implement these "flow augmentation releases" pursuant to Section 2 of the 1955 Act. *San Luis & Delta-Mendota Authority v. Haugrud*, 848 F.3d 1216 (9th Cir. 2017). On April 20, 2017, the Bureau of Reclamation executed its Record of Decision re Long-Term Plan to Protect Adult Salmon in the Lower Klamath River Final Environmental Impact Statement (FARs ROD). The Bureau selected the Proposed Action of providing supplemental flows from mid-August to late September, from

Lewiston Dam to prevent a disease outbreak in the lower Klamath River in years when the flow in the lower Klamath River is projected to be less than 2,800 cfs. The Bureau relied on Section 2 of the 1955 Act for the statutory authority for its decision.

The current state of the fishery in the Klamath-Trinity river system remains unstable and imperiled due to continued federal mismanagement, particularly in the coordinated operation of the CVP and SWP. Abundance and fishery allowances for Chinook salmon in 2017 were at the lowest levels since the stock was first managed in 1978. In consideration of the unprecedented low stock size, the Pacific Fishery Management Council significantly limited 2017 marine fisheries affecting Klamath River fall Chinook ("KRFC"). The harvest guideline for the in river Tribal fishery was set to 814 adult KRFC. The Yurok and Hoopa Valley Tribe share the annual harvestable surplus of KRFC on a 50-50 basis with non-Tribal fisheries. This harvest of only 814 KRFC was the lowest ever reserved for the two tribes whose collective membership exceeds 8,000 persons. Adding to the collapse of the tribal fishery for KRFC were record low returns of Coho salmon, which are listed (since 1997) under the Federal ESA as a "threatened" species. Klamath-Trinity origin Coho salmon are part of the Southern Oregon Northern California Coastal (SONCC) Evolutionarily Significant Unit (ESU) that are listed under the Federal ESA.

The federal statutory directive to return fish species in the Klamath and Trinity Rivers to pre-TRD levels has fallen woefully short due to mismanagement and continuing failure to recognize the priority for use of TRD water necessary to protect fish and other in-basin needs and for economic development. As an example, Trinity hatchery mismanagement has contributed to the instability and degradation of the fishery through CVP/SWP coordination mismanagement lacking proper oversight or goal and objective review. Nor can the Hoopa Valley Tribe or its members achieve the promised moderate livelihood based on fish. The United States, the State of California, and the Bureau of Reclamation, collectively and independently have a responsibility to ensure protection, preservation, and restoration of the Tribe's fisheries resources, which at the present time are in extremely imperiled condition. Any action taken by DWR with respect to coordinated operations of the CVP must be consistent with existing legal obligations to the Tribe and the Trinity and Klamath Rivers.

<u>Scoping Comments of the Hoopa Valley Tribe</u>

1. <u>Modification of Coordinated SWP-CVP Operations Must Fully Account For, Develop, and Implement Necessary Measures for Mitigation, Restoration, Preservation and Propagation of the Affected Fish Species, Habitat, and Indian Trust Assets</u>.

The May 11, 2020 Notice of Preparation appears to be focused on planning and implementation of conservation activities and regulatory standards for the Delta while largely ignoring environmental impacts of the coordinated operations of the SWP and the CVP, which are integrally connected with the Delta. However, one of the essential purposes of the CVP, as approved by Congress, is to mitigate, restore, preserve and propagate fish and wildlife. CVPIA Section 3406(a). Consequently, the description of the purpose of the proposal as well as subordinate objectives must also include protection of fisheries, including those in the Trinity and Klamath rivers, for which the State of California is responsible. To ensure full disclosure of environmental impacts, inclusion of fisheries protection to the EIR statement of purpose is required as a benchmark against which EIR alternatives will be measured. Moreover, as discussed above, federal reclamation law establishes a first priority for use of the CVP water developed by the TRD for restoration, preservation and propagation of Trinity River fish and wildlife, and economic development of the Hoopa Valley Tribe and other water users downstream of the TRD. Any alternatives considered for Delta conservation must consider ways to fully implement the mitigation, restoration, preservation, and propagation of fish and wildlife and Hoopa Valley Tribe economic development as mandated by Congress and required by the United States' and the State's obligations.

Specific examples of protective and restorative measures that the EIR should evaluate and ultimately adopt include:

- Full funding and implementation of actions under the 2000 ROD.
- Augmentation of flows beyond the requirements of the 2000 ROD as necessary for preservation and propagation of fish in the Trinity and/or Klamath Rivers when conditions warrant.
- Coordinating and integrating operation of CVP/TRD operations with the Klamath Irrigation Project in a joint directorate with the Hoopa Valley Tribe.
- Funding and developing infrastructure to establish and maintain temperature of water releases from TRD facilities suitable for fish and wildlife preservation and propagation.
- Upgrading the TRD hatchery facilities and funding Hoopa Valley Tribe plans for additional selective harvest;
- Transferring management of TRD hatchery to Hoopa Valley Tribe.
- When called upon by the Tribe as a third party beneficiary of the June 19, 1959 contract between the United States and Humboldt County for annual release of 50,000 acre-feet of TRD water for: (a) facilitating economic development of the Hoopa Valley Reservation and (b) fishery preservation and propagation activities in addition to those provided for with Proviso 1 TRD water.
- Accumulating and maintaining in TRD carryover storage for use in the Trinity/Klamath basin for beneficial uses, up to 150,000 acre-feet of Proviso 2 water.
- Facilitating lease or exchange of Proviso 2 water in carryover storage to CVP contractors and the State Water Project on terms acceptable to the Tribe.

In summary, no Delta conservation planning should be undertaken without full recognition and implementation of the Congressional priorities and mandate to mitigate, restore, preserve, and propagate fish and wildlife and provide for economic development of TRD water in the Trinity/Klamath basin. The Hoopa Valley Tribe depends on the water and fish of the Trinity and Klamath Rivers and the EIR must recognize that the Bureau of Reclamation, as trustee to the Tribe, must exercise its statutory and contractual authority to the fullest extent to protect the tribal resources and the in-basin water needs. The Secretary and DWR must identify and avoid any impacts in any program they undertake to make water deliveries to CVP contractors whose entitlement to use CVP water is manifestly junior to the Tribe's right under reclamation law to CVP water.

2. Recognize Priorities for use of TRD water downstream of Lewiston Dam.

As described above, the Trinity River Fishery Restoration ROD of 2000 resulted from Congress's requirement in CVPIA Section 3406(b)(23). In that subsection, Congress directed that the ROD concerning "the minimum Trinity River instream fishery releases established under this paragraph [(b)(23)] and the operating criteria and procedures referred to in subparagraph (A) shall be implemented accordingly." Thus, federal law demands compliance with the ROD. The ROD provides detailed flow releases for each day, depending on the water year type. These are mandatory. It also projects that "long-term average water exports to the Central Valley would be 630,000 acre-feet."

Further, Proviso 1 TRD water for fishery preservation and propagation is also established in the 2017 FARs ROD. There may be additional Proviso 1 needs identified in the future, which also will have priority over diversions to the CVP. 1955 Act Proviso 2 water for economic development must also be protected from export. Accordingly, the EIR must make no assumption that, on average, more water can be exported from the Trinity System to the CVP-DWR coordinated operation than the amounts required to fulfill Proviso 1 and Proviso 2 priorities. Only water surplus to the flow releases of those provisos, and other federal obligations, is available to the coordinated operations of the CVP and SWP.

3. Avoid assuming that changes in the timing of TRD water exports to the CVP can be made.

Trinity River water is stored behind Trinity Dam, then flows approximately 10 miles to Lewiston Dam, where it is either released by the Bureau of Reclamation to the Trinity River or diverted to the Sacramento River. During warm weather, the temperature of water released to the Trinity can rise substantially as it flows between the two dams, especially when Trinity Dam releases are small and little flow is present in that reach. For this reason, the ROD provides: "the TRD [will] be operated to release additional water to the Trinity River, and the timing of exports to the Central Valley would be shifted to later in the summer to help meet Trinity River instream temperature requirements."

Compliance with Trinity River instream temperature requirements is required by water quality standards of the North Coast Regional Water Quality Control Board (NCRWQCB), the water rights permits of the Bureau of Reclamation, and by the Biological Opinion adopted by the ROD. The Biological Opinion includes a mandatory condition, as follows: "7. In dry and critically dry water year types, Reclamation and USFWS shall work cooperatively with the upper Sacramento River Temperature Task Group to develop temperature control plans that provide for compliance with temperature objectives in both the Trinity and Sacramento rivers."

The NCRWQCB temperature objectives are:

Lewiston Dam to Douglas City Bridge

60°F July 1 – September 14
56°F September 15 – October 1

Lewiston Dam to confluence of North Fork Trinity River

56°F
October 1 - December 31

Further, Water Rights Order 90□5, which governs the Bureau of Reclamation's TRD water rights certificates, provides:

> Permittee shall not operate its Trinity River Division for water temperature control on the Sacramento River in such a manner as to adversely affect salmonid spawning and egg incubation in the Trinity River. Adverse effects shall be deemed to occur when average daily water temperature exceeds 56F at the Douglas City Bridge between September 15 and October 1, or at the confluence of the North Fork Trinity River between October 1 and December 31 due to factors which are (a) controllable by permittee and (b) are a result of modification of Trinity River operations for temperature control on the Sacramento River. If the temperatures in the Trinity River exceed 56F at the specified locations during the specified periods, Permittee shall immediately file with the Chief of the Division of Water Rights a report containing project operational data sufficient to demonstrate that the exceedance was not due to modifications of Trinity River operations for water temperature control on the Sacramento River. If, within fifteen days, the Chief of the Division of Water Rights does not advise Permittee that it is violating this condition of its water right, Permittee shall be deemed not to have caused the exceedance in order to control temperature on the Sacramento River.

These temperature standards require rigorous adherence; they can made unattainable if the schedule for water exports to the Delta or CVP-SWP is modified. Accordingly, it is essential that the EIR not assume that changes in the schedule of Trinity River exports are possible even if that is desirable from the standpoint of the Delta conveyance.

4. Recognize the influence that management of TRD carryover has on the ability to meet water quality standards in Trinity River

End of season carryover storage behind Trinity Dam influences the ability to meet water temperature standards protective of salmon spawning below Lewiston Dam. Specifically, the total volume of cold water available on 1 June is of significance; this can vary substantially from year to year with volume of runoff, volume and temperature profile of carryover from previous years, and temperature of the present year's runoff into Trinity Lake.

Limitations of TRD infrastructure also affect the ability to meet water temperature needs, as the current facilities cannot be operated to avoid considerable heat gain during summer months._As described in a letter written on 23 May 2016 by the Chair of the Trinity River Restoration Program, Federico Barajas, in a letter to Reclamation Regional Director, David Murillo. "*During periods of drought, and in the future under virtually all climate warming* *scenarios, the 2-3°F increase in water temperature that occurs in Lewiston Reservoir will likely elevate temperatures to unsuitable levels for salmonids for which Reclamation has Tribal Trust, Public Trust, and Endangered Species Act (ESA) responsibilities.*"

Water temperature standards for Trinity River below Lewiston Dam were exceeded in October 2015 for a period of two weeks during the onset of salmon spawning. On 21 January 2016, the Tribe filed a request for enforcement of Water Rights Order 90-5[2], which prohibits diversions from Trinity River that adversely affect salmonid spawning and incubation.

5. Model water deliveries in recognition of 1955 Act priorities for use of Trinity River water.

The second exception in Section 2 of the 1955 Act states: "That not less than 50,000 acre-feet shall be released annually from the Trinity Reservoir and made available to Humboldt County and downstream water users." That mandate requires the annual 50,000 acre-feet release from the Trinity Division to be made in such a way that the water will be available for use by Humboldt County and downstream users. In other words, the 50,000 acre-feet comes with the attributes of TRD storage, regulation and scheduling.

The State of California issued several permits for the Trinity Division. Permit 11968 includes conditions that limit diversions. Permit Condition 9 states "Permittee [Bureau of Reclamation] shall release sufficient water from Trinity and/or Lewiston Reservoirs into the Trinity River so that not less than an annual quantity of 50,000 acre-feet will be available for the beneficial use of Humboldt County and other downstream users." Permit Condition 10 states: "This permit shall be subject to the prior rights of the county in which the water sought to be appropriated originates to use such water as may be necessary for the development of the county, as provided in Section 10505 of the Water Code of California."

In the Council's previous Delta Plan planning process, it appears that modelers assumed that the 1955 Act's reserved 50,000 acre-feet of water could be treated as available for diversion to the Central Valley. This is unlawful. In 1979 the Solicitor of the Department of the Interior reviewed the legal status of the fishery flow releases and the 50,000 acre-feet of water developed and controlled by the Trinity Division. The Solicitor wrote:

> On occasion the Congress has specifically limited the Secretary's discretion in meeting the general CVP priorities. For example, in authorizing the Trinity River Division of the CVP in 1955, Congress specifically provided that in-basin flows (in excess of a statutorily prescribed minimum) determined by the Secretary to be necessary to meet in-basin needs take precedence over needs to be served by out-of-basin diversion. See Pub. L. No. 84-386, §2. In that case, Congress' usual direction that the Trinity River Division be integrated into the overall CVP, set forth at the beginning of section 2, is expressly modified by and made subject to the provisos that follow giving specific direction to the

[2] Letter from Ryan P. Jackson, Chair Hoopa Valley Tribal Council, to John O'Hagan, Permitting and Enforcement Branch Assistant Deputy Director, Division of Water Rights, California State Water Resources Board

Secretary regarding in-basin needs.

Memorandum opinion from the Solicitor to the Assistant Secretary, Land and Water Resources 3-4 (December 7, 1979) (1979 Opinion). S*ee also* Memorandum from Solicitor to Secretary (M-37030) re Trinity River Division Authorization's 50,000 Acre-Foot Proviso and the 1959 Contract between the Bureau of Reclamation and Humboldt County, December 23, 2014. So long as the EIR does not confirm that the 50,000 acre-feet entitlement for the Trinity Basin is unavailable to the CVP-DWR coordinated operation, it will significantly overstate the water benefits of the alternatives under consideration.

In summary, no further planning for the Bay-Delta should occur that assumes the availability for diversion of any Trinity River water resources that are committed by law to the Trinity River Basin and its communities. The EIR. should preclude the availability for use in a delta conveyance water allocated to: the ROD flow releases; the 50,000 acre-feet of additional Trinity Division water for Humboldt County and downstream users; the carryover storage for preservation of temperatures needed for the Trinity River fishery; or the area of origin rights of Trinity County.

Sincerely yours,

HOOPA VALLEY TRIBAL COUNCIL

Byron Nelson, Jr., Chairman

T:\WPDOCS\0020\05543\HVT Scoping Comments on NOP

From:	Lindsey Liebig
To:	Delta Council Ecosystem Amendment
Subject:	Draft Program EIR for Proposed Ecosystem Amendment
Date:	Wednesday, June 24, 2020 3:56:32 PM
Attachments:	image003.png 2020 DSC Ecosytem Amendment- Delta Caucus.pdf

I apologize for the delay in this comment letter, it seems to have gotten stuck in my outbox from my home office.

Dear Ms. Ross:

The Delta Caucus (Contra Costa, Sacramento, San Joaquin, Solano and Yolo County Farm Bureaus) appreciates the opportunity to comment on the Chapter 4 Amendments of the Delta Plan.

The Delta Caucus remains concerned that some of the policies and recommendations could negatively impact the resiliency of Delta agriculture. It is clear from the following excerpts that one of the required objectives of the Delta Plan is to achieve the coequal goals in a manner that protects and enhances Delta agriculture.

- **Page 21:** "The Delta Reform Act requires that the ecosystem be protected, restored, and enhanced in a way that protects and enhances the unique…agricultural values of the Delta…" (California Water Code Section 85054).

- **Page 21:** "The Delta's agricultural economy… depend on these processes derived from the continued functioning of the Delta and its connected ecosystems."

Because protection and enhancement of Delta agriculture is a core objective of the Delta Plan, normal agricultural activities should not be considered covered actions. Exempt status would help ensure that the coequal goals are achieved in a manner that protects and enhances Delta agriculture.

Regarding specific amendments to the Policies and Recommendations our comments include the following:

1. **Chapter 4, Page 68, Core Strategy 1:** We support the concept of utilizing more natural functional flows as a means of ecosystem management. However, this should be based on the best available science as a means of determination. Additionally, we are opposed to any policy that would allow flow objectives in the Delta to be negotiated without public input. We recognize that this will be a lengthy process, but it is one that should be required to be done in a public forum.
2. **Chapter 4, Page 69, Problem Statement:** We support the concept that updates to flow objectives need to balance agriculture with other beneficial uses and that best available science should guide decision-making.

3. **Chapter 4, page 69, Core Strategy 2:** We support the concept that restoration projects should be compatible with adjacent land uses and support agricultural values of the Delta.

4. **Chapter 4, page 70, ER P4:** We request that the existing policy be amended to clarify that any setback levees only apply to urban projects. Rural levee projects are unable to meet these expectations due to insufficient resources in comparison to urban projects.

5. **Chapter 4, Page 70, ER Policy "A":** Because protection and enhancement of Delta agriculture is a core objective of the Delta Plan, normal agricultural activities should not be considered covered actions. Because protection of Delta agriculture is one of the key components of a successful Delta Plan, normal Delta agricultural operations should be exempted as covered actions. Exempt status would help ensure that the coequal goals are achieved in a manner that protects and enhances Delta agriculture.

6. **Chapter 4, Page 74, Problem Statement:** Agricultural practices haven a vital part of the Delta's history and vibrancy for decades. Agriculture has long since been working collaboratively on habitat restoration and biodiversity projects among working agricultural lands. There can be collective action taken to ensure the vitality of the agricultural lands while enhancing ecosystem protections and restoration, without mandated non-agricultural uses. We need to collaboratively work together to achieve common goals, not make one stakeholder the sole culprit for subsidence and ecological challenges in the area.

7. **Chapter 4, Page 74, ER Recommendation "D" and "E":** While Resource Conservation Districts are vitally important to the local management of regions throughout the Delta, Reclamation Districts are equally as important and should be a focal point, versus just including them with "other local agencies". These entities are used throughout the Delta region to effectively manage local lands for ecosystem function, agricultural land management and supporting native species.

8. **Chapter 4, Page 77, Core Strategy 5:** The large and diverse array of public agencies and private organizations are vital for adequate input on a variety of functions and protections throughout the Delta. If a single, consolidated restoration forum is implemented, then agriculture needs to be a cornerstone of that forum to be a qualified and informed stakeholder as efforts move forward. Chapter 4 should include a clear statement that any restoration must respect local land uses when any siting decisions are determined.

9. **Chapter 4, Page 78, ER Recommendation "F":** We are in support of the concept of a coordinated effort to support ecosystem restoration. If a subcommittee is developed, agriculture should be considered a stakeholder and have a position on that committee.

In summary successful agriculture, habitat, and water supply (including exports) depend upon a defensible levee system. A vital agricultural economy in the Delta, supports the levee system by building and maintaining the levees which supports the whole system. It is imperative that agriculture productivity remain an essential function within the delta to further contribute to the overall ecosystem and landscape of the Delta.

Thank you for your consideration of our concerns shared by our five counties. We look forward to seeing these addressed in the Final Program Environmental Impact Report. Should you have any questions, please direct them to Lindsey Liebig (916) 685-6958 of the Sacramento County Farm Bureau.

Lindsey Liebig | Executive Director
Sacramento County Farm Bureau
8970 Elk Grove Blvd.
Elk Grove, CA 95624
P: (916) 685-6958 | C: (916) 513-1619

SCFB
SACRAMENTO COUNTY FARM BUREAU

DELTA CAUCUS

CONTRA COSTA - SACRAMENTO - SAN JOAQUIN - SOLANO - YOLO

June 15, 2020

Draft Program EIR for Proposed Ecosystem Amendment
Attn: Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Submitted via email: ecosystemamendment@deltacouncil.ca.gov

Dear Ms. Ross:

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Thank you for your consideration of our concerns shared by our five counties. We look forward to seeing these addressed in the Final Program Environmental Impact Report. Should you have any questions, please direct them to Lindsey Liebig (916) 685-6958 of the Sacramento County Farm Bureau.

Sincerely,

David Strecker
President
San Joaquin County Farm Bureau

Ken Oneto
President
Sacramento County Farm Bureau

Joe Martinez
President
Yolo County Farm Bureau

John Viano
President
Contra Costa County Farm Bureau

Sean Favero
President
Solano County Farm Bureau

From:	Kent, Stephen R@DOT
To:	Delta Council Ecosystem Amendment
Cc:	Bushong, Christian M@DOT; Scott Morgan
Subject:	Caltrans Comments on the NOP Draft Program Environmental Impact Report for Proposed Ecosystem Amendment
Date:	Thursday, July 9, 2020 5:07:07 PM
Attachments:	Caltrans-070920-Eco-Amend-NOP-Letter.pdf

Good Afternoon Ms. Ross,

Thank you for providing Caltrans the opportunity to comment on the NOP Draft Program Environmental Impact Report for Proposed Ecosystem Amendment. Our comment letter is attached to this email. Feel free to contact me with any questions or concerns.

Thank you,

Steve Kent, AICP
Associate Transportation Planner
Division of Transportation Planning, HQ
Office of Smart Mobility – Climate Change
LD-IGR Branch
916-653-8766

DEPARTMENT OF TRANSPORTATION
Division of Transportation Planning
P.O. BOX 942874, MS–32
SACRAMENTO, CA 94273–0001
Phone (916) 653-0548
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

July 9, 2020

RE: Notice of Preparation for the Draft Program Environmental Impact Report for Proposed Ecosystem Amendment
SCH # 2020050219

Ms. Harriet Ross
Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814
Phone: 916-445-5511

RE: Notice of Preparation for the Draft Program Environmental Impact Report for Proposed Ecosystem Amendment

Dear Ms. Ross:

The California Department of Transportation (Caltrans)would like to thank the Delta Stewardship Council (Council) for the opportunity to review and provide input on the Notice of Preparation (NOP) for the Draft Program Environmental Impact Report (DEIR) for the Proposed Ecosystem Amendment (Plan). The proposed update designates the Council to amend Chapter 4 of the Delta Plan to address the fundamental shift in the planning and implementation of conservation in the Delta. The original expectations for Chapter 4 of the Delta Plan – Protect, Restore, and Enhance the Delta Ecosystem was based on the incorporation of the Bay Delta Conservation Plan (BDCP).

In 2015, state and federal agencies shifted their approach from the BDCP to a more focused set of mitigation projects. This transition will provide a more comprehensive approach to ecosystem protection, restoration, and enhancement of the delta. The primary planning area is the Sacramento-San Joaquin Delta and Suisun Marsh.

Specific Comments

1. On page 10 of the May 11, 2020 NOP states "Regulate Angling for Nonnative Sport Fish to Protect Native Fish": Please explain in greater detail

the potential removal of the policy and the subsequent recommendation that will address this issue.

2. On page 11, in the "New Performance Measures" section, please clarify if the new performance measures will have interim targets or milestones.

Removal of Performance Measures

3. On page 11, in "Performance Measure 4.8: Landscape Metrics to Assess Ecological Functions", please elaborate on the habitat and wildlife functional values.

4. For the remaining proposed performance measures to be eliminated, will these performance measures be incorporated into new or existing performance measures and methodologies in the draft environmental Impact report (DEIR)? Please explain.

Mitigation Opportunities

5. Please identify opportunities for advance mitigation, direct and/or partnering mitigation?

6. Will there be a consideration of resiliency and adaption strategies at the program level?

7. Please consider contingencies, methodologies, and effects of proposed tunnels and significant water diversions.

Transportation, Traffic, and Circulation

8. In the qualitative transportation analysis, the analysis should adequately address the potential impacts from the Plan's activities to the State Highway System (SHS) facilities specifically State Route (SR) segments for the following: SR-160, SR-12, SR-4, SR-120, SR-132, I-80, I-5, I-205, SR-84 that are based on the DEIR's proposed multiple projects and activities in and adjacent to the State's Right of Way (R/W) for the proposed Ecosystem Amendment of the Delta Plan.

General Comments

Structures and Maintenance

Please send Caltrans Structures plans, modifications, calculations, etc. when an existing bridge is planned to be modified, or the Council will do work near an existing bridge. The Caltrans Structures contact for this is Kevin Flora and can be reached at (916) 227-8036 or kevin.flora@dot.ca.gov.

For any planned bridge or tunnel that passes over or under a public road:

- The Agency must apply for a bridge name and number from Caltrans.

- Please design bridges and tunnels using Caltrans adopted and latest modified American Association of State Highway and Transportation Officials (ASSHTO)codes to prevent load capacity restrictions.

- To ensure quality control during construction, please reference Caltrans bridge standard specifications at the following weblink: https://dot.ca.gov/programs/design/ccs-standard-plans-and-standard-specifications.

- Please indicate and print procedure on the plans to submit approved pre-construction and as-built plans to Caltrans Headquarters Structures Maintenance.

- Caltrans requests to review bridge plans to ensure these plans comply with Caltrans standard practice, the scope of service, and alignment and geometrics. Please contact the Caltrans Local Development office for assistance and to set up a review.

  Please find more information at the following weblinks: https://dot.ca.gov/programs/engineering-services/manuals/bridge-constr-records-proc-manual-vol1 and https://dot.ca.gov/programs/engineering-services/manuals/bridge-constr-records-proc-manual-vol2.,

- The Council can obtain existing bridge plans from Caltrans Headquarters Structures Maintenance and Investigations. Please contact Kevin Flora at (916) 227-8036 or kevin.flora@dot.ca.gov

Hydrologic and Hydraulic Impact Study

Please prepare a Hydrologic and Hydraulic Impact Study to ensure the Plan's impacts on the SHS are properly assessed. Caltrans request that the Council coordinate with Caltrans on this Plan and its various projects.

Please include the following in the study:

- Impacts on existing floods, floodways, and floodplains near the SHS
- Impacts on existing flood control structures: levees, pump stations, detention, and retention basins
- Change in groundwater table within SHS infrastructure
- Change in runoffs discharging to drainage systems near SHS
- Alteration of drainage systems crossing state R/W

The Caltrans contact for Hydrologic and Hydraulics is Robin Amatya and can be reached at (510) 286-4829or at robin.amatya@dot.ca.gov

Environmental Studies

Additional studies for biological and cultural resources may be required if the applicant anticipates specific impacts to Caltrans' R/W. Please contact Elizabeth Hummel at (209) 948-382-5916 or at Elizabeth.Hummel@dot.ca.gov for more information regarding Caltrans biological and cultural resources studies.

Transportation Management Plan

A Transportation Management Plan (TMP) should be prepared with Caltrans input to outline the process of minimizing project-related traffic impacts and delays associated with various activities and are not limited to the following: logistics related to staging and storage of construction equipment, workers and materials, prescriptive vegetation control and prescribed burns adjacent to proposed SHS areas throughout the State. The Plan would provide a framework for the implementation of traffic control strategies and the timely distribution of traffic-related information to emergency services and the local citizens and businesses throughout the life of the Plan.

The TMP is an approach for alleviating or minimizing work-related traffic delays by the effective application of traditional traffic handling practices that may include an innovative combination of various strategies. These strategies include public awareness campaigns, motorist information, incident management, construction methods, demand management, and alternate route planning. Depending on the complexity of the work or magnitude of anticipated traffic impacts, a TMP may provide lane requirement charts, Standard Special Provisions (SSPs) for maintaining traffic. The schedule and staging of logistics for workers, equipment, materials, and activities are a requirement to communicate effectively, plan, and execute coordination and implementation efforts for these activities in work zone areas.

For more information on Caltrans Transportation Management Plan Guidelines refer to this weblink: https://dot.ca.gov/programs/traffic-operations/tmp

Encroachment Permits

- Any staging or work in Caltrans' Right of Way (R/W) will require an encroachment permit.

- Any work to occur in Caltrans' R/W, including temporary shoulder or lane closures, requires a Caltrans encroachment permit. Any temporary constructed access will be needed to be removed upon completion. Also, the installation of permanent signs, as department policy, is not permitted within Caltrans' R/W.

- Please note Caltrans R/W often extends to the mean high-water level throughout the delta.

- Refer to Chapter 8 of the Caltrans R/W Manual, Encroachment Permits for all activities and work in and adjacent to Caltrans R/W at the following weblink:
https://dot.ca.gov/programs/traffic-operations/ep

- Caltrans requests the Council to engage with Caltrans District Traffic Operations and Permits staff for interaction regarding any encroachment permit, impacts to the SHS and its travelers, traffic control measures or other mitigation measures, and other requirements such as tree trimming and removal procedures. Appendix K (2018 update) of the Caltrans Encroachment Permit Manual has specific provisions for tree trimming and tree removal in Caltrans R/W. For more information concerning Encroachment Permits are at the following weblink:
https://dot.ca.gov/programs/traffic-operations/ep/ep-manual

To apply for an encroachment permit, please complete and submit an encroachment permit application, environmental documentation, and five sets of plans indicating Caltrans R/W to the appropriate Caltrans District:

For San Joaquin County, Caltrans District 10:
Francisco Rodriguez, P.E.
Acting District Permits Engineer

California Department of Transportation
District 10, Encroachment Permits
1976 East Charter Way
Stockton, CA 95205
(209) 948-7891
Francisco_J_Rodriguez@dot.ca.gov

For Sacramento County, Caltrans District 3:
Hikmat Bsaibess
California Department of Transportation
District 3, Office of Permits
703 B Street
Marysville, CA 95901
(530)7555-6357
Hikmat.bsaibess@dot.ca.gov

For Alameda, Contra Costa, and Solano Counties, Caltrans District 4:
Ajay Sehgal
California Department of Transportation
District 4, Office of Permits
111 Grand Avenue, 6th Floor MS 5E
P. O. Box 23660
Oakland, CA 94623-0660
(510) 286-4425
Ajay.Sehgal@dot.ca.gov

Please continue to keep Caltrans informed of this Plan and any future developments that could potentially impact state transportation facilities. Should the Council have any questions regarding this letter, please contact Steve Kent at (916) 653 – 8677 or stephen.kent@dot.ca.gov.

Sincerely,

Christian Bushong

CHRISTIAN BUSHONG
Branch Chief, Local Development-Intergovernmental Review
Headquarters

c: Scott Morgan Chief Deputy Director,
State Clearinghouse Director, State Clearinghouse
Caltrans District 10 Transportation Planning
Caltrans District 3 Transportation Planning
Caltrans District 4 Transportation Planning

From:	De Bord, Elisia
To:	Delta Council Ecosystem Amendment
Cc:	Drane, Natasha@saccounty
Subject:	DCC Comments on NOP of PEIR for the proposed Delta Plan Ecosystem Amendment
Date:	Friday, July 10, 2020 11:03:43 AM
Attachments:	2020-07-10 DCC Ltr on DSC Chapter 4.pdf

Hello,

Attached is the Delta Counties Coalition's response to the NOP of PEIR for the proposed Delta Plan Ecosystem Amendment.

Thank you,

Elisia De Bord

Delta Counties Coalition

Contra Costa County · Sacramento County · San Joaquin County · Solano County · Yolo County

"Working together on water and Delta issues"

July 10, 2020

SENT VIA EMAIL: ecosystemamendment@deltacouncil.ca.gov

Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814
Attn: Harriet Ross, Assistant Planning Director

Re: Comments on Notice of Preparation of Program Environmental Impact Report (PEIR) for the proposed Delta Plan Ecosystem Amendment

Dear Council:

Thank you for the opportunity to comment on the Notice of Preparation ("NOP") for a Program Environmental Impact Report ("PEIR") for the proposed Delta Plan Ecosystem Amendment (Proposed Project), and the Draft Amendments to Chapter 4: Protect, Restore and Enhance the Delta Ecosystem. This letter is submitted on behalf of the Delta Counties Coalition ("DCC"), which is composed of elected members from Contra Costa, Sacramento, San Joaquin, Solano, and Yolo counties. DCC members request to be kept informed of project developments and remind the Delta Stewardship Council ("DSC") of the counties' roles as responsible agencies for projects that may be covered actions subject to the Chapter 4 Amendments.

Project Description and Relationship to Other Regulatory Actions Must be Clear

In addition to containing a clear project description, the Draft PEIR must also describe actions by other agencies to carry out the project, including "[a] list of related environmental review and consultation requirements [found in] federal, state, or local laws, regulations, or policies. To the fullest extent possible, DSC must integrate review under the California Environmental Quality Act ("CEQA") (Pub. Resources Code, § 21000, et seq.) with these related environmental review and consultation requirements." (CEQA Guidelines, § 15124, subd. (d)(1)(C); see also CEQA Guidelines, § 15006, subd. (i).) An EIR must also consider related regulatory regimes when considering project alternatives. (See Guidelines, § 151126.6, subd. (f)(1).) Identifying competing regulatory authorities of other agencies and disclosing how those authorities may impact a project is essential information for an EIR. (See *Banning Ranch Conservancy v. City of Newport Beach* (2017) 2 Cal.5th 918, 935 (*Banning Ranch*); see Pub. Resources Code, § 21003, subd. (a).) DSC must also "make a good faith attempt to analyze project alternatives and mitigation measures in light of applicable [regulatory] requirements" and may not "leav[e] it to other responsible agencies to address related concerns seriatim." (*Banning Ranch, supra*, 6 Cal.5th at 941.)

The interrelationship of authority between DSC and other regulatory entities for covered actions potentially subject to consistency review with the proposed revisions to Chapter 4 of the Delta Plan must be described. To the extent there are conflicts between the Chapter 4 Amendments and other regulatory processes, that must be described and analyzed. In particular, the relationship of the habitat considerations in the Chapter 4 Amendments to other processes that apply to the provision of flood control in the Delta, must be disclosed. If the Chapter 4 Amendments would hinder the provision of flood control in the Delta, those environmental impacts must be disclosed.

Potential Water Quality Impacts Associated with Restoration Proposed in the Chapter 4 Amendments Must be Analyzed

The Chapter 4 Amendments state that "Achieving the Delta Reform Act vision for the Delta ecosystem requires the reestablishment of tens of thousands of acres of functional, diverse, and interconnected habitat." The Program EIR must fully analyze the environmental impacts associated with large scale restoration. In addition to being compatible with local land uses, such restoration projects must avoid negative water quality impacts. In particular, restoration can affect salinity and increase methyl mercury. Increasing the tidal range in the Delta can increase salinity and thereby decrease agricultural productivity. In addition, methylmercury is a potent bioaccumulator and a bioconcentrator in people and wildlife. To the extent the Chapter 4 Amendments would lead to these types of water quality impacts, they must be disclosed, analyzed and properly mitigated. It should not be assumed that restoration has only benefits and causes no impacts.

Compatible Restoration with Good Neighbor Policies

Over the years, there have been very expansive plans for restoration of the Delta, much of which has been mapped on private lands with no consultation with landowners and no commitment to willing sellers. These projects are often required by state and federal water project Endangered Species Act permit requirements, and there is a great amount of pressure to minimize costs.

In the past, these projects have been designed without regard to offsite impacts on neighboring landowners and islands and include no local benefits. The DSC recommended amendment to include the use of Good Neighbor Checklist to coordinate restoration with adjacent land uses is appreciated. The referenced DWR Good Neighbor checklist, however, does not fully encompass all aspects needed to assure that restoration projects are consistent with neighboring land uses and not cause long-term negative economic, social, and environmental impacts. DCC requests that the DSC work with DCC and other stakeholders to develop comprehensive Good Neighbor Checklist that restoration project proponents must consider at the outset of project planning. In addition, DSC should encourage restoration projects to include local benefits in the initial design in order to create greater community support (e.g., addition of recreational facilities where possible).

Expansion of Floodplains and Riparian Habitats for Levee Projects

DCC remains concerned that the ER P4 requirements to investigate expansion of floodplains and increase connectivity for levee projects along the miles of the Sacramento River and other waterways shown in Appendix 8A is wasteful and inappropriate. The overarching goal of connecting the river and channels to floodplains should not apply in locations where existing communities rely on the levees providing continued flood protection.

The habitat restoration promoted in the Chapter 4 Amendments would have significant impacts on the Delta levee systems. Maintain the capacity and functionality of flood control systems surrounding and protecting the neighboring land uses is necessary for the protection of life and property. Mandating the expansion of floodplains as part of levee projects can cause hydraulic effects to neighboring levees and have system wide operational effects (e.g., removal of primary levees may increase potential flooding impacts to secondary interior levees not designed for added wave fetch and tidal pressures).

The cumulative hydraulic changes in the Delta and associated impacts on the remaining levee system must also be evaluated. Further, expansion of floodplains and commensurate reductions in productive agriculture can hinder economic feasibility of long-term operation and maintenance of the levee system. In addition, adjacent land use needs must be considered before applying policies that would remove all or a portion of the original levee prism in order expand water-side habitat.

To extent that flood policies would hinder provision of flood protection, the Draft PEIR must analyze those increased flood risks. It would be preferable for the DSC to adjust the proposed policies and maps so that they do not interfere with implementation of necessary flood protection measures in the Delta.

Protect Land for Restoration and Safeguard Against Land Loss

Current efforts to promote participation in the carbon markets in the Delta have focused on limited scientific data regarding alleged carbon dioxide emissions of Delta farms. While addressing climate change is an important priority, it is critical that Delta farmers not be disparaged in the process of seeking out solutions. The DSC should focus on publicly owned lands initially then willing landowners and should promote other viable programs to reduce carbon emission besides conversion of viable agricultural land into tidal habitat including; Healthy Soils Program, beneficial reuse of dredge material, and other similar programs. These and similar programs maintain the viability of land uses and simultaneously reverses the impacts to subsidence, carbon emissions, and climate change.

Conclusion

The DCC and its staff are available to discuss and work with DSC on implementing our recommendations and requests. Please feel free to contact DCC Coordinator Natasha Drane at 916-874-4627 or DraneN@SacCounty.net.

From:	Dante Nomellini, Jr.
To:	Delta Council Ecosystem Amendment
Cc:	Dante John Nomellini Sr.; Brett Baker
Subject:	CDWA Comments on Delta Plan Ecosystem Amendment NOP_July 10 2020
Date:	Friday, July 10, 2020 2:12:55 PM
Attachments:	CDWA Comments on Delta Plan Ecosystem Amendment NOP_July 10 2020.pdf

Please see the attached comments.

And please acknowledge receipt of this email and that attachment.

-
Many thanks,
Dan Jr.
Attorney for the Central Delta Water Agency

Dante J. Nomellini, Jr. ("Dan Jr.")
Attorney at Law
Nomellini, Grilli & McDaniel
Professional Law Corporations
235 East Weber Avenue
Stockton, CA 95202
Mailing address:
P.O. Box 1461
Stockton, CA 95201-1461
Telephone: (209) 465-5883
Facsimile: (209) 465-3956
Email: dantejr@pacbell.net

CENTRAL DELTA WATER AGENCY
235 East Weber Avenue • P.O. Box 1461 • Stockton, CA 95201
Phone (209) 465-5883 • Fax (209) 465-3956

DIRECTORS
George Biagi, Jr.
Rudy Mussi
Edward Zuckerman

COUNSEL
Dante John Nomellini
Dante John Nomellini, Jr.

July 10, 2020

Via Email to ecosystemamendment@deltacouncil.ca.gov

Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Re: Comments on the Delta Plan Ecosystem Amendment NOP.

CORE STRATEGY 1 SHOULD BE AMENDED AS FOLLOWS:

CORE STRATEGY 1: Provide More Functional Flows.

The volume, timing, and extent of freshwater flows into and as outflow from the Delta affect the reliability of water supplies for the Delta and areas exporting water from the Delta and are critical to protect and enhance the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. Substantially reduced SWP and CVP exports from the Delta watershed coupled with more functionally purposed flows into and as outflow from the Delta can support native species recovery, while providing more certainty to the water supply reliability for other uses. Freshwater flows should be allocated and focused to achieve a specific measurable result.

Export of water from the Delta watershed by the SWP and CVP must be limited to water that is surplus to the present and future needs within the Delta and other areas of origin including fish and wildlife needs. The Exhibits 22-25 show the correlation of SWP and CVP exports with the critical declines of important fish species. It appears that critical declines in fish commenced about when annual exports reached 2 million acre feet. The adverse impacts of the SWP and CVP are not limited to the pumping from the Delta but include the upstream diversions to storage and induced direct diversions to other uses. Additionally construction of Dams blocked fish migration to historic spawning areas where more suitable temperature conditions exist. The export projects failed to develop sufficient surplus water to meet the quantities desired by uncontrolled demand in export areas and the contractual distinction between firm supply and available surplus supply has been erased by California water politics. Especially critical to supply was the failure to develop the 5 million acre feet of annual surplus supply from North Coast Watersheds by the year 2000. (See Exhibit 14, p. 13.)

The correlation between SWP and CVP exports and the decline of the fisheries has been a concern for many years. In August of 1978 the State Water Resources Control Board rendered its Water Right Decision 1485. The Decision was the culmination of 32 days of evidentiary hearing initiated on November 15, 1976 and concluded on October 7, 1977. At that time the striped bass index was considered to be the indicator of ecosystem health for the Delta and Suisun Marsh. Striped bass were in effect the "canary in the coal mine" and the focus was on maintaining favorable conditions for the null zone in Suisun Bay. As the years passed and striped bass populations plummeted, the water exporters claimed striped bass to be invasive species, predators on endangered species and a major cause of fish declines wrongfully attributed to the export of water. The canary died and the death was ignored to facilitate greater exports. As Exhibits 22-25 show, striped bass, steelhead, Delta smelt, fall-run Chinook salmon and winter-run Chinook salmon all co-existed at relatively high populations at lower export levels.

In 1978 the SWRCB concluded in D-1485 at page 13 that:

> "To provide full mitigation of project impacts on all fishery species now would require the virtual shutting down of the project export pumps." (See Exhibit 21.)

The SWRCB also concluded in D-1485 at page 14 that:

> "Full protection of Suisun Marsh now could be accomplished only by requiring up to 2 million acre feet of fresh water outflow in dry and critical years in addition to that required to meet other standards." (See Exhibit 21.)

Exports from the Delta were not curtailed and the additional 2 million acre feet of outflow was not provided for the marsh.

THE DSC PROPOSED INSERTION OF "RESTORED LANDSCAPE" UNDERMINES THE COEQUAL GOALS PROVIDED IN WATER CODE SECTION 85054. CONVERSION OF DELTA AGRICULTURAL LAND TO TIDAL WETLANDS OR TIDAL BAY DOES NOT PROTECT AND ENHANCE AGRICULTURAL VALUES AND THE SUBSTITUTION OF HABITAT FOR FLOW IN THE DELTA IS NOT SUPPORTABLE AS A MEANS OF PROTECTING AND ENHANCING RECREATIONAL AND NATURAL RESOURCE VALUES IN THE DELTA.

The Delta was fully leveed and reclaimed by about 1930: "By 1930 all but minor areas of the swampland had been leveed and were in production." (See page 8 of December 1960 Bulletin 76 - Exhibit 14.)

The USACE completed project levee construction on the San Joaquin River in the early 1960's. There are no significant changes in leveed areas or even riverine habitat in the Delta which appear to be the cause of the decline of the fisheries. In fact, there have been increases in Delta wetland habitat, including tidal wetland, during the periods of apparent decline. Mildred Island flooded in 1983 and has not been reclaimed. Little Mandeville and Little Frank's Tract flooded in the 1980's and have not been reclaimed. Lower Liberty Island levees were not restored and the area has been in a tidal wetland condition since at least 2002.

The focus on conversion of Delta land to habitat as a substitute for water for fish is misplaced and the result of the inappropriate commitment to increase exports. Adequate analysis has not been done to determine if development of shallow tidal and other wetland habitat in the Delta and other locations is actually detrimental to salmon and other anadromous fish. In particular, stranding and predation from otters, egrets, herons, cormorants, gulls, white pelicans and the like have been identified as a serious concern. In contrast to floodplain which is infrequently inundated, tidal wetlands and tide water in the Delta is more highly populated by Black bass, Striped bass and other fish which are considered to have a significant predation impact on the diminished populations of salmonids.

The limited study (Exhibit 26) showing a picture of larger salmon smolts raised for a time in a wetland versus smaller smolts raised in the channel was cited by BDCP/WaterFix proponents as the evidence that shallow seasonal wetland in the Delta would be a substitute for flow and justification for a 50 year take permit. The study monitored caged smolts in the channel where the fish must constantly swim against the current and compared those smolts to smolts in cages in shallow wetlands where there was little or no current. The experiment did not attempt to evaluate stranding or predation and it is doubtful that the smolts in the channel cages if uncaged would spend as much time swimming against the stronger currents rather than seeking areas of the channel where the velocity is lower. The presentation of results by BDCP including the fat fish/skinny fish photo neglected to show the sizes of the fish from the cages in the channel upstream of the shallow habitat which reportedly were comparable to those in the wetlands: "During periods of low, clear water, fish growth rates in the river site above the floodplain were comparable to those in the floodplain." (Exhibit 26, p. 1.)

Creation of Floodplain Habitat Is Not a Substitute for Flow.

The available evidence and studies do not support such a substitution. The floodplain habitat which is suggested as potentially beneficial is that which is inundated by high flows for a limited period; involves a large area of water of a proper depth to help avoid predation; assumes avian predator populations are limited; is properly drained to avoid stranding; and avoids increased water temperatures detrimental to salmonids.

The Jeff Opperman Final Report for Fellowship R/SF-4 referenced above containing the picture of the fat fish and skinny fish is often shown as support for the proposition that floodplain habitat can be substituted for flow (Exhibit 26.) The study does not put forth that conclusion but suggests "that juvenile Chinook benefit from access to floodplain habitats." (*Id.*, p. 2.) It is important to recognize that the test fish were caged and thus predation from birds, fish and other animals was not an issue. Stranding was down-played but admittedly not tested. The test was conducted in and along the Cosumnes River. The skinny fish were in the river swimming against the current and because they were in cages and could not move with the current or move to quiet and more productive water. The fat fish obviously saved their energy for growth and apparently benefitted from improved food availability. The report states "During high flows the river offers poor habitat and fish living in this type of habitat will tend to be displaced downstream." (*Ibid.*) High flows and displacement downstream are likely not detrimental. It is generally accepted that the salmon do well in high flow years. The return of adults (escapement) is usually higher two and one-half years after a high flow year. It is recognized that ocean conditions also play a part and may in some cases reduce escapement nullifying the benefit of high flow. The difference in food availability in the high flow channel versus in the quiet water may not be significant in the test given the consumption of energy and lack of opportunity for the skinny fish to move to more favorable parts of the river. Displacement downstream into the cooler and more productive parts of the estuary is likely not bad for displaced salmon smolts.

Floodplain Habitat Not Accompanied by High Flow Does Not Appear to Result in Increased Chinook Salmon Ocean Survival and May Not Improve Survival of Sacramento River Juvenile Chinook Salmon Migrating to the Ocean.

In the study titled "Floodplain Rearing of Juvenile Chinook Salmon: Evidence of enhanced growth and survival" by Sommer, et al. (2001), a copy of which is Exhibit 27, tests were conducted in the Yolo Bypass in 1998 and 1999. The study concluded that during such years salmon increased in size substantially faster in the seasonally inundated agricultural floodplain than in the river, suggesting better growth rates. The study, however, provides: "Survival indices for coded-wire-tagged groups were somewhat higher for those released in the floodplain than for those released in the river, but the differences were not statistically significant. Growth, survival, feeding success, and prey availability were higher in 1998 than in 1999, a year in which flow was more moderate indicating that hydrology affects the quality of floodplain rearing habitat." (Exhibit 27, p. 1.)

In the discussion the authors provide (at p. 3):

> "Mean length increased faster in the Yolo Bypass during each study year, and CWT fish released in the Yolo Bypass were larger and had higher apparent growth rates than those released in the Sacramento River. It is possible that these observations are due to higher mortality rates of smaller individuals in the Yolo Bypass or of larger individuals in the Sacramento River; however we have no data or reasonable mechanism to support this argument."
>
> "Elevated Yolo Bypass survival rates are also consistent with significantly faster migration rates in 1998, the likely result of which would be reduced exposure time to mortality risks in the delta, including predation and water diversions."

In the study "Habitat Use and Stranding Risk of Juvenile Chinook Salmon on a Seasonal Floodplain" by Sommer, et al. (2004), a copy of which is Exhibit 28, the authors build upon the above study with further testing in 2000 and present their analysis of ocean survival. The author's abstract provides:

> Although juvenile Chinook salmon Oncorhynchus tshawytscha are known to use a variety of habitats, their use of seasonal floodplains, a highly variable and potentially risky habitat, has not been studied extensively. <u>Particularly unclear is whether a seasonal floodplain is a net "source" or net "sink" for salmonid production</u> ... Adult ocean recoveries of tagged hatchery fish indicate that

seasonal floodplains support survival at least comparable with that of adjacent perennial river channels. These results indicate that floodplains appear to be a viable rearing habitat for Chinook salmon, making floodplain restoration an important tool for enhancing salmon production." (Emphasis added.)

The data provided for ocean survival (at p. 1499 of the study) is as follows:

"Table 1. - Number of coded wire tags recovered in the ocean and commercial fisheries for Chinook salmon released in the Yolo Bypass and Sacramento River. The total number of tagged fish released in each location for each year is shown in parentheses. The survival ration is calculated as the number of Yolo Bypass recoveries divided by the number of Sacramento River recoveries."

Release Group	1998 (53,000)	1999 (105,000)	2000 (55,000)
Yolo Bypass	75	136	27
Sacramento River	35	138	47
Survival Ratio	2.14	0.99	0.57

In 1998 Yolo Bypass looked like a benefit, in 1999 it was a push and in 2000 Yolo Bypass looked like a detriment.

It is assumed that shaded river aquatic habitat is desirable for special status fish. Attention is called to the BDCP Draft Chapter 8 which puts forth the need to control predators by removing structures which affect flow fields and provide shade. The focus appears to be on abandoned docks, pilings and the like, however, shaded river aquatic habitat can provide the same effect on flow and provide shade. The impact of shaded river aquatic habitat on special status fish is unclear.

There are a number of significant adverse impacts associated with so-called restoration of tidal floodplain habitat within the Delta which have not been objectively considered or mitigated.

In the Delta where the waters are tidal the proposed habitat restoration is not necessarily floodplain but rather is tidal wetlands which is inundated most if not all of the time. This condition is favorable to predators.

Increased salinity intrusion could result from the increased tidal prism and/or creation of shortened pathways to the interior Delta and particularly to the large SWP and CVP intakes whether in the north Delta or south Delta.

Setting back, breaching, degrading and/or not restoring levees in the Delta has significant adverse impacts.

Increases in the tidal prism at locations similar to and including the area in and around the lower Yolo bypass results in advection adversely affecting the out migration of salmon smolts some of which are endangered.

The regularly or permanently inundated areas constitute increased habitat for predator species and increase ambush locations affecting the fish species of concern. The increase in water surface and wetland vegetation will greatly increase the evaporation and evapotranspiration of fresh water. In many cases there is an increased threat of flooding to surrounding areas due to increased fetch and wave action across the habitat area and increased seepage into adjoining levees and lands. Other significant adverse impacts include propagation of vectors including disease bearing mosquitoes, production of methyl Mercury and toxic algal blooms.

There is also the harm to and loss of agricultural land and production and harm to terrestrial species.

Exhibit 29-1 contains excerpts from the April 2011 report by Dave Vogel titled, "Insights into the Problems, Progress, and Potential Solutions for Sacramento River Basin Anadromous Fish Restoration," prepared for the Northern California Water Association and Sacramento Valley Water Users contains the results of studies which include the Liberty Island Ecological Reserve area. (The entire study can be viewed on the Northern California Water Association website by clicking on "Fisheries.")

At pages 112 and 113 the report provides, with emphasis added:

> Subsequent, additional juvenile salmon telemetry studies were conducted by Natural Resource Scientists Inc. on behalf of the USFWS and CALFED in the north Delta (Vogel 2001, Vogel 2004). Triangulating radio-tagged fish locations in real time (Figure 61) clearly demonstrated how juvenile salmon move long distances with the tides and were advected into regions with very large tidal prisms, such as upstream into Cache Slough and into the flooded Prospect and Liberty Islands (Figure 62). During the studies, it was determined that some radio-tagged salmon were eaten by predatory fish in northern Cache Slough, near the levee breaches into flooded islands (discussed below).

At page 120 the report provides, with emphasis added:

> During recent years, there has been an emphasis to reclaim or create shallow, tidal wetlands to assist in re-recreating the form and function of ecosystem processes in the Delta with the intent of benefitting native fish species (Simenstad et al. 1999). Among a variety of measures to create such wetlands, Delta island levees either have been breached purposefully or have remained unrepaired so the islands became flooded. A recent example is the flooding of Prospect Island which was implemented under the auspices of creating shallow water habitat to benefit native fish species such as anadromous fish (Christophel et al. 1999). Initial fish sampling of the habitat created in Prospect Island suggested the expected benefits may not have been realized due to an apparent dominance of non-native fish (Christophel et al. 1999). Importantly, a marked reduction of sediment load to the Delta in the past century (Shvidchenko et al. 2004) has implications in the long-term viability of natural conversion of deep

water habitats on flooded Delta islands into shallow, tidal wetlands. The very low rates of sediment accretion on flooded Delta islands indicate it would take many years to convert the present-day habitats to intertidal elevations which has potentially serious implications for fish restoration (Nobriga and Chotkowski (2000) due to likely favorable conditions for non-salmonid fish species that can prey on juvenile salmon. Studies of the shallow water habitats at flooded Delta islands showed that striped bass and largemouth bass represented 88 percent of the individuals among 20 fish species sampled (Nobriga et al. 2003).

There have likely been significant adverse, unintended consequences of breaching levees in the Delta. There is a high probability that site-specific conditions at the breaches have resulted in hazards for juvenile anadromous fish through the creation of favorable predator habitats. The breaches have changed the tidal prisms in the Delta and can change the degree in which juvenile fish are advected back and forth with the tides (Figure 61; previously discussed). Additionally, many of the breaches were narrow which have created deep scour holes favoring predatory fish. Sport anglers are often seen fishing at these sites during flood or ebb tides. Breaching the levees at Liberty Island is an example (Figure 72 and 73). Recent acoustic-tagging of striped bass in this vicinity confirmed a high presence of striped bass (Figure 74, D. Vogel, unpub. data.)

The increased loss of fresh water due to creation of tidal and wetland habitat is clear. Exhibit 29-2 is Table A-5 from DWR Bulletin 168, October 1978 which shows the annual Et values for various crops and for Riparian Vegetation and Water Surface. The Riparian Vegetation and Water Surface 67.5 inches can be compared to tomatoes 33.8 inches and alfalfa 46.0 inches. The increased fresh water loss is from 33.7 inches when compared to tomatoes and 2l.5 when compared to alfalfa. The increased loss of fresh water is particularly significant in drier years.

The Division of Water Resources (predecessor to The Department of Water Resources) in the Sacramento - San Joaquin Water Supervisor's report for the year 1931 dated August 1932 and designated Bulletin 23 includes the results of studies of water consumption of tules and cat-tails. Exhibit 29-3 includes Tables 69, 74, 75 and 77 from such report. Consumptive use for open water surface is shown as 4.91 acre feet per acre, tules at 9.63 acre feet per acre, and alfalfa at 3.51 acre feet per acre. To examine the relatively high consumptive use for tules the U.S. Department of Agriculture undertook a continuation of the study of consumptive use for asparagus, tules and cattails. The tables show an average of 14.63 acre feet per acre for cat-tails and 13.48 acre feet per acre for tules. Results from cat-tails and tules grown in tanks at Camp 3, King Island for 1931 are shown in Table 77. The results for normal sized tules was 8.0 acre feet per acre.

Restored landscape in areas outside the Delta may be appropriate but in the Delta it is not supportable. Much of the organic soil of the delta has oxidized or subsided and the land area is lower than at the time of reclamation. Restoration will not result in floodplain but in a tidal bay. The Delta as defined in Water Code Section 12220 was defined by the reach of the tides. Water Code section 85320(b)(2)(C) requires the consideration of possible sea level rise of up to 55 inches, and possible changes in total precipitation and runoff patterns on habitat restoration activities considered in the environmental impact report. This section references consideration of BDCP but the same logic would require consideration in the subject EIR. The Administration's predetermined single tunnel conveyance requires design to anticipate 10 feet of sea level rise by 2100. The contemplated landscape restoration in the Delta is conversion to tidal bay not restoration to floodplain or even tidal wetland. The evidence appears clear that restoration of landscape in the Delta is not directed at the cause of the critical decline in fish species of concern which occurred after 1968.

FLOODPLAIN RESTORATION AND RIVERINE WETLANDS SHOULD BE LOCATED UPSTREAM OF THE EXISTING AND PROJECTED TIDAL ZONE.

Conversion of Delta Land to Tidal Wetland Whether by Breaching or Setting Back Levees has a Detrimental Impact on Delta Water Quality.

Salinity control and an adequate water supply in the Delta sufficient to maintain and expand agriculture, industry, urban and recreational development in the Delta area is a precondition to the SWP and CVP export of water from the Delta. (See Wat. Code, § 12200 et seq.) Additionally, the projects must reduce reliance on exports from the Delta and as coequal goals provide a more reliable water supply for California including the Delta and protect, restore and enhance the Delta ecosystem. (See Wat. Code, § 85054.) The unique cultural, recreational, natural resource, and agricultural values of the Delta are specifically referenced.

For agriculture in much of the Delta including the central Delta salt accumulates in the soil as a result of evapotranspiration and surface evaporation. Due to soil types, shallow groundwater levels and crop limitations increasing leaching fractions by application of greater quantities of irrigation water is not feasible. Salt balance requires application of good quality water during periods of irrigation such that rainfall will achieve the leaching of salts from the soil necessary to achieve salt balance. Control of land use in the Primary zone of the Delta is intended to assure that this area remains in agricultural use including the growing of grain and other forage crops to sustain the wintering waterfowl of the Pacific Flyway and other important wildlife. Typically winter flooding is used to saturate the soil so that winter rains can drive the accumulated salts from the root zone for growing the customary crops. Leaching of salts can be accomplished through special land grading with containment dikes and open drains in close proximity that allow applied water to push salts from the root zone area. The process is very expensive and only applicable to growing high value crops.

Compliance with water quality objectives for agricultural uses rather than avoidance of degradation assumes that the objectives avoid significant harm. There is no supporting analysis for such assumption. The significant adverse impact to water quality from reduced Delta Outflow and tidal and other wetland habitat must be recognized. Increased salinity intrusion from increases of the tidal prism, shortening the path for salinity intrusion and increased evaporative losses will result from habitat development. Degradation is the result of the desire to increase exports and is inconsistent with the Delta Reform Act requirements to honor the statutory and water right priorities, enhance Delta agricultural values, reduce reliance on the Delta and make the Delta water supply more reliable. The SWRCB has in the past viewed the water quality objectives for specific uses as a composite providing protection for all beneficial uses. Changes in objectives for a particular use will likely impact protection for other beneficial uses.

There are significant adverse impacts to fish from increases in methyl mercury concentration from the creation of the habitat which is intended to be beneficial to fish. Improvement of Delta water quality and flow with reduction of exports so as to provide sufficient conditions to protect fish would avoid the need for habitat measures which increase methyl mercury.

Toxic algal blooms and microcystis are already a significant health hazard in the Delta to recreational users, animals, and even fish. The Delta is a source of drinking water for export and local users and the possibility of transmission of toxins is real. The degradation of Delta water quality will substantially increase the health risk from such algal blooms. Cumulative impacts with likely future projects and actions will greatly increase the adverse impacts. The proposed single tunnel alone will remove substantial quantities of the good quality Sacramento River water from passing through the interior of the Delta. This will reduce velocities in some areas and increase residence time. Elimination of the flushing action and dilution from the cross-delta flow and outflow will increase residence time in many locations and increase the concentration of constituents contributing to algal blooms. Water temperature and clarity increases could also result. Further investigation and implementation of operational measures to manage residence time is clearly not a good faith effort to fully consider all reasonable alternatives. The most obvious of which is to eliminate isolated conveyance, provide adequate flushing flows and export only water that is truly surplus.

The microcystis effects from habitat development could certainly be mitigated by eliminating those projects which create the problem. The impacts to fish which habitat development is intended to mitigate can be greatly mitigated with water flow and other measures including the reduction of export of water that klis not truly surplus and sensitivity as to when to run the export pumps.

CORE STRATEGY 2 SHOULD BE AMENDED AS FOLLOWS:

CORE STRATEGY 2: Protect and Enhance the Unique Cultural, Recreational, Natural Resource and Agricultural Values of the Delta.

Given the lack of correlation of restoration of tidal and floodplain habitat in the Delta to the fishery crisis, the projected impact of sea level rise and the detrimental impact caused by conversion of Delta land to tidal bay or tidal wetlands, the protection and enhancement of the Delta values must be focused on maintaining and improving the existing Delta levee systems and ensuring adequate water quality and flows. Due to projected sea level rise and climate change, habitat restoration in the Delta must be on lands in areas protected by levees and implemented in a manner which does not interfere with maintenance or improvement of existing Delta levee systems. Floodplain and riverine wetland restoration should be located upstream of the Delta and other areas projected to be tidal due to sea level rise.

Water Code section 12981 ("Unique resources with statewide significance; preservation") provides:

> (a) The Legislature finds and declares that the delta is endowed with many invaluable and unique resources and that these resources are of major statewide significance.
>
> (b) The Legislature further finds and declares that the delta's uniqueness is particularly characterized by its hundreds of miles of meandering waterways and the many islands adjacent thereto; that in order to preserve the Delta's invaluable resources, which include highly productive agriculture, recreational assets, fisheries, and wildlife environment, the physical characteristics of the delta should be preserved essentially in their present form; and that the key to preserving the delta's physical characteristics is the system of levees defining the waterways and producing the adjacent islands. However, the Legislature recognizes that it may not be economically justifiable to maintain all delta islands.
>
> (c) The Legislature further finds and declares that funds necessary to maintain and improve the delta's levees to protect the delta's physical characteristics should be used to fund levee work that would promote agricultural and habitat uses in the delta consistent with the purpose of protecting the delta's invaluable resources.

The benefits from preservation of the system of levees in the Delta extend statewide. The legislature established the Delta Levee Subvention Program and Delta Levee Special Projects Program to provide funding in addition to the local funding to maintain and improve Delta levees. The two programs are directed to the areas in the Primary Zone of the Delta where development is greatly restricted and to the very small historic communities therein. Past funding for the programs has included some general funds but mostly bond funding from periodic water related state general obligation bonds.

Many of such levees do not yet meet the recommended minimum agricultural standards in DWR Bulletin 192-82 or those in the USACE PL 84-99 Delta standards. Many merit improvement to much higher standards. All require ongoing maintenance and improvement. Since most areas are precluded from development by the primary and secondary zone limitations in the Delta Protection Act and Delta Stewardship Delta plan, the levee work is dependent upon the agricultural land ability to pay and constrained by Prop 218 requirements. Without levee improvement the risk of levee failure will remain high and increase with state predicted sea level rise, climate change and earthquakes.

When Delta levees fail during the summer or dry periods there has historically been an interruption in exports from the Delta either due to salinity intrusion or difficulty in efficiently meeting Delta standards due to disruption of the expected hydraulics of the Delta. There are also issues with contamination, turbidity and increases in salinity due to increased evaporative losses. There can also be a shortening of the path for salinity to intrude into the Delta and reach the export pumps. A resulting increase in the tidal prism could also induce greater salinity intrusion.

The Delta Protection Act, Water Code section 12200 et seq. “prohibits project exports from the Delta of water necessary to provide water to which the Delta users are ‘entitled’ and water which is needed for salinity control and an adequate supply for Delta users.” (*United States v. State Water Resources Control Bd.* (1986) 182 Cal.App.3d 82, 139.)

Inconsistency with the referenced coequal goals statute is also evidenced from the system impacts. The Delta overlies sands and gravels which extend beneath numerous islands and tracts. When an area floods seepage usually increases in adjoining lands and levees increasing the risk of levee failure, causing damage to crops and rendering portions of the land unfarmable. Where there is urban development the seepage and increased pressure on the groundwater will result in shallow flooding of streets, homes, other structures and utilities Wind across the flooded area generates waves impacting the unprotected interior levee slopes which could break through the flooded island levee causing damage to adjoining lands and levees. Over time the wind will wash away the flooded island levees including riparian habitat and greatly increase the wind wave height and run up on adjoining levees. If the flooded island is not promptly reclaimed the adjoining levees and drainage systems must be substantially improved and some of the damage will persist. If such reclamation is not accomplished additional levee failures and other adverse impacts will result. Franks Tract which flooded in 1938 is an example where the wind wave generation across the flooded area has eroded most of the remnant levee contributing to the 1980 levee failure on Holland Tract and requiring substantial improvements on adjoining islands beyond the agricultural standards to resist the increased wave action. Additionally, the loss of the levee along False River caused a more direct path for salinity intrusion to reach the export pumps. This triggered the need for the emergency placement of the temporary rock barrier in False River at a cost of about $40 million.

Loss of the physical characteristics of the Delta includes the loss of farmland, miles of meandering waterways, erosion of channel islands, loss of riparian habitat along the levees, loss of protected areas for recreation, including boating, fishing, sightseeing, swimming and the like. When flooding occurs terrestrial habitat is destroyed, terrestrial species are displaced or drowned, some of which are endangered, fish become stranded and subject to greater predation, waterfowl of the Pacific Flyway lose critical wintering habitat, water quality is degraded due to spreading of contaminates including those from upstream sources such as hazardous sites, flooded waste treatment facilities, broken pipelines and the like, generation of methyl mercury, propagation of harmful algal blooms and the related toxins, increased water temperature, production of undesirable aquatic vegetation, propagation of vectors such as mosquitoes together with the spreading of related diseases and the harmful impact of chemicals used to control the same, increased evaporation of fresh water and the resulting increased concentration of salinity. The failure of Delta levees will result in substantial adverse impacts to human health and safety to those in urban areas and others passing or attempting to evacuate through the Delta area. The cumulative impact of contaminants, toxins, vectors and disruption of the evacuation routes through the Delta could result in significant additional loss of life.

Attached hereto as Exhibit 30 are the cover and pages 32 and 33 from DWR’s June 15, 2007 Technical Memorandum, Delta Risk Management Strategy Phase 1, Impact to Infrastructure. The entire memorandum is available on the web under DRMS Technical Memorandum June 15, 2007. The memorandum provides the estimated replacement costs of

Delta Infrastructure within Mean Higher High Water at $6.1 billion (2005 dollars) and $8.5 billion (2050 dollars). The estimated replacement cost within 100-year limits is $56.3 billion (2005 dollars) and $67.1 billion (2050 dollars).

Preservation of the physical characteristics of the Delta is critical to the preservation and enhancement of the Delta, the maintenance of water quality, and the conveyance of water through the Delta with or without a tunnel.

The State through the Central Valley Flood Protection Board (formerly the Reclamation Board) is the nonfederal sponsor for federal project levees and is obligated to operate and maintain the project levees in accordance with an Operation and Maintenance Manual incorporating USACE requirements. In most cases the State has contracted with a local agency to maintain the project levee in accordance with the Operation and Maintenance Manual. The local maintaining agency (LMA) in many cases is a Reclamation District. The USACE has become more demanding as to its Operation and Maintenance requirements including enforcement of the no vegetation requirements and has become less willing to proceed with reconstruction assistance. The USACE Operation and Maintenance is in reality the OMRR&R requirement. OMRR&R is "Operation, Maintenance, Repair, Rehabilitation and Replacement." The Maintenance responsibility for the State includes maintaining the integrity of the flood control system and designated floodways. "Levee inspection reports provided by the USACE indicate severe levee maintenance deficiencies in over 90% of State Plan of Flood Control levee systems." (See Exhibit 31 CVFPB Resolution No. 2018-06.) Inability of the LMA to fund the maintenance or lack of agreement to fund as defined will result in State funding or loss of USACE reconstruction assistance. USACE reconstruction assistance could be in the hundreds of millions of dollars.

FEMA assistance for non-project levee reconstruction after emergencies is dependent upon a good faith State effort to mitigate damages. The general policy question is why should federal money be used to repair damage resulting from the State's deferred action? The general approach in emergencies is locals exhaust their ability and then the State exhausts its ability up to $100 million (a somewhat arbitrary number) and then FEMA will assist unless there is an issue of State deferred maintenance or failure to proceed with mitigation. In the case of repeated emergencies FEMA requires a mitigation plan. As a result of multiple Delta levee breaks in 1980 where the Director of the Department of Water Resources did not provide support but FEMA and State OES did, FEMA required a Flood Hazard Mitigation Plan for the Delta.

Attached hereto as Exhibit 32 is the Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta dated September 15, 1983. The plan was prepared by the Department of Water Resources for the Office of Emergency Services and accepted by FEMA. The short term mitigation plan was to work towards a levee configuration with 1 foot of freeboard above the 100 year flood elevation, a 16 foot crown width, a 1.5 to 1 waterside slope, a 2 to 1 landside slope and an all-weather access road. (See Exhibit 32, p. 13.) This came to be known as the HMP Standard. It was recognized that the HMP Standard was not an engineered standard but merely a gage to reflect good faith improvement. The long term mitigation plan was to implement within 20 years a Delta Levee System plan "as described in the Corps' Draft Feasibility Report, dated October 1982 and in the Department's Bulletin 192-82, Delta Levees Investigation, dated

December 1982 …All islands should be included in the System Plan for stage construction, as recommended in the Corps' plan." (See Exhibit 32, p. 15.) Failure to continue funding the Delta programs will surely jeopardize future federal disaster assistance which could involve hundreds of millions and perhaps billions of dollars of recovery costs.

Currently highways in the Bay-Delta region are loaded to capacity during much of the day. In the event of an emergency whether it be flood, earthquake, terrorist attack or other emergency the loss of highways through the Delta will greatly increase the loss of life.

Increased funding of the Delta Levee Subvention Program and the Delta Levee Special Projects Program together with continued funding of the urban levee programs applicable to Delta Urban levees should be a priority. A specific allocation for the Delta Levee Programs should be included in each water related General Obligation Bond Proposition. There should be a priority for meeting the minimum engineering standards as adjusted for progressive sea level rise. Until the levees meet the minimum engineering standards the funding for habitat should be separately identified and implemented off levee. Integrating habitat with levee work greatly increases the cost thereby delaying progress in meeting the minimum engineering standards. Concentrating habitat in larger blocks where it is less likely to be disturbed and as separately managed projects is more beneficial to wildlife. Due to sea level rise, the restoration of non-terrestrial habitat impacting the Delta must be located upstream of the Delta and the projected tidal zone.

CORE STRATEGY 2'S PROPLEM STATEMENT ("IMPROVE PROJECT DESIGN") SHOULD BE AMENDED AS FOLLOWS:

Problem Statement

The loss of wetlands in the Bay/Delta watershed greatly impacted the Delta ecosystem; further impacts across all ecosystem (physical, chemical and biological) continue to severely stress the Delta ecosystem. Habitats and migration corridors in the Delta are already shifting with climate-driven impacts such as sea level rise and temperature changes, and these changes are likely to accelerate rapidly in coming decades. Restoration projects must be implemented at scales and in locations with sufficient opportunity to restore land-water connections in order to be resilient to these long-term trends. Due to sea level rise those with land-water connections should be located upstream of the Delta and above the projected tidal zone.

CORE STRATEGY 2'S "NEW ER POLICY 'A'."

Maintenance and improvement of existing levee systems should not be subject to consistency determinations or otherwise obstructed by further regulation. Greater flood protection is required due to sea level rise and climate change and higher levels of protection are required on existing levee systems relied upon for decades. There is no choice but to strive to meet the higher standard. Additional burdens add unnecessary cost, delay and risk.

CORE STRATEGY 2'S "ER P4. EXPAND FLOODPLAINS AND RIPARIAN HABITATS IN LEVEE PROJECTS."

Due to sea level rise and climate change, floodplain expansion and riparian habitat development should be focused on areas upstream of the Delta and above the projected tidal zones. Additionally, the integration of riparian habitat in levee projects greatly adds to the cost, delay and maintenance. Such habitat is best accomplished off levee and in larger units.

A setback levee and expansion of the floodplain may add detriments rather than multi-benefits depending greatly on location. Moving a levee off of the foundation which has been consolidating for over 100 years introduces the risk of instability which could take years to correct. This is a concern particularly in the Delta. Detrimental changes to the hydraulics in the rivers including the flow splits, velocity, scour, sedimentation and changes in flood routing have to be carefully analyzed. Sedimentation could significantly affect channel capacity and even induce meandering. In the current regulatory environment, maintenance of channel capacity is difficult if not impossible and is ignored. Water quality impacts including methylation of Mercury and propagation of algal bloom toxins or other toxins in the added floodplain could adversely impact aquatic species and even humans.

The rerouting of floodwaters into areas near development or critical structures increases the risk to such areas. Seepage into adjoining levees and development can occur by way of through seepage, under seepage or by pressurization of the aquifer which is especially critical if there is a high water table. Wind generated waves across the flooded area are also a problem to be addressed. Stranding and increased predation of protected fish species is a huge problem. The predation is not only by other fish species but by numerous bird species including white pelicans, cormorants, egrets, herons, gulls and king fishers and by other species such as river otters, raccoons, mink and sea lions. Flooding of areas every few years or every 10 or 20 years will drown the animals or damage the habitat for terrestrial species including species of particular concern such as riparian brush rabbits, endangered Garter snakes burrowing owls and the like. Human health and safety impacts from disease bearing vectors such as mosquitoes and the chemical control of the same are particularly significant near developed areas and other areas of substantial human activity. The spreading of contaminants from the flooded area and from the flooding of upstream wastewater pipe systems and treatment facilities and hazardous material sites is also a problem.

Levee setbacks and expanding the floodplain should only be done with careful consideration of the particular location. Benefits and detriments will change dramatically depending on location. Adding to the concerns discussed above, in the lower Delta increased salinity intrusion can result from increasing the tidal prism and or shortening the path to the export pumping facilities. For large setbacks and expansion of floodplains the increased evaporative losses could be significant. Setbacks and expansion of the floodplain would appear to be best placed away from development in areas where the water table is lower and groundwater recharge can be a real benefit. Development of floodplain habitat and spreading of floodwater in areas farther upstream of the Delta will reduce the detriment, increase the possible benefit for recharge of the groundwater and provide greater flood control benefit to downstream areas.

THE DRAFT PRIORITY AREAS FOR EXPANSION OF FLOODPLAINS IN THE SOUTH DELTA SHOULD BE DELETED EXCEPT AS TO PARADISE CUT.

The designated areas of Middle and Upper Roberts Island, Union Island, Fabian Tract and portions of the Pescadero District south of Paradise Cut are intensively farmed and within the primary zone of the Delta. These areas are a significant part of agriculture in San Joaquin County and are highly productive. Periodic flooding of such areas or conversion to habitat would clearly not protect and enhance the unique cultural and agricultural values of the Delta. Such areas also are projected to become tidal with the projected sea level rise and climate change

The areas protected by urban levees downstream from the Stanislaus River should not be considered for expansion of floodplain. The proximity to urban development and high water table will likely result in significant damage to urban improvements and cause significant health and safety issues. For much of the area land use is restricted to agriculture which currently is highly productive.

Existing levees in the Delta constitute an interrelated system necessary for the protection of the entire area including evacuation of the entire region in the event of emergency whether it be from flooding, earthquake, terrorist attack or otherwise. With climate change, sea level rise and the desire to increase flood protection for populations and critical infrastructure, improvement of existing Delta levees should be encouraged and not burdened with floodplain restoration concepts.

The San Joaquin River suffers from degraded water quality due to upstream diversions and lack of a valley drain connected to the ocean. Detrimental concentrations of selenium place fish species and waterfowl at greater risk and slowing the out migration of fish through the lower portion of the river and particularly in the Delta is unwise. The impact of increased inundated areas during the waterfowl nesting season will increase the risk of deformities due to selenium. As the tidal zone increases areas not protected by levees will be increasingly inundated.

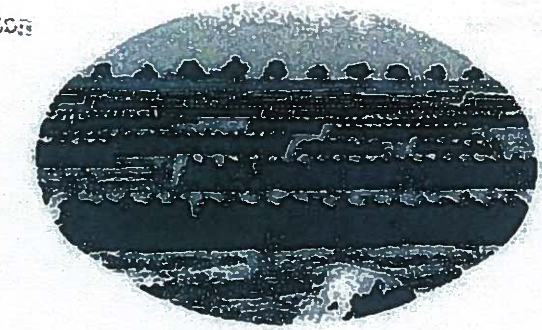
Unless revised the proposed amendments are very detrimental to the Delta and unlikely to achieve real benefit to fish and wildlife.

Yours very truly,

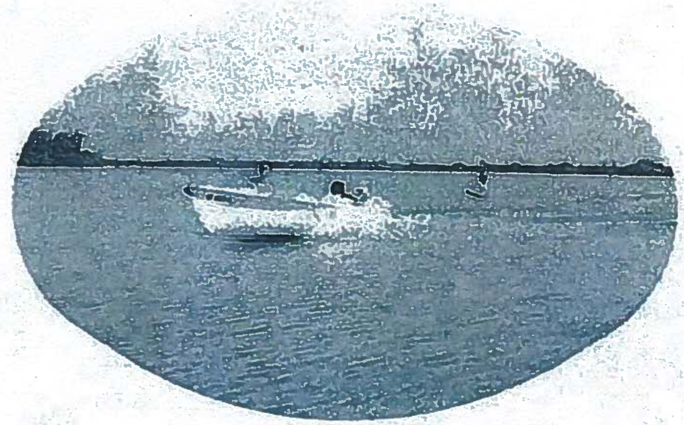
Dante John Nomellini Sr.

John A. Wilson

Preliminary Edition



Bulletin No. 76
DELTA WATER FACILITIES

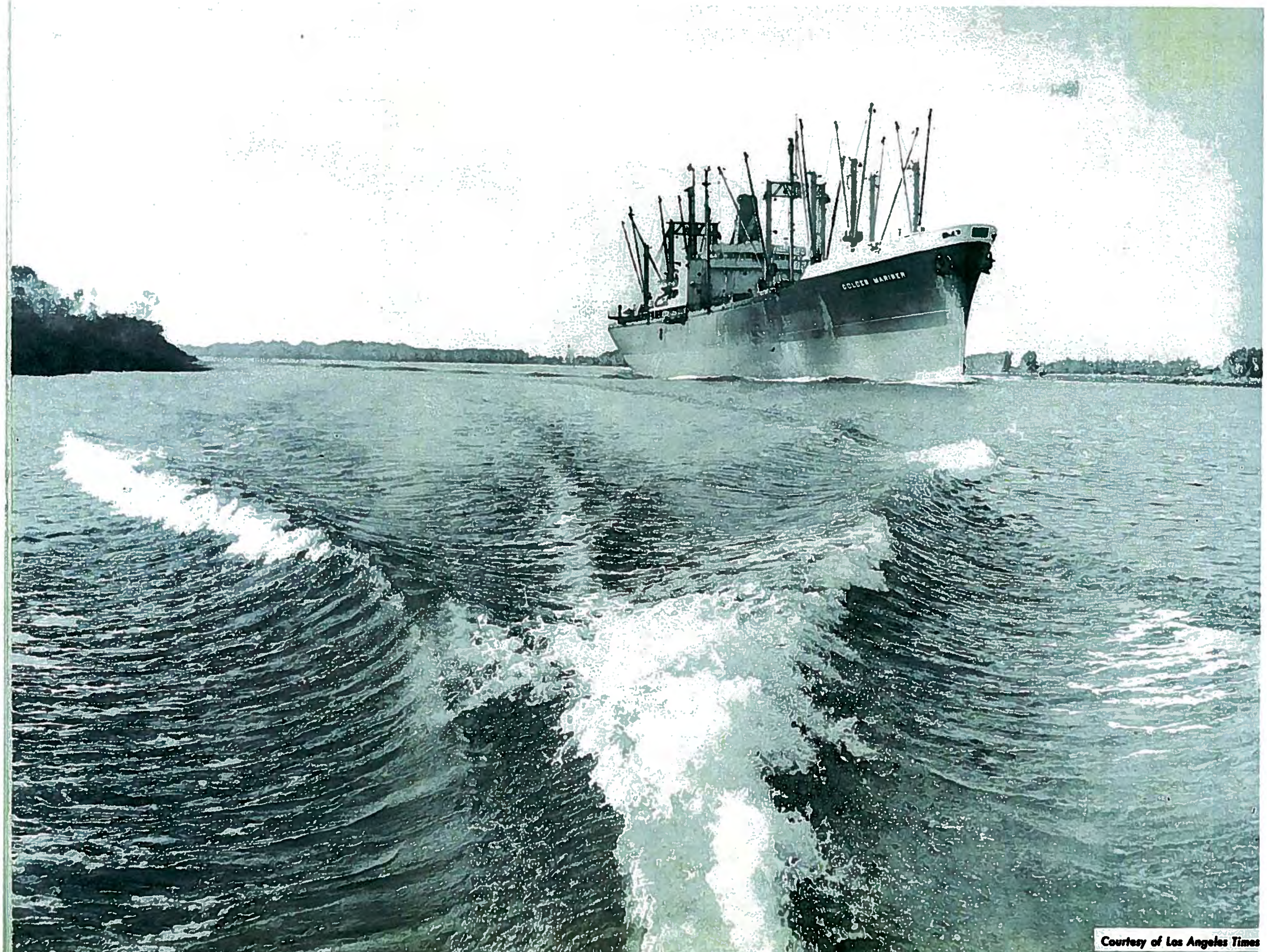


EDMUND G. BROWN
Governor
State of California

December, 1960

HARVEY O. BANKS
Director
Department of Water Resources

Exhibit 14



Courtesy of Los Angeles Times

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF CLARIFICATION

This preliminary edition presents a comparison of alternative solutions to the Delta problems. This bulletin shows that the Single Purpose Delta Water Project is the essential minimum project for successful operation of the State Water Facilities. This bulletin also presents, for local consideration, optional modifications of the Single Purpose Delta Water Project which would provide additional local benefits.

The evaluation of project accomplishments, benefit-cost ratios, and costs of project services, are intended only to indicate the relative merits of these solutions and should not be considered in terms of absolute values. Benefits related to recreation are evaluated for comparative purposes. Detailed recreation studies, presently in progress, will indicate specific recreation benefits.

Subsequent to local review and public hearings on this preliminary edition, a final edition will be prepared setting forth an adopted plan. The adopted plan will include, in addition to the essential minimum facilities, those justifiable optional modifications requested by local entities.

Bulletin No. 76

REPORT TO THE
CALIFORNIA STATE LEGISLATURE

ON THE

DELTA WATER FACILITIES

John A. Wilson

AS AN INTEGRAL FEATURE OF

THE STATE WATER RESOURCES DEVELOPMENT SYSTEM

EDMUND G. BROWN
Governor

HARVEY O. BANKS
Director

December, 1960

Letters....

HARVEY O. BANKS
Director

EDMUND G. BROWN
Governor

ADDRESS REPLY TO
[illegible]

STATE OF CALIFORNIA
Department of Water Resources
SACRAMENTO

December 30, 1960

Honorable Edmund G. Brown, Governor
Members of the Legislature of the
State of California

Gentlemen:

I have the honor to transmit herewith a preliminary edition of Bulletin No. 76, "Delta Water Facilities". This bulletin summarizes the results of investigations conducted pursuant to the Abshire-Kelly Salinity Control Barrier Acts of 1955 and 1957, Chapter 1434, Statutes of 1955, and Chapter 2092, Statutes of 1957, as amended by Chapters 1765 and 2038, Statutes of 1959.

Bulletin No. 76 presents findings and conclusions regarding the feasibility of alternative plans for the Delta feature of the State Water Facilities included in the Burns-Porter Act approved by the electorate on November 8, 1960. The Delta water facilities would (1) provide adequate water supplies throughout the Delta, (2) transport water across the Delta without undue loss or deterioration in quality, (3) provide flood and seepage control to Delta islands, (4) provide improved vehicular transportation access, and (5) minimize effects on existing recreation development and enhance recreation growth. All of the alternative plans would accomplish the first two objectives, and two alternative plans would also accomplish the other objectives.

Further planning for Delta water facilities should include consideration of joint financing and construction by federal, state and local interests. Facilities for flood and seepage control, vehicular transportation and recreation would not have to be constructed unless local governmental agencies desire these works and are willing to share in certain costs thereof. There would be some conflicts of interest in operation of these facilities which must be resolved prior to a decision by local interests regarding the extent of local participation. To this end, it is recommended that a period of a few months be allowed for local review and resolution of differences, after which public hearings should be held by the California Water Commission and the department. Following the public hearings, a final edition of Bulletin No. 76, incorporating any necessary modifications, should be published.

Very truly yours,

Harvey O. Banks

HARVEY O. BANKS
Director

BOARD OF CONSULTING ENGINEERS

November 16, 1960

Mr. Harvey O. Banks, Director
Department of Water Resources
Sacramento, California

Dear Mr. Banks:

This Board of Consulting Engineers which was active in 1958 was reconvened in April, 1960 and has met from time to time with your staff. Thus we have followed the preparation of this report and have commented to you following each meeting.

The Delta Water Facilities constitute needed works vital to the transfer of northern water into and across the Delta to provide water for use in the Delta and for export to water deficient areas along the Coast, in the San Joaquin Valley and to Southern California, to be financed under the California Water Resources Development Bond Act. The Board is of the opinion that the gross future water requirements for municipal and industrial purposes in the Delta have been very liberally estimated.

The Board is of the opinion that the engineering studies, designs and estimates are adequate for the purpose of this planning report and we support the conclusions and recommendations embodied therein.

We believe that the Chipps Island Barrier Project should not be authorized or constructed owing to its high cost of nearly $200 million which substantially exceeds project benefits.

The Delta Water Project, including such economically desirable flood control, seepage control, transportation and recreational features as may be agreed upon by local Delta beneficiaries willing to share in costs, would meet all water requirements with maximum net project benefits, and should be constructed under the Bond Act.

Respectfully submitted,

H. A. Einstein
H. A. Einstein

O. J. Porter
O. J. Porter

Ray K. Linsley
Ray K. Linsley

Samuel B. Morris
Samuel B. Morris, Chairman

Preface

This bulletin summarizes the engineering and economic conclusions and recommendations concerning the feasibility of providing salinity control, water supply, flood and seepage control, transportation facilities, and recreation development for the Sacramento-San Joaquin Delta, and conserving and making the most beneficial use of a major portion of the water resources of the State. Alternative plans for accomplishing some or all of these objectives are presented and compared to indicate their relative merits and to guide the selection of facilities to be constructed.

Findings presented herein are the result of intensive studies conducted during a five-year period. Previous studies and cooperative investigations by various public and private agencies and individuals were utilized in development of the plans. The cooperation of these individuals and agencies is gratefully acknowledged.

Study procedures and analyses are summarized in six supporting office reports, which are available to interested agencies and individuals. The subjects and titles of these reports are:

- Salinity Incursion and Water Resources
- Delta Water Requirements
- Channel Hydraulics and Flood Channel Design
- Recreation
- Plans, Designs, and Cost Estimates
- Economic Aspects

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Salinity Control Studies

1879-1880, WM. HAM. HALL

Salinity incursion into the Delta, which was recorded in 1841 and 1871, was recognized by the early settlers as a potential problem to water supplies, and a salt water barrier was proposed in the 1860's. State Engineer Wm. Ham. Hall subsequently studied a barrier in conjunction with flood control and concluded that, while a physical barrier could be constructed, the costs would exceed the benefits.

1924-1928, WALKER YOUNG INVESTIGATION

A series of subnormal water supply years began in 1917 and various proposals for barriers were advanced during the early 1920's. In cooperation with the State of California and the Sacramento Valley Development Association, the U. S. Bureau of Reclamation, under the direction of Walker Young, extensively investigated four alternative barrier sites and concluded that it was ". . . physically feasible to construct a Salt Water Barrier at any one of the sites investigated . . ." It was recognized that without a barrier, ". . . salinity conditions will become more acute unless mountain storage is provided to be released during periods of low river discharge . . ." Economic analyses of barriers were not made by Mr. Young.

1929-1931, BULLETINS NOS. 27 AND 28

Following investigation of the physical feasibility of barriers, the State Division of Water Resources studied the phenomena of salinity incursion and the economics of barriers. In Bulletin No. 27, "Variation and Control of Salinity in Sacramento-San Joaquin Delta and Upper San Francisco Bay," it was concluded that ". . . invasion of salinity . . . as far as the lower end of the . . . Delta is a natural phenomenon which, in varying degree, has occurred each year as far back as historical records reveal." It was also concluded that the Delta could be protected from saline invasion and be assured of ample and dependable water supplies if mountain storage were utilized to provide a controlled rate of outflow from the Delta.

In Bulletin No. 28, "Economic Aspects of a Salt Water Barrier," it was concluded that it was not economically justifiable to construct a barrier. With conditions of upstream water use at that time, it was concluded that the most economical solution to salinity incursion and provision of adequate water supplies in the Delta could be achieved by constructing upstream storage and controlling rates of outflow during periods of insufficient natural outflow.

1953, ABSHIRE-KELLY SALINITY CONTROL BARRIER ACT

Shasta Reservoir on the Sacramento River was constructed and began operation in 1944 for salinity control and other purposes. Expanding water requirements in the Central Valley and San Francisco Bay area stimulated reconsideration of barrier plans for water conservation and related purposes. Seven alternative plans for barriers in the Bay and Delta system were investigated by a Board of Consultants and the State Division of Water Resources for the California Water Project Authority. The Board of Consultants concluded that barriers in the San Francisco Bay system would not be functionally feasible due to the uncertainty of the quality of water in a barrier pool. It was recommended by the Division of Water Resources that "Further consideration be given only to . . . barriers . . . at or upstream from the Chipps Island site" at the outlet of the Delta.

1955, ABSHIRE-KELLY SALINITY CONTROL BARRIER ACT

Additional legislation specified study of a system of works in the Delta, referred to as the Junction Point Barrier Plan, and the Chipps Island Barrier Plan. The principal purposes of these studies were to develop complete plans for water supply in the San Francisco Bay area and to provide salinity control and urgently needed flood protection in the Delta.

CHAPTER 1434

An act to provide for a study of the junction point barrier and appurtenant facilities, the Abshire-Kelly Salinity Control Barrier Act of 1955, relating to barriers for salinity and flood control purposes, declaring the urgency thereof, to take effect immediately.

[Approved by Governor June 27, 1955. Filed with Secretary of State June 28, 1955.]

The people of the State of California do enact as follows:

SECTION 1. There is hereby appropriated to the Water Project Authority the sum of one hundred thousand dollars ($100,000), payable from the Flood Control Fund of 1946, to initiate the further investigation and study of the Junction Point Barrier and Chipps Island Barrier and appurtenant facilities, as such barriers and facilities are described in the report of the Water Project Authority to the Legislature entitled "Feasibility of Construction by the State of Barriers in the San Francisco Bay System," dated March, 1955, for the purposes of developing complete plans of the means of accomplishing delivery of fresh water to the San Francisco Bay area, including the Counties of Solano, Sonoma, Napa, Marin, Contra Costa, Alameda, Santa Clara, San Benito, and San Mateo, and the City and County of San Francisco, providing urgently needed flood protection to agricultural lands in the Sacramento-San Joaquin Delta, conducting subsurface exploration work in the delta and designing facilities appurtenant to the cross-delta aqueduct, obtaining more complete information on the hydrology of the delta, and studying integration of the proposed project in the California Water Plan.

SEC. 2. The Water Project Authority may contract with such other public agencies, federal, state, or local, as it deems necessary for the rendition and affording of such services, facilities, studies, and reports to the Water Project Authority as will best assist it to carry out this act. The Water Project Authority may also employ, by contract or otherwise, such private consulting engineering and other technical services as it deems necessary for the rendition and affording of such services, facilities, studies, and reports as will best assist it to carry out this act.

SEC. 3. It is the intent of the Legislature that in conducting the study and investigation the Water Project Authority shall confer and exchange information with and shall seek the participation of the United States Navy, the United States Bureau of Reclamation, the United States Corps of Engineers and the local port districts to the extent possible.

SEC. 4. The Water Project Authority shall report to the Legislature the result of its study and investigation not later than March 30, 1957.

SEC. 5. This act shall be known and may be cited as the Abshire-Kelly Salinity Control Barrier Act of 1955.

SEC. 6. This act is an urgency measure necessary for the immediate preservation of the public peace, health or safety within the meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting such necessity are:

The areas adjacent to the San Francisco Bay urgently need an adequate supply of fresh water for domestic and industrial uses. It is essential to the public health, safety and welfare that a study of salinity control barriers as a means of securing such a supply of fresh water, be undertaken without delay.

A four-year investigation was contemplated, and an interim report, Bulletin No. 60, "Salinity Control Barrier Investigation", was published in March 1957, by the Department of Water Resources. This report outlined a water plan for the San Francisco Bay area, and recommended that the North Bay Aqueduct be authorized for construction. The North Bay Aqueduct was authorized by the Legislature in 1957. The report also compared the Biemond Plan, a system of works in the Delta, with the Chipps Island Barrier Plan, and recommended that further study be limited to the Biemond Plan.

1957, ABSHIRE-KELLY SALINITY CONTROL BARRIER ACT

The Legislature concurred in limiting further study to the Biemond Plan and stressed the need for improving the quality of water in the Delta and making the most beneficial use of the water resources of the State. A report on the further studies was scheduled for release by March 30, 1959.

CHAPTER 2092

An act relating to barriers for salinity and flood control purposes.

[Approved by Governor July 8, 1957. Filed with Secretary of State July 10, 1957.]

The people of the State of California do enact as follows:

SECTION 1. The Department of Water Resources may limit its studies of salinity control barriers to the Biemond Plan as described in Bulletin No. 60 of the Department of Water Resources entitled "Salinity Control Barrier Investigation," dated March, 1957, subject to such modifications thereof as the department may adopt, said studies being for the purposes of developing complete plans of the means of accomplishing delivery of fresh water to the Counties of Solano, Sonoma, Napa and Marin, providing urgently needed flood protection to agricultural lands in the Sacramento-San Joaquin Delta, accomplishing salinity control, improving the quality of water exported from the delta to the San Francisco Bay area, San Joaquin Valley, and southern portions of California, making the most beneficial use of the water resources of the State, and studying integration of the proposed project in The California Water Plan.

SEC. 2. The department may contract with such other public agencies, federal, state or local, as it deems necessary for the rendition and affording of such services, facilities, studies, and reports to the department as will best assist it to carry out this act.

SEC. 3. It is the intent of the Legislature that in conducting the study and investigation the department shall confer and exchange information with and shall seek the participation of the United States Navy, the United States Bureau of Reclamation, the United States Corps of Engineers, and the local port districts to the extent possible.

SEC. 4. The department shall submit a report to the Legislature stating the result of its study and investigation not later than March 30, 1959.

SEC. 5. This act shall be known and may be cited as the "Abshire-Kelly Salinity Control Barrier Act of 1957."

1959, ADDITIONAL LEGISLATION

The potential expansion of water requirements of the urban and industrial complex in the western Delta area, and greater upstream water use with resultant depletion of inflow to and outflow from the Delta, indicated need for more concentrated study of the water requirements and supplies of the Delta. Legislation was enacted in 1959 to undertake studies of the type and extent of future water requirements of lands which can be served from present channels in the western Delta, effects of upstream water uses on Delta supplies, plans for water service and costs thereof, and economic and financial feasibility of the plans. Additional legislation authorized studies of the most economical and efficient procedures of constructing levees for flood control.

CHAPTER 1765

An act providing for the investigation of water supplies and flood control losses for the Sacramento-San Joaquin Delta and making an appropriation therefor.

[Approved by Governor July 10, 1959. Filed with Secretary of State July 13, 1959.]

The people of the State of California do enact as follows:

SECTION 1. The Department of Water Resources shall investigate the water supplies for the Sacramento-San Joaquin Delta. The investigation shall include, among other things: (1) the type and extent of the future water requirements of lands which can be served from present channels in the western Delta; (2) the extent and nature of effects of upstream water developments on water supply available to such lands; (3) the development of plans for water service to such lands and estimates of costs thereof; and (4) economic and financial analyses of such plans. In carrying out the investigation, the department shall seek the co-operation and assistance of the counties and other local agencies and entities in the Sacramento-San Joaquin Delta and of the United States; may enter into contracts with such entities to assist it in carrying out the purposes of such investigation, and shall consult with and keep appropriate legislative committees informed of the progress of this work.

SEC. 2. There is appropriated from the California Water Fund to the Department of Water Resources the sum of two hundred thousand dollars ($200,000) to be expended for the purposes of this act.

SEC. 3. Section 4.5 is added to the Abshire-Kelly Salinity Control Barrier Act of 1957 (Chapter 2092, Statutes of 1957), to read:

Sec. 4.5. As a part of the studies being performed hereunder and to obtain such information as may be required to implement the plan included in the report referred to in Section 4, the department may conduct studies and investigations to determine the most economical and efficient type and methods and procedures of construction to provide an adequate levee system in the Delta.

SEC. 4. There is hereby appropriated to the Department of Water Resources from the California Water Fund the sum of two hundred thirty thousand dollars ($230,000), of which one hundred eighty thousand dollars ($180,000), may be expended for the studies and investigations authorized by Section 3 hereof, and fifty thousand dollars ($50,000) may be expended for such remedial work as may be necessary in connection with levee tests being performed as a part of the studies and investigations authorized by Section 3 hereof.

Intensive studies were made of the future economic growth of lands which can be served from channels in the western Delta. Particular attention was given to the future municipal and industrial water needs in the area and the future water supplies available in the Delta. Due to the expanded scope of the studies, the report was delayed.

CHAPTER 2038

An act to amend Section 4 of Chapter 2092, Statutes of 1957, relating to barriers for salinity and flood control purposes.

[Approved by Governor July 17, 1959. Filed with Secretary of State July 20, 1959.]

The people of the State of California do enact as follows:

SECTION 1. Section 4 of Chapter 2092, Statutes of 1957, is amended to read:

Sec. 4. The department shall submit a report to the Legislature stating the result of its study and investigation not later than January 2, 1961.

The unique character of the water supply problems of the Delta was recognized by the State Legislature when it amended the California Water Code in 1959 to include general policy regarding the Delta. This legislation calls for provision of salinity control and adequate water supplies in the Delta and states that water to which the users within the Delta are entitled should not be exported. The policy in this act is basic to the planning and operation of all works in the Delta or diversions therefrom.

CHAPTER 1766

An act to add Part 4.5 (commencing at Section 12200) to Division 6 of the Water Code, relating to delivery of surplus water into, and extractions thereof for exportation from, the Sacramento-San Joaquin Delta.

[Approved by Governor July 10, 1959. Filed with Secretary of State July 13, 1959.]

The people of the State of California do enact as follows:

SECTION 1. Part 4.5 (commencing at Section 12200) is added to Division 6 of the Water Code, to read:

PART 4.5. SACRAMENTO-SAN JOAQUIN DELTA

CHAPTER 1. GENERAL POLICY

12200. The Legislature hereby finds that the water problems of the Sacramento-San Joaquin Delta are unique within the State; the Sacramento and San Joaquin Rivers join at the Sacramento-San Joaquin Delta to discharge their fresh water flows into Suisun, San Pablo and San Francisco Bays and thence into the Pacific Ocean; the merging of fresh water with saline bay waters and drainage waters and the withdrawal of fresh water for beneficial uses creates an acute problem of salinity intrusion into the vast network of channels and sloughs of the Delta; the State Water Resources Development System has as one of its objectives the transfer of waters from water-surplus areas in the Sacramento Valley and the north coastal area to water-deficient areas to the south and west of the Sacramento-San Joaquin Delta via the Delta; water surplus to the needs of the areas in which it originates is gathered in the Delta and thereby provides a common source of fresh water supply for water-deficient areas. It is, therefore, hereby declared that a general law cannot be made applicable to said Delta and that the enactment of this law is necessary for the protection, conservation, development, control and use of the waters in the Delta for the public good.

12201. The Legislature finds that the maintenance of an adequate water supply in the Delta sufficient to maintain and expand agriculture, industry, urban, and recreational development in the Delta area as set forth in Section 12220, Chapter 2, of this part, and to provide a common source of fresh water for export to areas of water deficiency is necessary to the peace, health, saftey and welfare of the people of the State, except that delivery of such water shall be subject to the provisions of Section 10505 and Sections 11460 to 11463, inclusive, of this code.

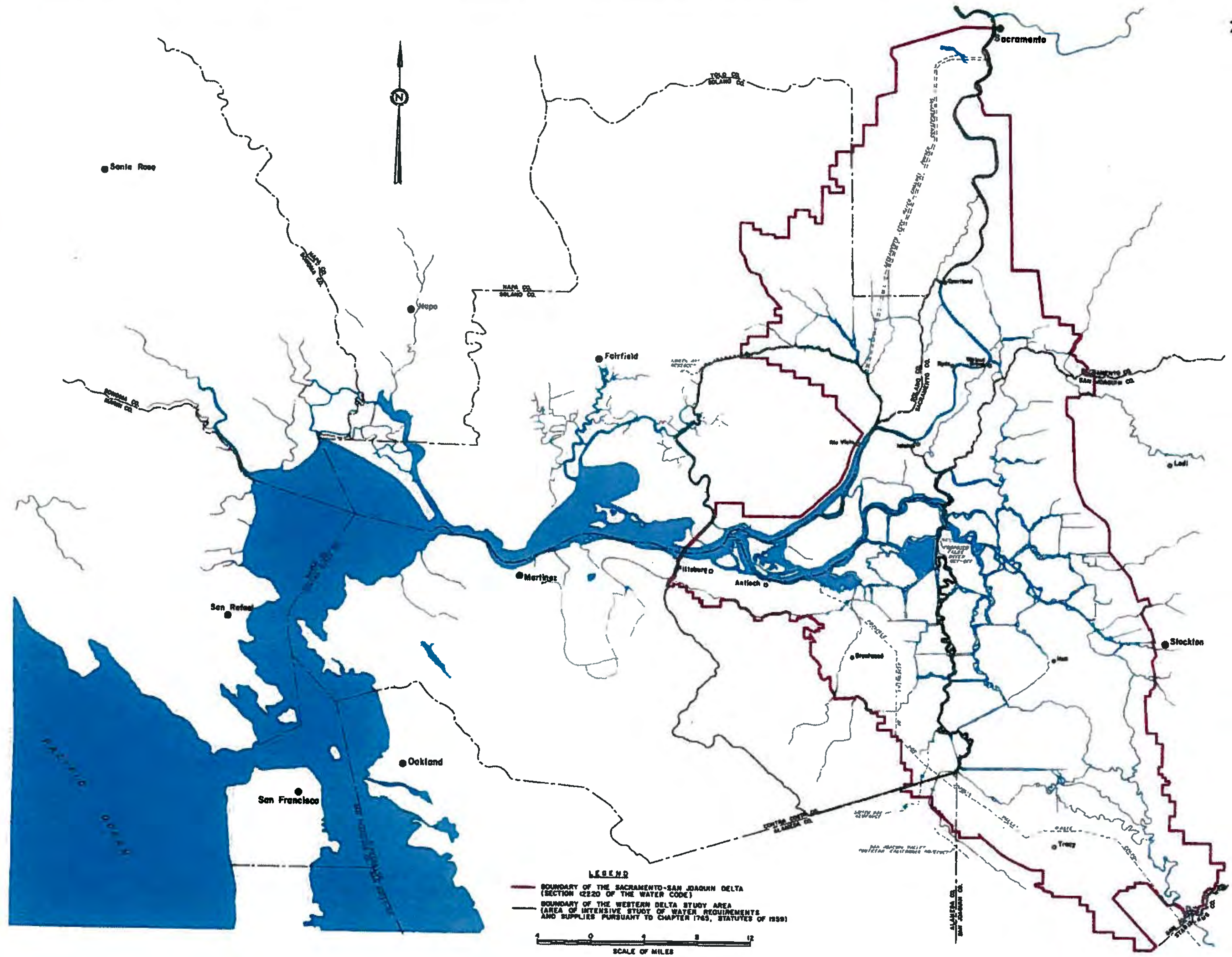
12202. Among the functions to be provided by the State Water Resources Development System, in coordination with the activities of the United States in providing salinity control for the Delta through operation of the Federal Central Valley Project, shall be the provision of salinity control and an adequate water supply for the users of water in the Sacramento-San Joaquin Delta. If it is determined to be in the public interest to provide a substitute water supply to the users in said Delta in lieu of that which would be provided as a result of salinity control no added financial burden shall be placed upon said Delta water users solely by virtue of such substitution. Delivery of said substitute water supply shall be subject to the provisions of Section 10505 and Sections 11460 to 11463, inclusive, of this code.

12203. It is hereby declared to be the policy of the State that no person, corporation or public or private agency or the State or the United States should divert water from the channels of the Sacramento-San Joaquin Delta to which the users within said Delta are entitled.

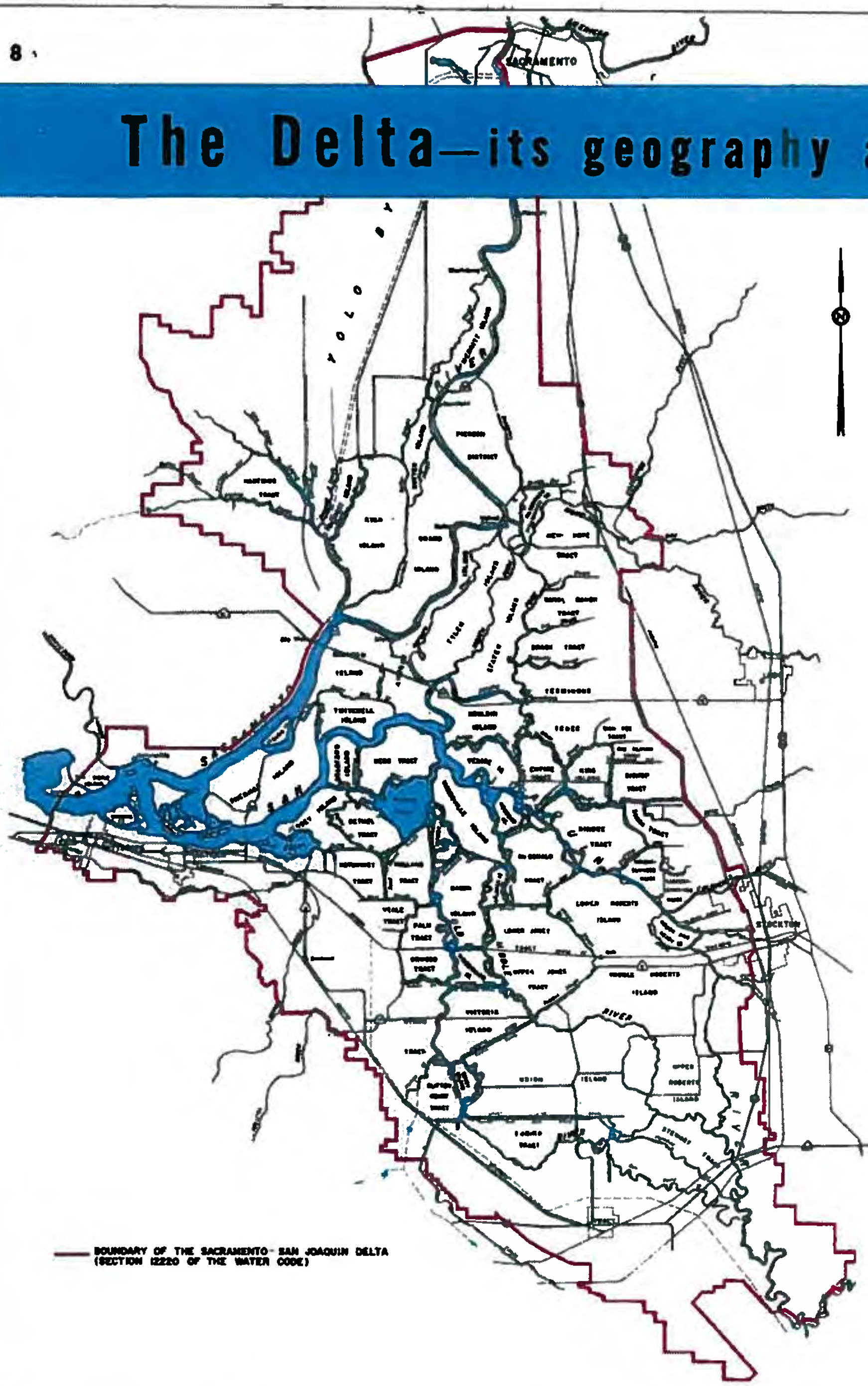
12204. In determining the availability of water for export from the Sacramento-San Joaquin Delta no water shall be exported which is necessary to meet the requirements of Sections 12202 and 12203 of this chapter.

12205. It is the policy of the State that the operation and management of releases from storage into the Sacramento-San Joaquin Delta of water for use outside the area in which such water originates shall be integrated to the maximum extent possible in order to permit the fulfillment of the objectives of this part.

This legislation also described the area of the Delta to which the general policy applies. The boundary of the Delta, as described in Section 12220 of the Water Code, is indicated on the facing map. The area considered in the intensive studies of water requirements and supplies is described as the Western Delta Study Area.


Sacramento
Santa Rosa
Napa
Fairfield
Martinez
Pittsburg
Antioch
San Rafael
Oakland
San Francisco
Stockton
Lodi
Tracy
Brentwood
Rio Vista
PACIFIC OCEAN
NAPA CO.
SOLANO CO.
SONOMA CO.
MARIN CO.
YOLO CO.
SACRAMENTO CO.
SAN JOAQUIN CO.
CONTRA COSTA CO.
ALAMEDA CO.
LEGEND
BOUNDARY OF THE SACRAMENTO-SAN JOAQUIN DELTA
(SECTION 12220 OF THE WATER CODE)
BOUNDARY OF THE WESTERN DELTA STUDY AREA
(AREA OF INTENSIVE STUDY OF WATER REQUIREMENTS
AND SUPPLIES PURSUANT TO CHAPTER 1763, STATUTES OF 1959)
4 0 4 8 12
SCALE OF MILES

The Delta—its geography and economy

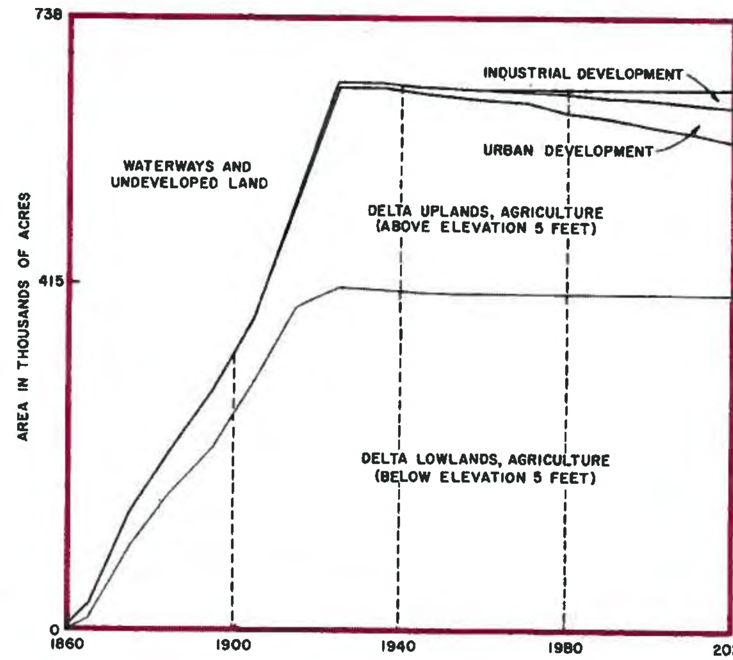


The Delta, located at the confluence of the Sacramento and San Joaquin Rivers system, is a unique feature of the California landscape. The Delta encompasses some 738,000 acres, interlaced with 700 miles of meandering waterways covering 50,000 acres. About 415,000 acres of land, referred to as Delta Lowlands, lie between elevations of 5 feet above and 20 feet below sea level. This area is composed of peat, organic sediments, and alluvium, and is protected from flood water and high tides by man-made levees. The extensive waterways afford opportunity for shipping and provide a wonderland for boating and water sports. These same waterways must safely discharge flood waters of the Central Valley.

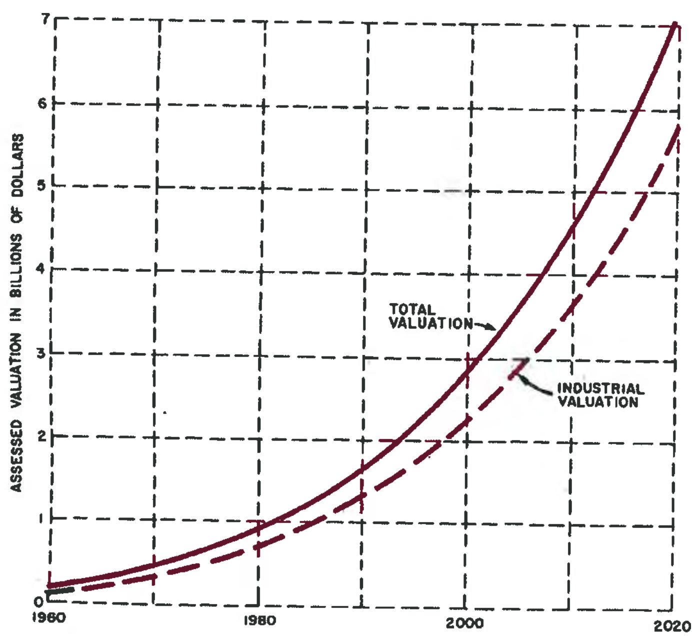
The fortunate combination of fertile soils, convenient water supplies, and shallow-draft shipping to central California markets led to development of an intensified agricultural economy in the Delta. Initial reclamation of the marshlands began slowly in the 1850's, but rapidly expanded after state assistance was provided by a swampland act in 1861. By 1930, all but minor areas of the swamplands had been leveed and were in production.

The Delta has historically been noted for its asparagus, potatoes, celery, and varied truck crops. Recently, greater emphasis has been placed on field corn, milo, grain, and hay, although the Delta still produces most of the nation's canned asparagus. The Delta's agricultural economy for many years was dependent upon repulsion of ocean salinity by fresh water outflow, which fluctuated widely, but during the past sixteen years has been protected largely by releases from upstream reservoirs of the Federal Central Valley Project during summer months.

Several towns and cities are located in the upland areas and an industrial complex is expanding in the western part of the Delta. Early industrial development centered around food and kindred products, steel production, fibreboard, lumber, and shipbuilding activity. Large water-using industries, such as steel, paper products, and chemicals, have developed in the western area where water, rail, and highway transportation, coupled with water supplies, has stimulated growth. The manufacturing employment in this area was about 10,000 people in 1960.



TRENDS IN LAND USE



PROJECTED ASSESSED VALUATIONS WITHIN THE WESTERN DELTA STUDY AREA

A deep-draft ship channel serving commercial and military installations terminates at Stockton, and another is being constructed to Sacramento. Water-borne shipments in the Delta amounted to about 6,000,000 tons annually in recent years.

The Delta encompasses one of California's most important high quality natural gas fields. Since 1941 the field has produced about 300,000,000 cubic feet of methane gas for use in the San Francisco Bay area.

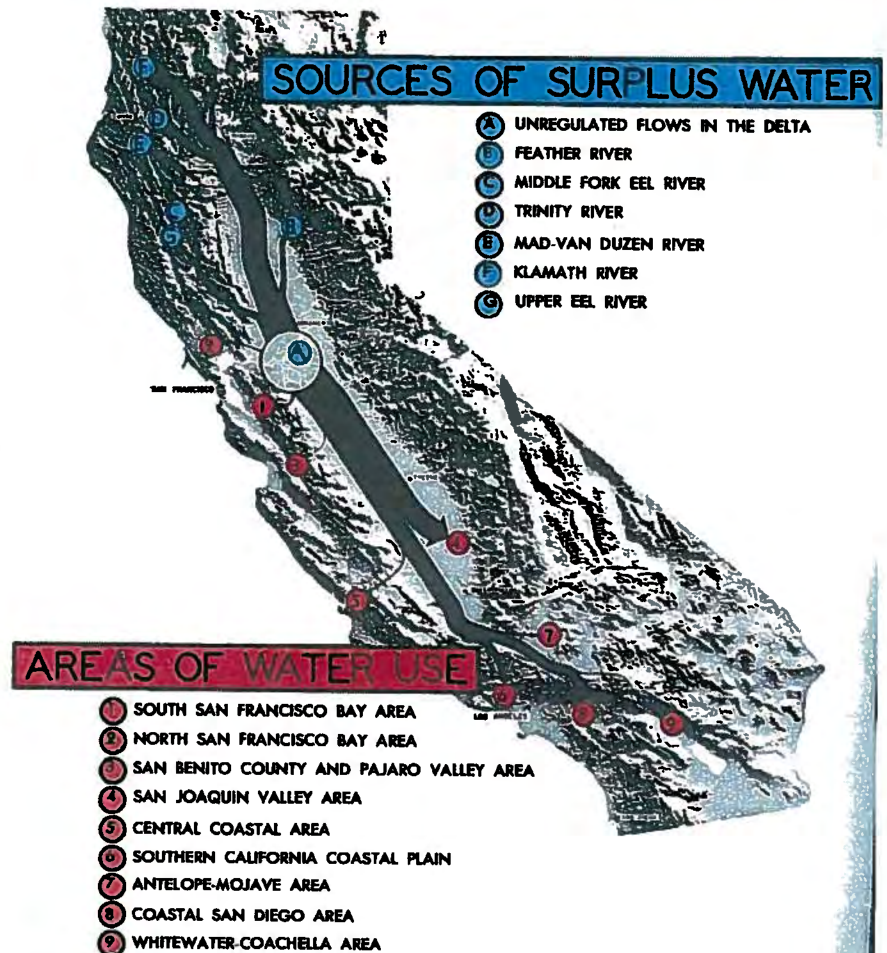
With the growing significance of recreation, the Delta has blossomed into a major recreation area at the doorsteps of metropolitan development in the San Francisco Bay area, Sacramento, and Stockton. In 1960, nearly 2,800,000 recreation-days were enjoyed in this boating wonderland.

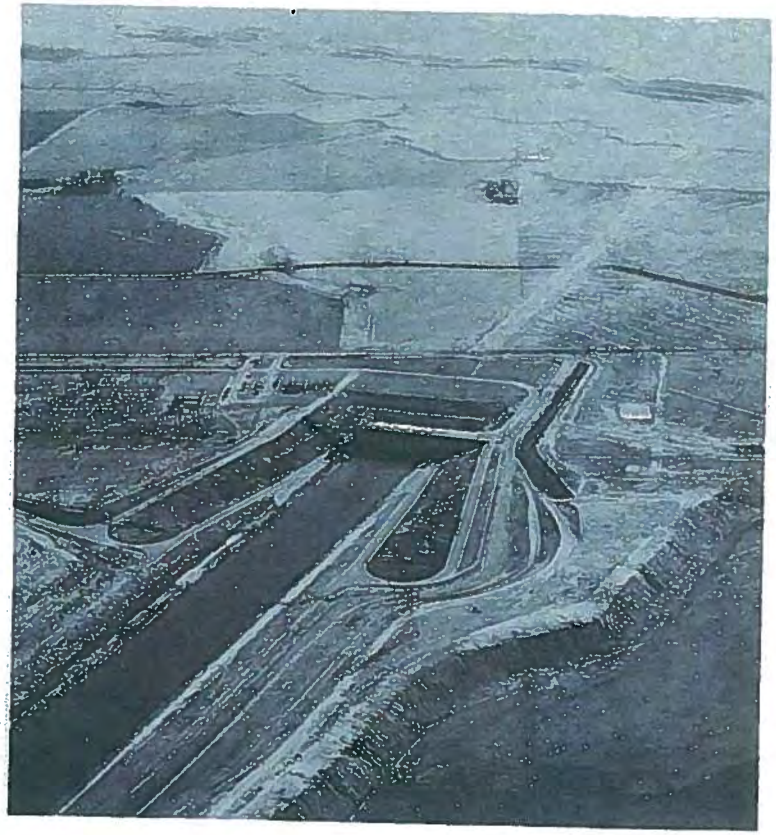
The Delta — its role in California's water development

In 1959, the State Legislature enacted the California Water Resources Development Bond Act to finance construction of the State Water Resources Development System. The bond act was approved by the California electorate in November 1960. The State Water Facilities, the initial features of this system, will complement continuing local and federal water development programs and include the very necessary works in the Delta.

One of the principal objectives of the State Water Resources Development System is to conserve water in areas of surplus in the north and to transport water to areas of deficiency to the south and west. The Delta is important in achieving this objective, since it receives all of the surplus flows of Central Valley rivers draining to the ocean during winter and spring months and is the last location where water not needed in the Delta or upstream therefrom can conveniently be controlled and diverted to beneficial use. Surplus water from the northern portion of the Central Valley and north coastal rivers will be conveyed by the natural river system to the Delta, where it must be transferred through Delta channels to export pumping plants without undue loss or deterioration in quality. Aqueducts will convey the water from the Delta to off-stream storage and use in areas of deficiency to the south and west.

In addition to being an important link in the interbasin transfer of water, the Delta is a significant segment of California's economy, and its agricultural, municipal, and industrial water supply problems, and flood control and related problems, must be remedied. A multipurpose system of Delta water facilities, which will comprise one portion of the State Water Resources Development System, is the most economical means of transferring water and solving Delta problems.

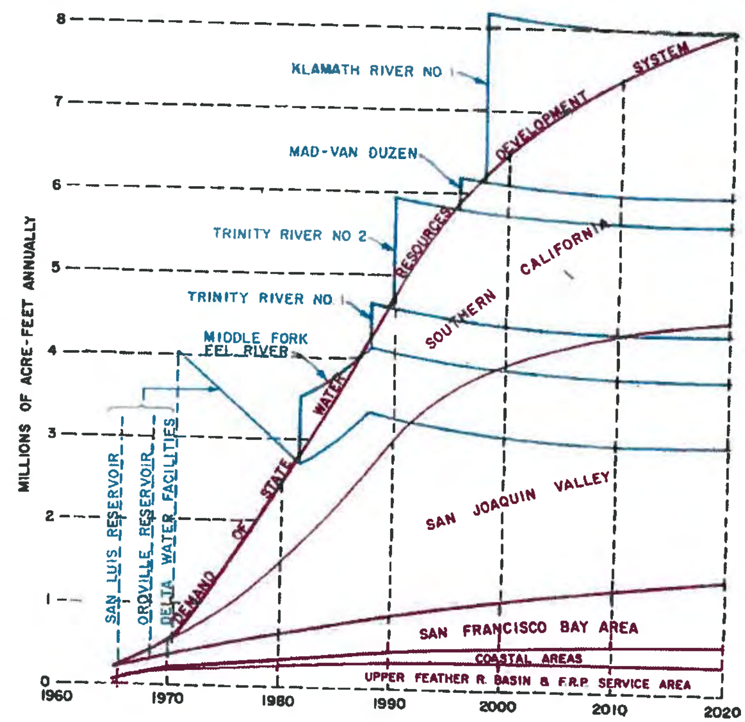




Tracy Pumping Plant

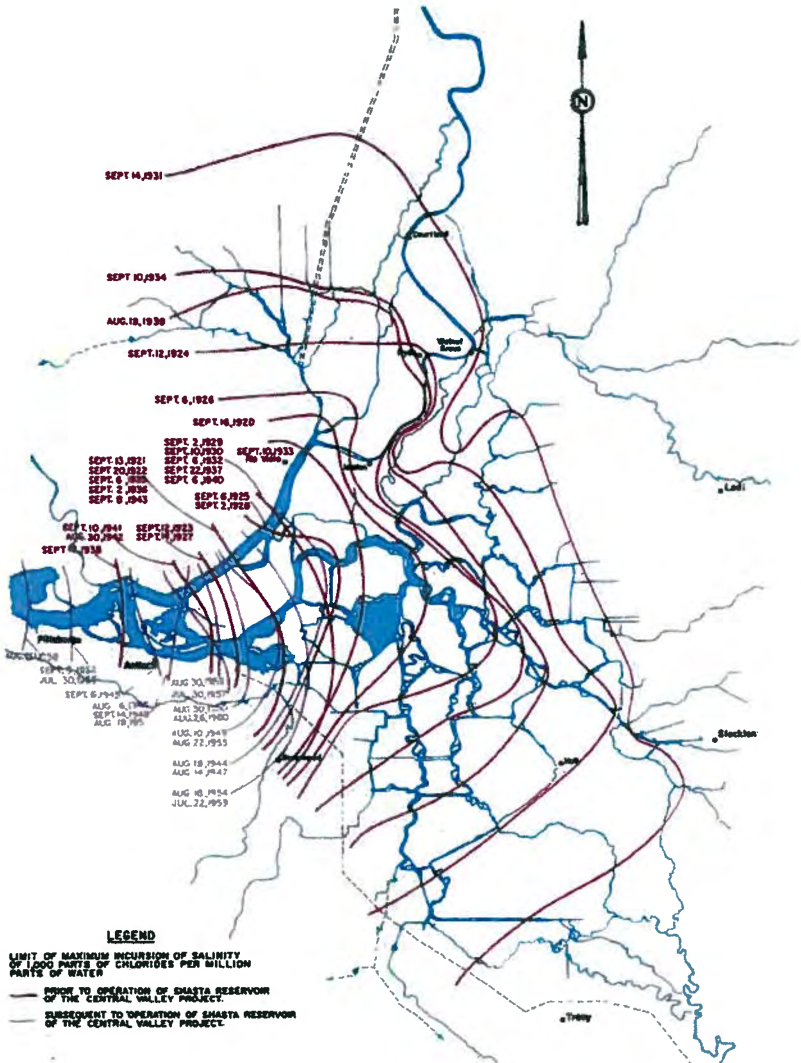
Full demands on the State Water Resources Development system can be met until about 1981 from surplus water in and tributary to the Delta with regulation by the proposed Oroville and San Luis Reservoirs. However, upstream depletions will reduce the available surplus supplies and water will have to be imported from north coastal sources after that year. It is anticipated that coordinated operation of the State Water Resources Development System and the Federal Central Valley Project will afford a limited increase in usable surplus Delta supplies beginning in 1981. As indicated in the chart, upstream depletions will continue to decrease the available surplus supplies.

The coordinated use of surplus water in and tributary to the Delta and of regulated or imported supplements to this supply, as required, is referred to as the Delta Pooling Concept. Under this concept of operation the State will ensure a continued supply of water adequate in quantity and quality to meet the needs of export water users. Advantage will be taken of surplus water available in the Delta, and as the demand for water increases and the available surplus supply is reduced by further upstream uses, the State will assume the responsibility of guaranteeing a firm supply of water, which will be accomplished by construction of additional storage facilities and import works. At the same time, the water needs of the Delta will be fully met.



WATER SOURCES AND USES

Delta Problems — salinity incursion and water supplies

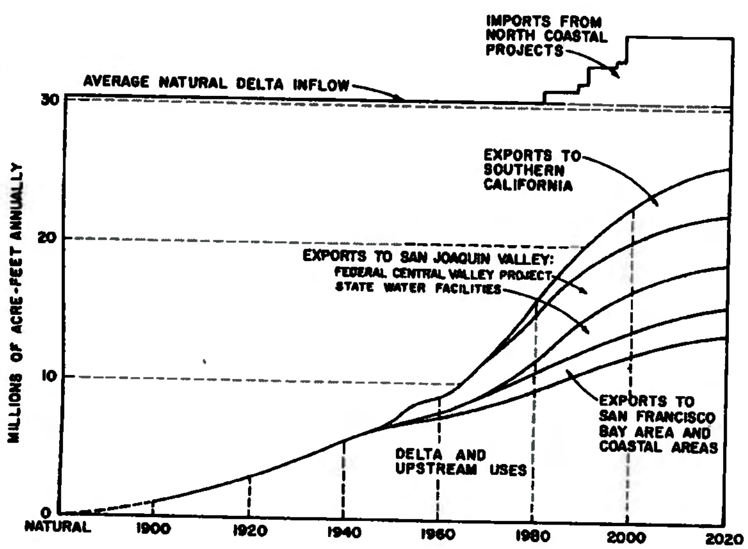


HISTORICAL SALINITY INCURSION
1920-1960

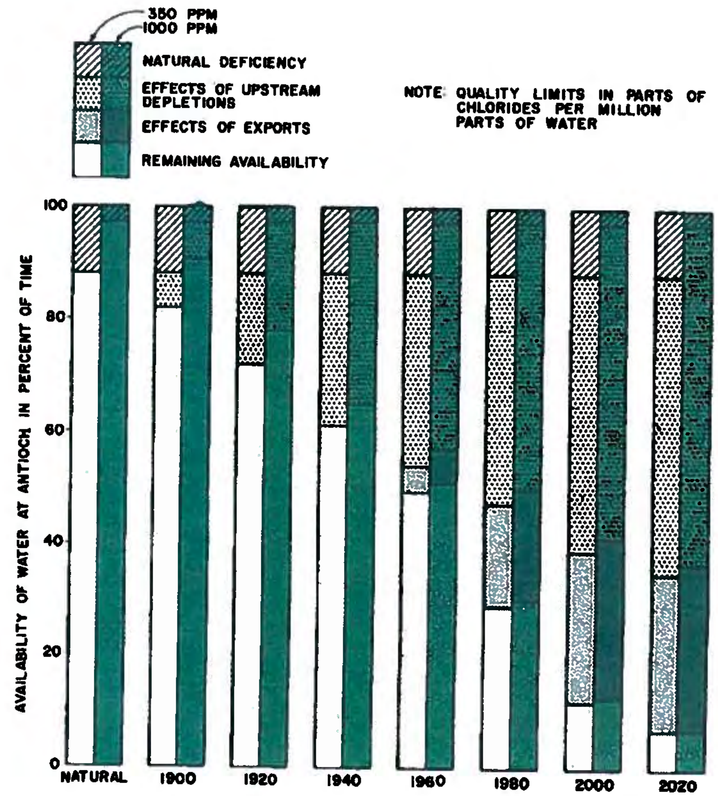
Salinity incursion into the Delta results from the flooding and ebbing of ocean tides through the San Francisco Bay and Delta system during periods when the fresh water outflow from the Delta is insufficient to repel the saline water. The natural fresh water outflow from the Central Valley was historically inadequate to repel salinity during summer months of some years. The first known record of salinity encroachment into the Delta was reported by Cmdr. Ringgold, U. S. Navy, in August 1841, whose party found the water at the site of the present city of Antioch very brackish and unfit for drinking. Since that time, and particularly after the turn of the century, with expanding upstream water use salinity incursion has become an increasingly greater problem in Delta water supplies. The maximum recorded extent of salinity incursion happened in 1931, when ocean salts reached Stockton. Since 1944 extensive incursion has been repulsed much of the time by fresh water releases from Central Valley Project storage in Shasta and Folsom Reservoirs. Without such releases, saline water would have spread through about 90 percent of the Delta channels in 1955 and 1959. Although upstream uses might not have reached present levels in the absence of the Central Valley Project, salinity problems would still have been very serious during most years.

Further increase in water use in areas tributary to the Delta will worsen the salinity incursion problem and complicate the already complex water rights situation. To maintain and expand the economy of the Delta, it will be necessary to provide an adequate supply of good quality water and protect the lands from the effects of salinity incursion. In 1959 the State Legislature directed that water shall not be diverted from the Delta for use elsewhere unless adequate supplies for the Delta are first provided.

The natural availability of good quality water in the Delta is directly related to the amount of surplus water which flows to the ocean. The graph to the right indicates the historic and projected availability of water in the San Joaquin River at Antioch containing less than 350 and 1,000 parts chlorides per million parts water, under long-term average runoff and *without* specific releases for salinity control. It may be noted that even under natural conditions, before any significant upstream water developments, there was a deficiency of water supplies within the specified quality limits. It is anticipated that, without salinity control releases, upstream depletions by the year 2020 will have reduced the availability of water containing less than 1,000 ppm chlorides by about 60 percent, and that exports will have caused an additional 30 percent reduction.



USE OF DELTA WATER SUPPLIES



DELTA WATER QUALITY WITHOUT SALINITY CONTROL

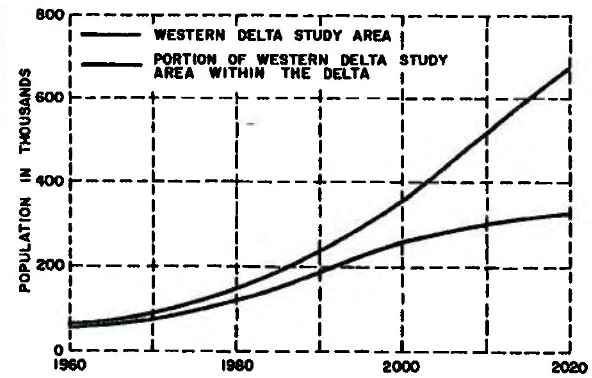
The magnitude of the past and anticipated future uses of water in areas tributary to the Delta, except the Tulare Lake Basin, is indicated in the diagram to the left. It may be noted that, while the present upstream use accounts for reduction of natural inflow to the Delta by almost 25 percent, upstream development during the next 60 years will deplete the inflow by an additional 20 percent. By that date about 22 percent of the natural water supply reaching the Delta will be exported to areas of deficiency by local, state, and federal projects. In addition, economical development of water supplies will necessitate importation of about 5,000,000 acre-feet of water seasonally to the Delta from north coastal streams for transfer to areas of deficiency.

Delta Problems—municipal water

Municipalities in the surrounding upland areas of the Delta, except in the western portion, obtain their water supplies from surface or underground sources which are, or will be with further development, adequate to meet their needs. In the western Delta, the principal municipalities rely on supplies from the Contra Costa Canal which are diverted from Delta channels. The main problem relates to quality of the water. At the present time, the mineral quality of the supplies deteriorates during some summer and fall months below standards established by the U. S. Public Health Service. This results from incursion of ocean salts, combined with industrial wastes and poor quality return water from the Central Valley. Assurance of good quality supplies in adequate quantities to meet present requirements and anticipated future growth is one of the most pressing problems in the Delta.

Estimates of future municipal water requirements in the western Delta area were based on projected population and per capita use. Population projections were founded on national, state, and regional forecasts for moderately high economical conditions. Although these conditions result in forecasts which may exceed an anticipated "most probable" projection by about ten percent, it is believed that this approach will assure adequate consideration of Delta water requirements in plans for diversion of surplus water from the Delta.

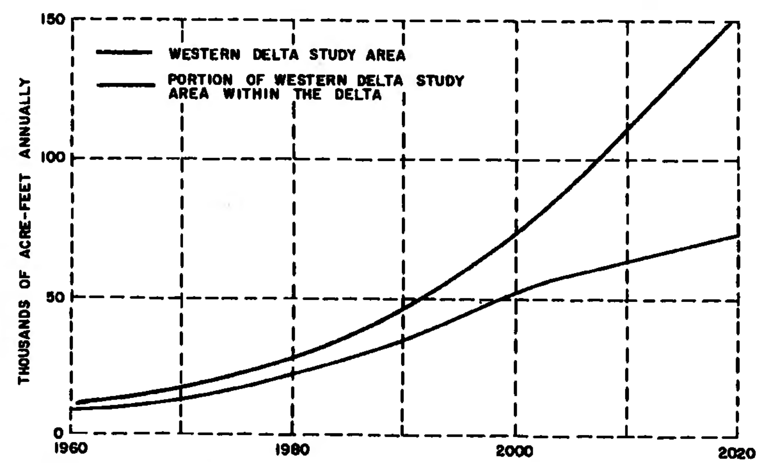
Projected estimates of per capita water uses reflect anticipated increases due to greater emphasis on water-using appliances in homes, additional lawns and landscaping, and the general trend toward higher standards of living. An average municipal water use of about 140 gallons per capita per day at this time reflects the climatic and economic conditions of the area. It is anticipated that the average use in low density residential areas will increase to about 200 gallons per capita per day by 2020. The estimated total annual municipal water requirement in the western Delta area indicates about a fifteenfold increase by 2020.



POPULATION
WESTERN DELTA STUDY AREA

ESTIMATED MUNICIPAL WATER REQUIREMENTS
WESTERN DELTA STUDY AREA
(In thousands of acre-feet annually)

Area	1960	1980	2000	2020
Western Delta Study Area				
Contra Costa Co.	9.6	26.8	62.7	116.4
Solano Co.	0.7	1.4	10.0	35.4
Portion of Western Delta Study Area Within the Delta				
Contra Costa Co.	8.6	22.6	52.0	71.4
Solano Co.	0.0	0.0	0.4	2.5



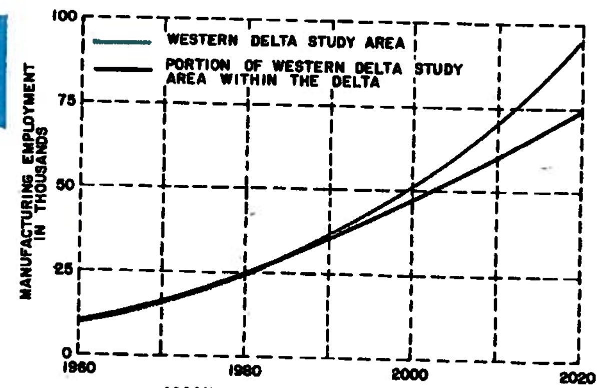
MUNICIPAL WATER REQUIREMENTS
WESTERN DELTA STUDY AREA

Delta Problems—industrial water

The problems of industrial water supply are similar to municipal supply problems in that they are concentrated in the western Delta area and center around quality aspects. Deterioration of water supplies by salinity incursion in 1959 caused curtailment of production in several plants and a production halt in one major industry. As additional upstream development and beneficial use of water takes place, the duration and degree of salinity incursion each year will become more extended. It will become increasingly necessary to provide adequate industrial water supplies in the western Delta area for maintenance and expansion of the present economy.

Estimates of future industrial growth were based on correlation of state and regional manufacturing employment with national projections. Projections to 1980 were based on detailed analyses of the several components of the industrial complex, while projections beyond that date reflect total manufacturing employment. A sevenfold increase in manufacturing employment in the western Delta area is anticipated by 2020. Increasing productivity per employee, due to automation and technical advancements, coupled with projected employment, indicates a thirtyfold increase in production by that date.

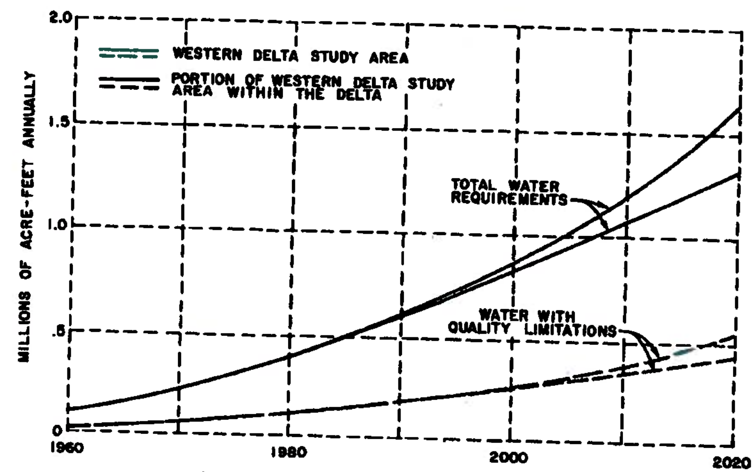
Estimates of future water supplies to enable the production increases were based on six manufacturing categories, and reflect a continuation of the trend of decreasing water use per unit of production. A fifteenfold increase in total industrial water requirements is indicated by 2020. The total requirement includes two types of industrial water. One type is for processing and recirculated cooling with quality limitations, and the second type is for general cooling where good quality water is not required because materials of construction in cooling equipment can satisfactorily withstand a wide range of quality conditions.



MANUFACTURING EMPLOYMENT
WESTERN DELTA STUDY AREA

ESTIMATED INDUSTRIAL WATER REQUIREMENTS
WESTERN DELTA STUDY AREA
(in thousands of acre-feet annually)

Area	1960	1980	2000	2020
Western Delta Study Area				
Total water requirements, Contra Costa Co.	106	396	790	1,270
Total water requirements, Solano Co.	1	7	67	387
Water with quality limitations, Contra Costa Co.	30	120	251	423
Water with quality limitations, Solano Co.	–	2	21	129
Portion of Western Delta Study Area Within the Delta				
Total water requirements, Contra Costa Co.	106	396	790	1,270
Total water requirements, Solano Co.	–	–	9	56
Water with quality limitations, Contra Costa Co.	30	120	251	423
Water with quality limitations, Solano Co.	–	–	3	19



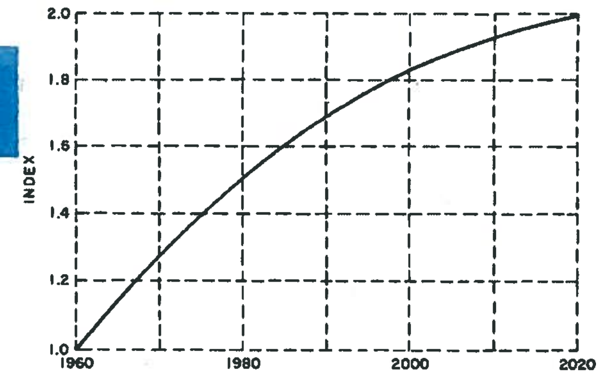
INDUSTRIAL WATER REQUIREMENTS
WESTERN DELTA STUDY AREA

Delta Problems—agricultural water

For many years farmers in the Delta have been confronted with salinity incursion in Delta channels. Since 1944 they have enjoyed partial salinity protection and supplemental water due to releases from Shasta and Folsom Reservoirs. As additional water is utilized in areas tributary to the Delta, there will be further reductions in unregulated late spring runoff to the Delta, which will result in diminishing supplies in the western Delta and greater Delta-wide reliance on regulated fresh water outflow. About 40,000 acres in the western Delta are faced with water supplies of poor quality even if future export projects are not constructed. In the southern portion of the Delta the present water supplies during summer months consist mainly of very poor quality drainage water in the San Joaquin River. Operation of the proposed San Joaquin Valley waste conduit may reduce the amount of return drainage water available in the San Joaquin River. If this occurs, substitute water supplies would have to be provided.

Although most of the suitable land in the Delta is now irrigated, limited additional development in the uplands is anticipated, and more intense use by double-cropping will be made of Delta lowlands. Estimates of expanding water requirements reflect correlations with statewide projections of the economic demand for farm produce. It is anticipated that about 10,000 acres of "new" land will be irrigated in the upland areas, but about 40,000 acres will be converted to urban uses by 2020.

Future water requirements were based on projected crop patterns and unit water requirements of the various crops. Some additional water may be required for leaching of lands surrounded by brackish water. Separate allowance for this purpose was provided in operation studies of plans which result in brackish water in western Delta channels.

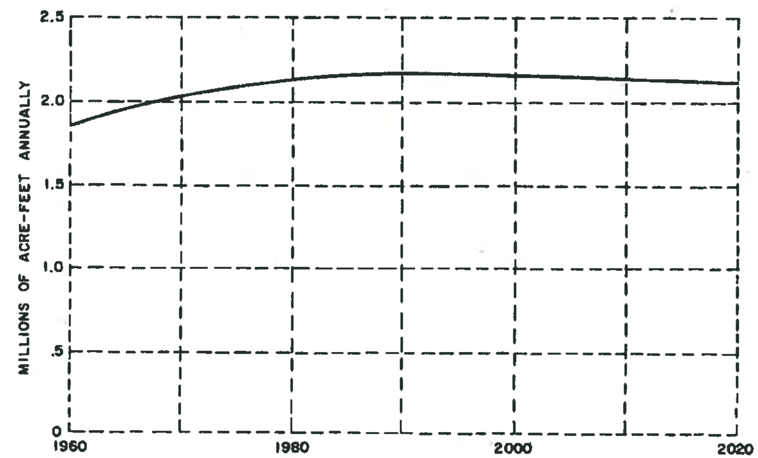


INDEX OF AGRICULTURAL PRODUCTIVITY

ESTIMATED AGRICULTURAL WATER REQUIREMENTS WITHIN THE DELTA [1]
(In thousands of acre-feet annually)

Area	1960	1980	2000	2020
Alameda County	13	15	15	15
Contra Costa County	236	272	275	270
Sacramento County	294	339	342	336
San Joaquin County	838	967	977	958
Solano County	238	264	267	261
Yolo County	244	282	285	279
TOTAL	1,863	2,139	2,161	2,119

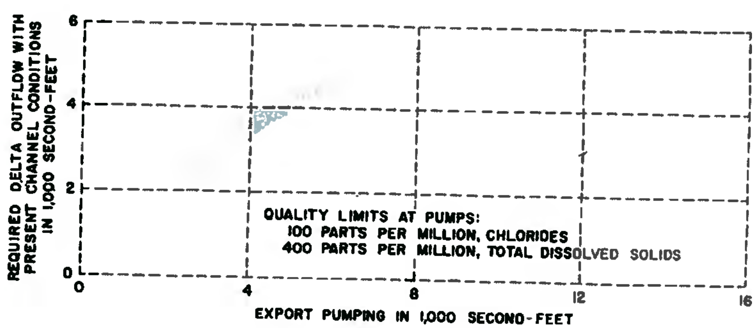
[1] Including effective precipitation.



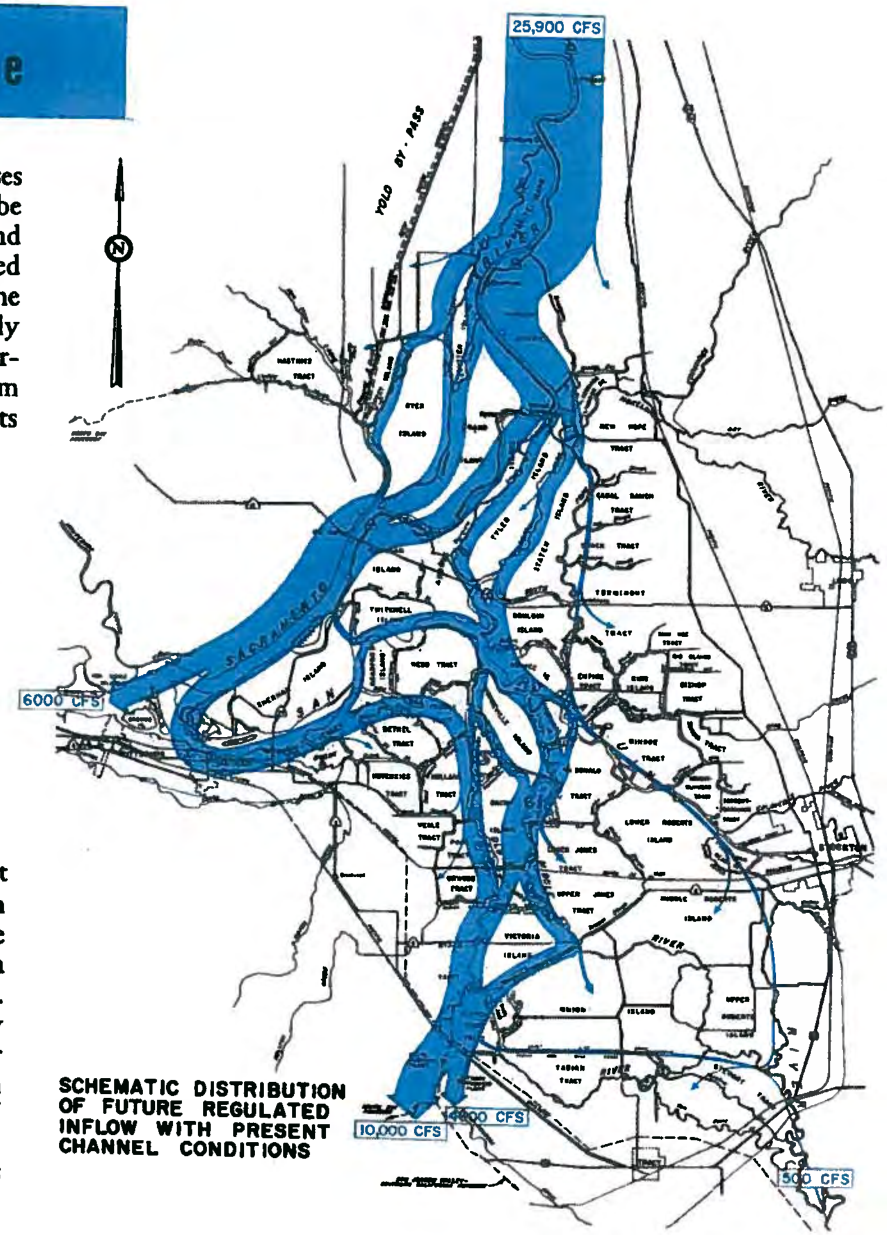
AGRICULTURAL WATER REQUIREMENTS

Delta Problems—water salvage

During winter months of most years, flood flows exceed Delta uses and flush ocean salts from the channel system. Surplus water can be diverted from the Delta under these conditions. During summer and early fall months, the inflow to the Delta is generally limited to regulated flow in the Sacramento River. This supply must meet all uses in the Delta and export therefrom, and prevent salinity incursion from unduly degrading the quality of water in the Delta. Due to the hydraulic characteristics of the complex channel system, the amount of outflow from the Delta necessary for quality control at the export pumping plants increases as the rates of export increase.

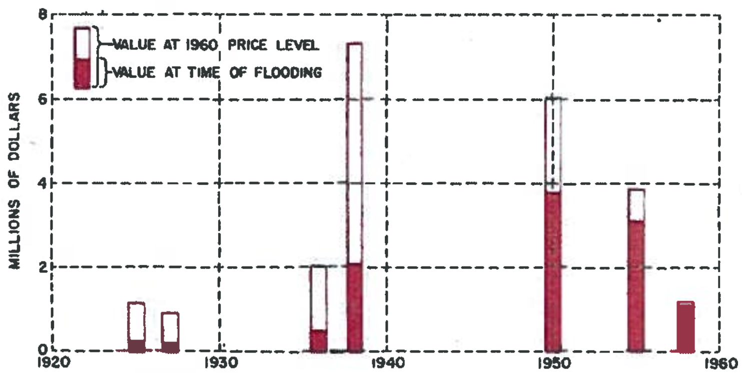


Water in the Sacramento River follows two basic routes to the export pumping plants. It flows from the vicinity of Walnut Grove through several generally parallel channels in a southerly direction across the central portion of the Delta, and also through channels in the western portion around Sherman Island and then upstream into the central area. The quantities transferred by the first route are *not sufficient* to supply the pumps and enroute Delta users during summer months, and water transferred around Sherman Island by the second route is mixed with and carries ocean salts into the Delta. Therefore, greater quantities of water will be necessary to reduce the salinity concentrations in the western Delta, unless a physical barrier is constructed or water is diverted directly southward across the Delta.

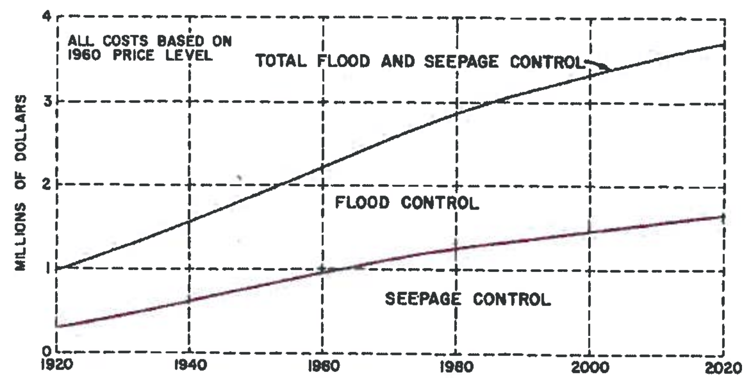


SCHEMATIC DISTRIBUTION OF FUTURE REGULATED INFLOW WITH PRESENT CHANNEL CONDITIONS

Delta Problems—flood and seepage control



HISTORICAL FLOOD DAMAGE IN THE DELTA

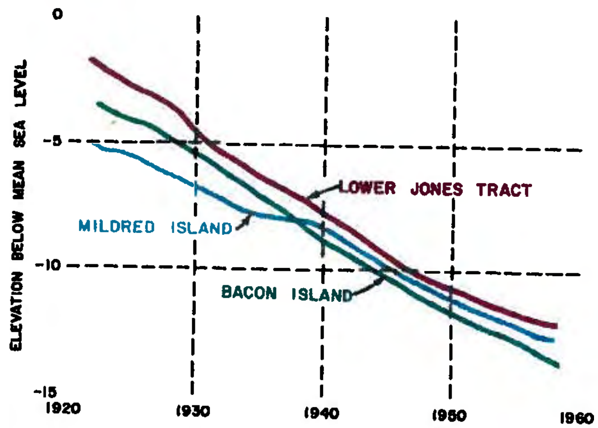


ANNUAL COSTS - FLOOD AND SEEPAGE CONTROL

While the peat soils of the Delta are excellent for growing crops, they cause several difficult levee maintenance and farming problems. Levees along the channels have been constructed on the peat and periodically must be raised and widened as the organic foundation soils are consolidated. During the early stages of land reclamation, islands were frequently flooded by overtopping of the levees. However, under present conditions floods due to overtopping are infrequent in the central portion of the Delta, but numerous islands have been flooded when sections of the levees have suddenly failed. This apparent trend toward decreasing levee stability results from subsidence of the land surface and resultant greater forces on the levees. Despite increasing maintenance work on many existing levees, no significant improvement in protection is achieved.

The land surface in areas of peat soils is subsiding at an average rate of about three inches per year. This is generally attributed to oxidation of the peat fibers, wind erosion, compaction by farm equipment, and loss of water in the upper few feet. As a result of land subsidence, future levees in many areas will be 30 to 35 feet high. Work must be initiated soon to gradually increase the stability of the levees for these future conditions. In this connection, it must be recognized that flood protection for the Delta must include works in the Delta. Flood stages in the Delta result from inflow and high tides, frequently amplified by heavy winds on the ocean and Bay system. Although upstream flood control reservoirs will afford some relief, more stable levees are needed to safely resist the high tide and flood stages.

As the peat soils are lost by oxidation and erosion, the seepage problems are compounded. Differences in elevation between water levels in the channels and in the islands will increase, and the resistance by the peat to upward movement of water from

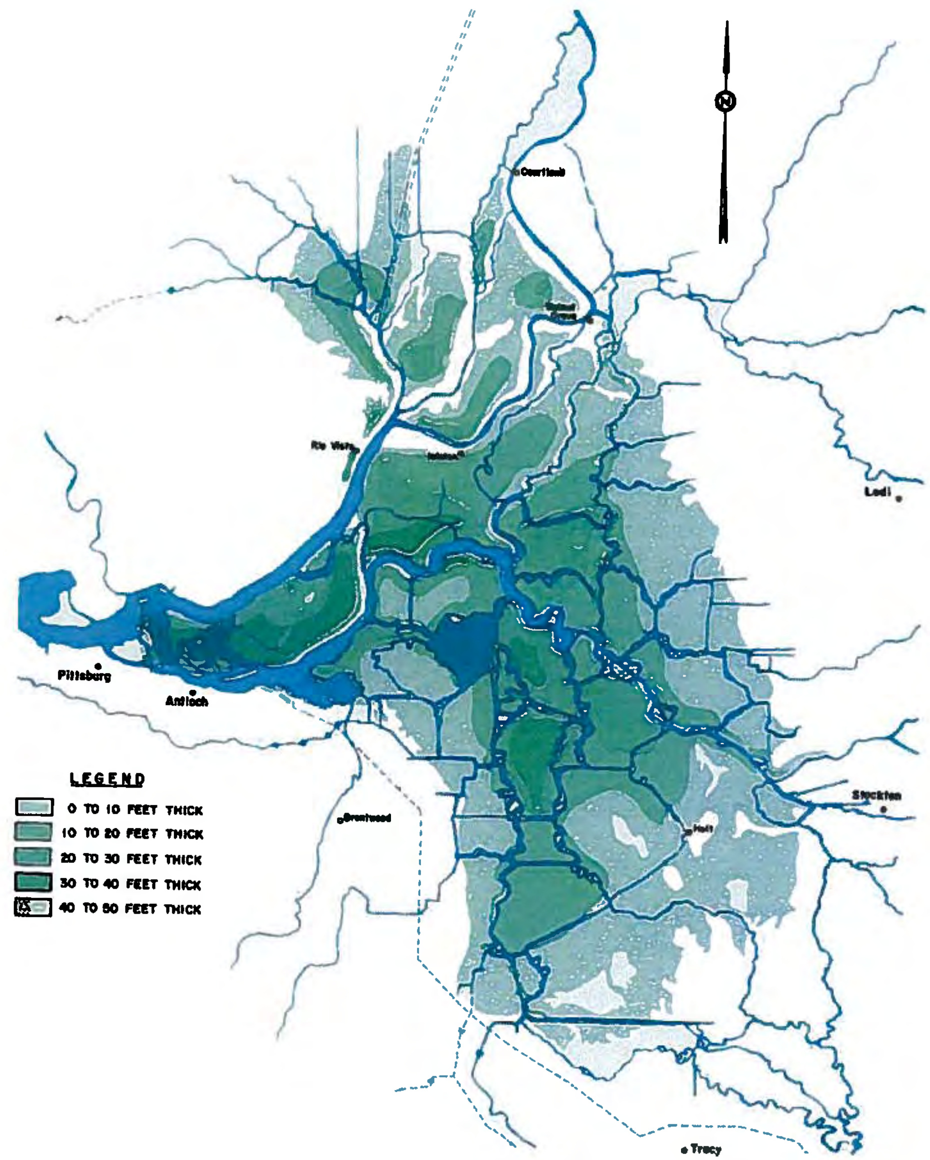


LAND SUBSIDENCE

underlying sand aquifers will be reduced. Unless suitable methods of arresting the loss of peat are developed, farming in the Delta will cause continued subsidence. Experience has shown that this subsidence will continue to within about two to three feet above the bottom of the peat. Significant tracts of Delta land will become impractical to farm unless seepage is controlled and the danger of inundation is reduced.

The largest natural gas field in areal extent in the State of California is located in the Delta. The geological structure of this field is strikingly similar to the structure of the oil fields of Wilmington, California, but the gas pressures are dissimilar. Because of the similarity of geologic conditions, studies are being conducted to determine if deep-seated subsidence might occur as the gas is extracted. Estimates based on preliminary data indicate a maximum subsidence of two feet in the Rio Vista area, if all the gas is extracted from the field.

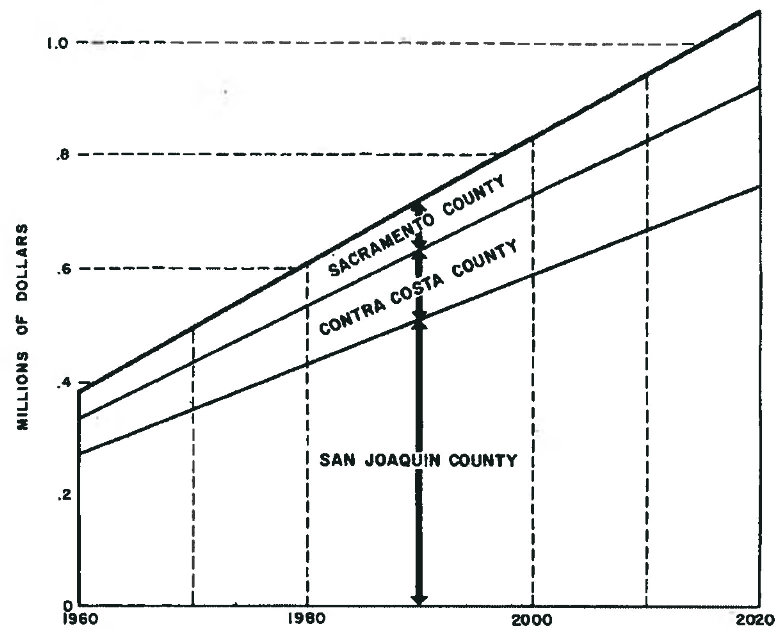
AREAS OF PEAT AND RELATED ORGANIC SEDIMENTS



Delta Problems—vehicular transportation

The wooden barges and stern paddle wheelers long ago disappeared from the Delta scene, to be replaced by fast trucks, ocean-going freighters, and tugs towing steel barges. However, despite tremendous technological advances in transportation, the Delta, with its poor foundation soils and miles of open waterways, has hindered the development of a satisfactory highway system.

Vehicular transportation, even today, is confined mainly to the crowns of the levees which encircle the farmlands, and inter-island traffic is dependent to a large extent on ferries. Periodic levee reconstruction to compensate for consolidation and land subsidence results in delays and detours for the traveling public and farm-to-market com-

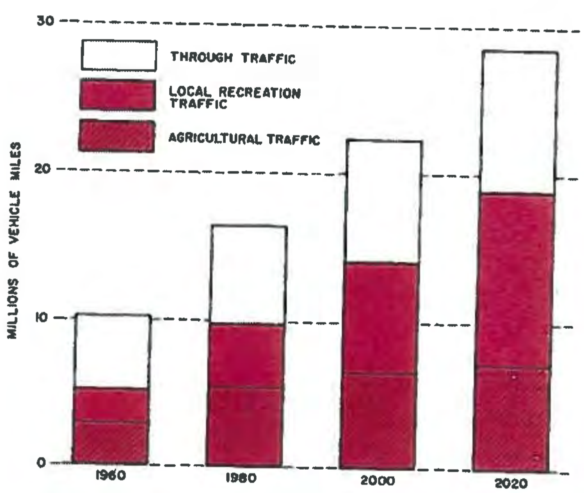


ANNUAL COST OF MAINTAINING
COUNTY ROADS WITHIN THE DELTA

merce. In winter months much of the area is inaccessible because of muddy roads. There are 950 miles of paved roads in the area, but because of the unstable peat foundation, the costs of maintenance and operation are disproportionately high. For example, in San Joaquin County only 12 percent of the county's 1,780 miles of roads is in the Delta, but almost 30 percent of the county's annual costs of $1,000,000 for highway facilities is expended in the Delta. Future costs will increase due to greater use of the road system.

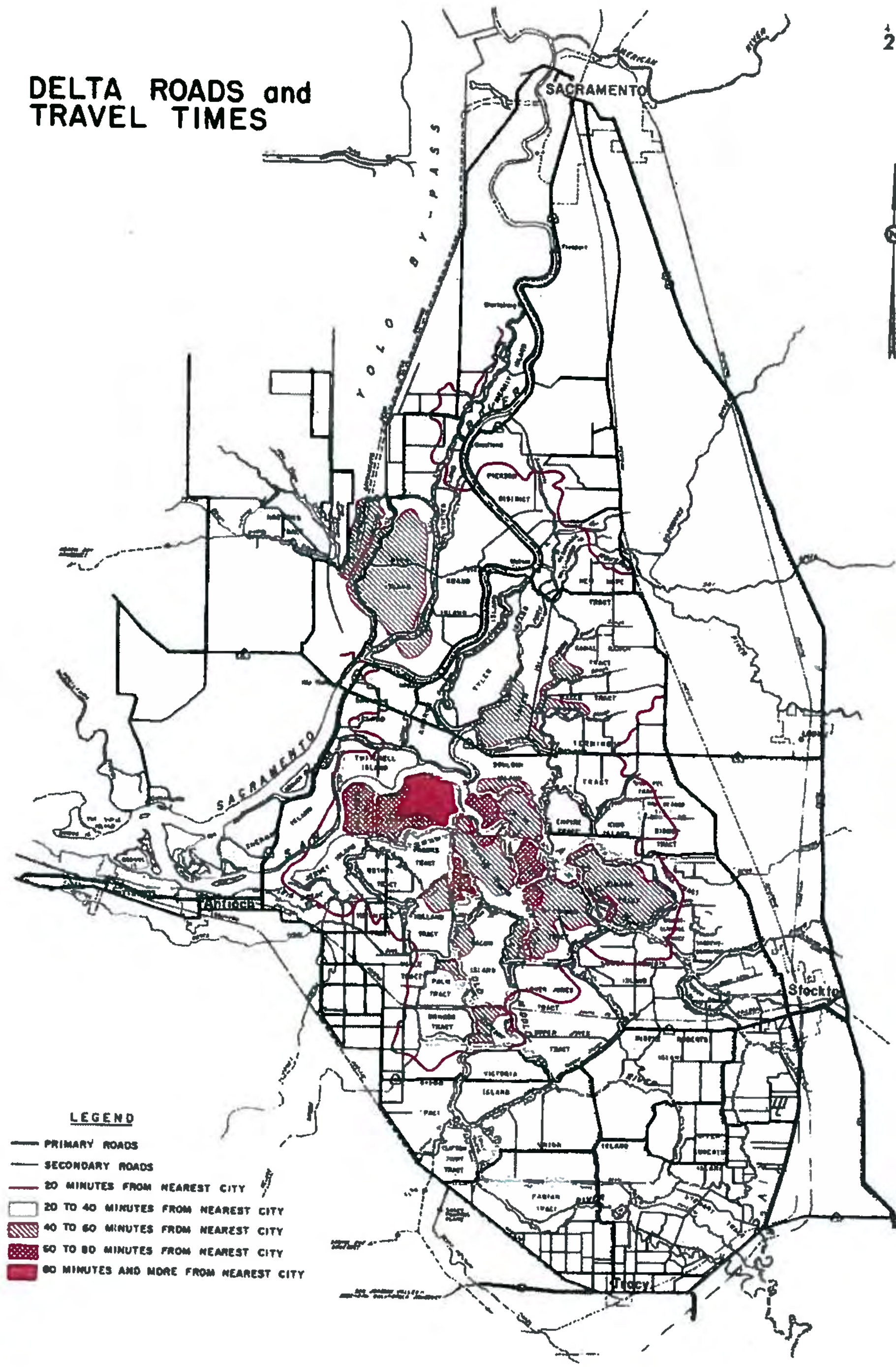
While it is true that today's Delta roads are greatly improved over those of the past, there still remains a serious lack of access to many remote locations of the Delta. Improvements are also needed in roads linked with the state and county highway networks. Travel times to principal cities of Stockton, Tracy, Sacramento, and Antioch are depicted on the map.

An expanded and improved system of roads would unquestionably make the Delta more attractive to the recreation industry. The new roadways also would benefit many local landowners who are presently at an economic disadvantage in shipment of their crops to markets. Increasing production in the Delta, due to anticipated double-cropping and improvements in farming practices, will increase the amount of agricultural road traffic.

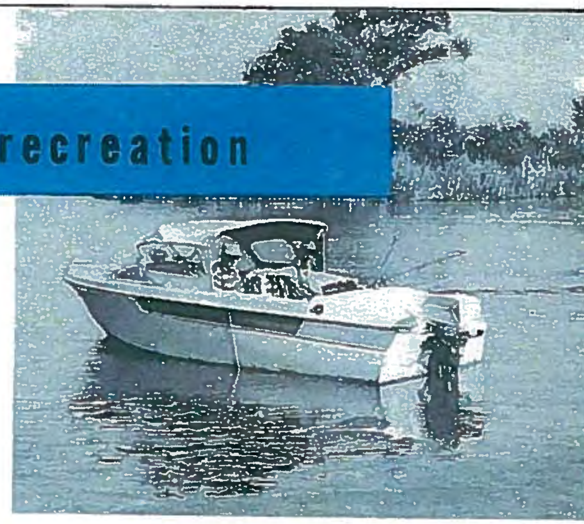


TRENDS IN TRAFFIC

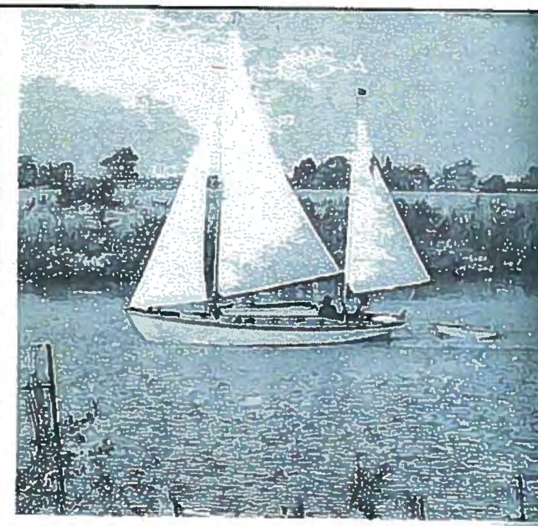
DELTA ROADS and TRAVEL TIMES



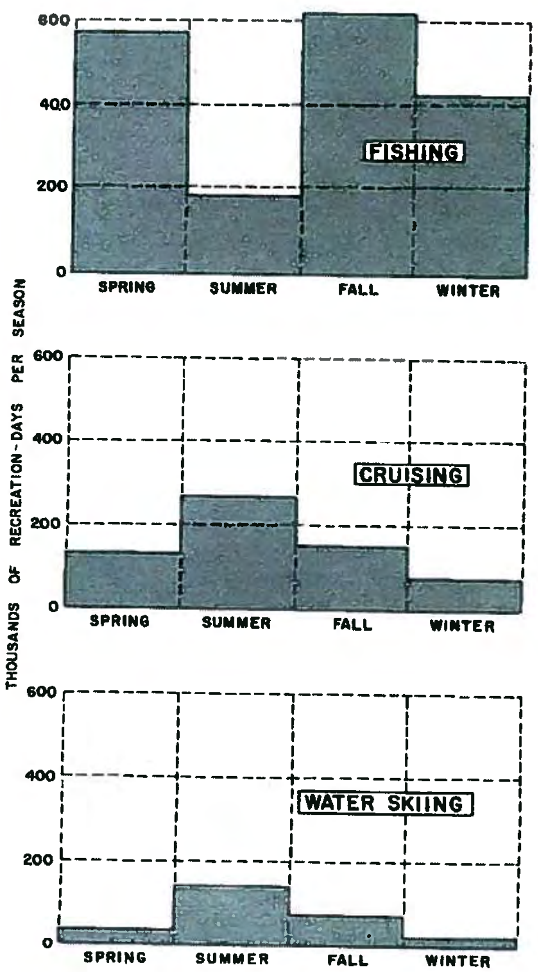
Delta Problems—recreation



Courtesy of Los Angeles Times



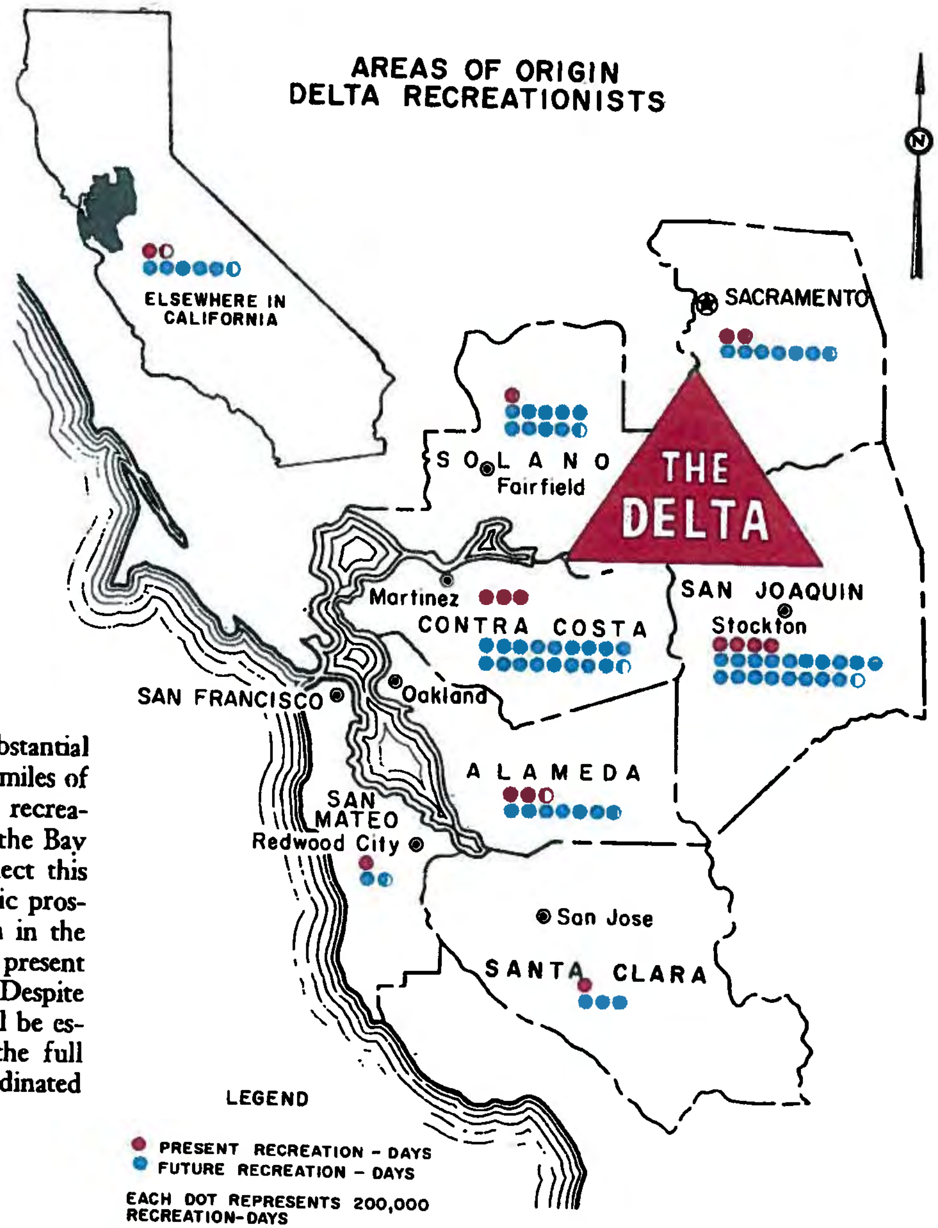
Courtesy of Los Angeles Times



RECREATION PATTERNS IN 1960

The 50,000 acres of water surface and almost 1,000 miles of shore line in the Delta offer a vast and fascinating area with a great diversity of recreational opportunities. Fishing is the favorite pursuit and striped bass is the leading catch. Salmon, shad, black bass, catfish, and sturgeon are also important in the sportsman's bag. The maze of Delta channels is appealing to boatmen for cruising, and the many miles of calm water are ideal for water skiing and high-speed boating. While many of the channels are not extensively used, due mainly to difficulty of access and lack of service facilities, other areas have become congested and competition is developing between fishermen, boatmen, and skiers. Safety of the recreationists is becoming a significant problem and local law enforcement agencies are increasing their patrols. Levee erosion problems due to speeding boats also have developed in some localities. Picnicking and swimming are becoming more attractive as facilities are developed, and duck and pheasant hunting is very popular. There are now 123 private and public resorts which cater primarily to fishermen and boatmen in the Delta. In addition, many of these resorts are also developing facilities for picnicking and camping.

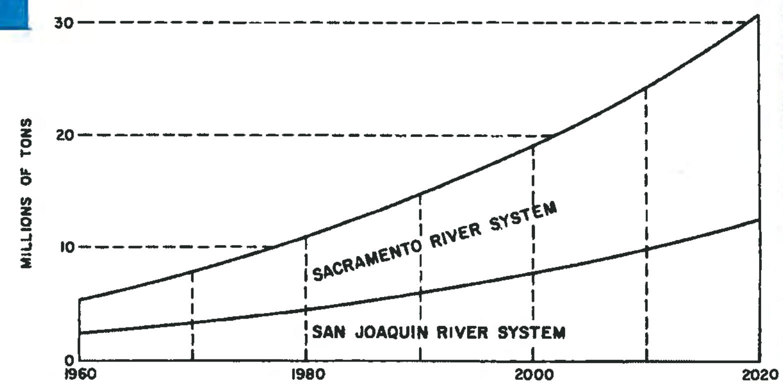
Courtesy of Hubert Miller



Although the Delta at the present time is a scene of substantial recreation use, there is ample room for expansion. Many miles of shore line and large areas of water are still available for recreational development. As the rapid population growth of the Bay area continues, recreation activity in the Delta will reflect this increase. Based on a future of continued general economic prosperity and population growth, the amount of recreation in the Delta will increase from 2,800,000 recreation-days at the present time to as many as 14,000,000 recreation-days by 2020. Despite the size of the Delta, proper local zoning and control will be essential for public safety and continued enjoyment. If the full recreation potential of the region is to be realized, coordinated planning by state and local agencies will be required.

Delta Problems—navigation

The Delta channels are extensively utilized by vessels ranging in size from rowboats to deep-draft commercial freighters and warships. The significance of navigation in the Delta has risen and fallen in the past, but in the last few decades it has been steadily increasing. The Corps of Engineers maintains many miles of channels in authorized navigation projects, the principal one in recent years being the Stockton Deep Water Channel. Construction is now underway on the Sacramento Deep Water Channel. Petroleum products carried by tugs and barges account for the majority of commercial shipping, but large amounts of farm produce are shipped by barges and deep-draft freighters.

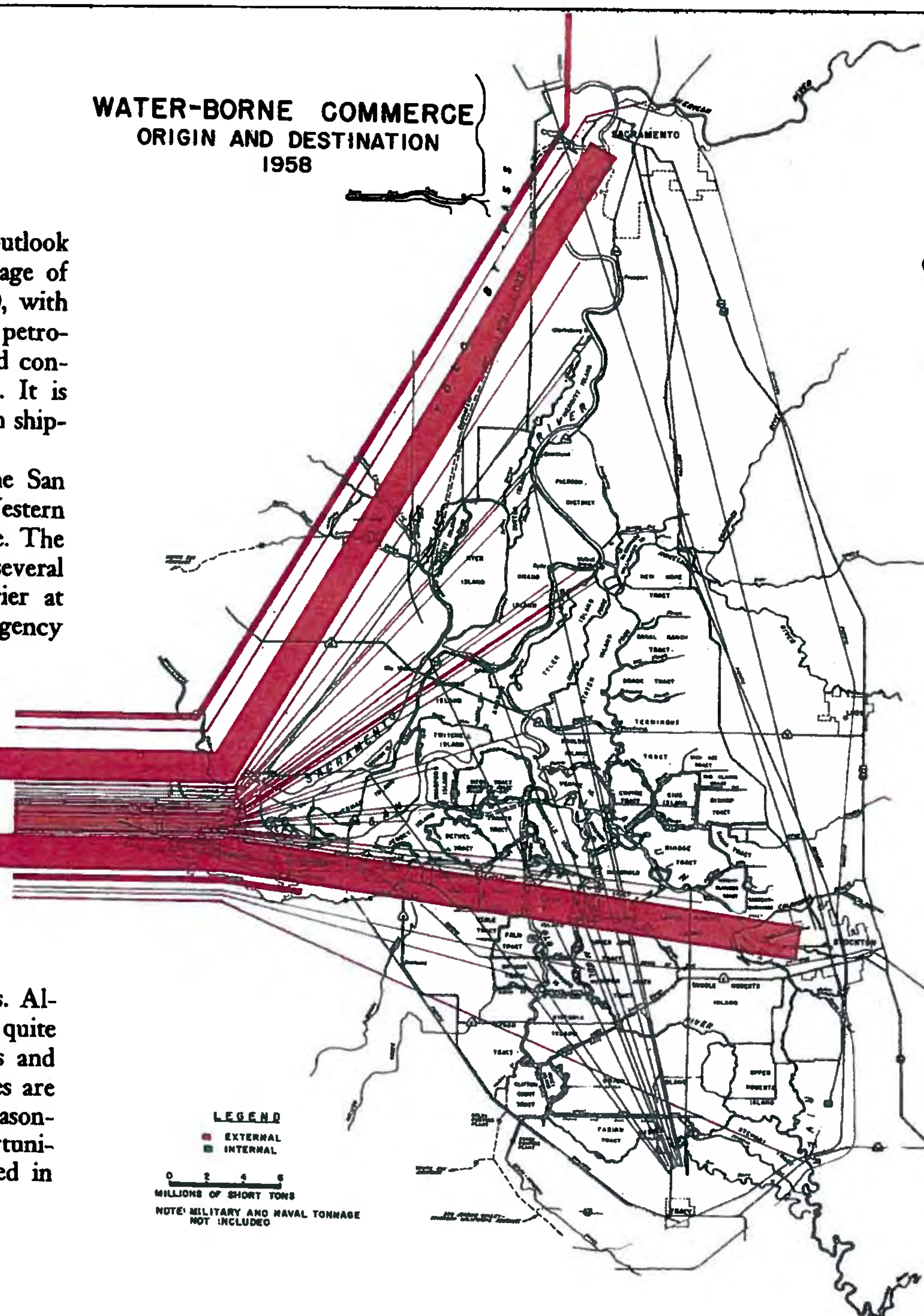


WATER-BORNE COMMERCE

Courtesy of Robert Yelland

Projections of future commerce indicate an optimistic outlook for shipping in the Delta. It is anticipated that the tonnage of commercial shipping will increase about fivefold by 2020, with petroleum being the principal commodity. Projections of petroleum shipments were related to population projections and continuation of the trend toward more vehicles per capita. It is anticipated that the present relationship between petroleum shipments by water and by other means will continue.

In 1955 in conjunction with studies of barriers in the San Francisco Bay system, an opinion was requested of the Western Area Joint Panel on effects of barriers on national defense. The panel, which was composed of representatives of the several branches of the military service, concluded that a barrier at Chipps Island would be permissible, if it contained an emergency access for navigation.



The Delta channels are widely used for recreation boats. Although some areas are relatively unused, other areas become quite congested. Conflicting interests arise between water skiers and cruising parties and the fishermen. In some locations levees are subjected to severe erosion by boat-generated waves. All reasonable measures must be undertaken to preserve boating opportunities, and facilities to enhance recreation can be constructed in certain locations.

Planning and Design Concepts

Planning for solutions to the complex Delta problems necessitates full recognition of the interrelated effects on all phases of the Delta's economy. The best solution should reflect the greatest overall benefits and least detriments, realizing that both objectives cannot be completely achieved when basic interests differ. Economies of construction and operation generally may be effected by multi-use of facilities. Therefore, consideration must be given to multipurpose development.

DELTA WATER SUPPLY

Water users in the Delta enjoy a naturally convenient source of supply in the numerous channels from which water is diverted by siphon or low-lift pumps. The supply problem in portions of the Delta stems from the poor quality of water, due to salinity incursion from the Bay and degradation by agricultural and industrial wastes. Adequate water supplies could be provided either by regulated releases of stored fresh water to repel salinity incursion and flush other wastes, or by constructing a physical barrier against salinity incursion and conveying unusable wastes beyond the barrier. A third alternative would involve a reduction of present salinity control in the western Delta channels and provision of substitute fresh water supplies to users who could not then divert from the channels containing brackish water. All three alternatives were evaluated, with particular attention to minimizing modifications to existing water supply systems.

The California Water Code specifies that one of the functions of the State Water Resources Development System is to provide salinity control and an adequate water supply in the Delta. If it is in the public interest to provide substitute supplies in lieu of salinity control, no added financial burden shall be placed on the local water users as a result of such substitution. The code also declares that water to which the Delta is entitled shall not be diverted. It is clearly established that supplying water for the Delta must be a primary and integral function of the State Water Facilities.

WATER SALVAGE

Unless physical works are constructed in the Delta, increasingly greater quantities of outflow will be required for quality control as more and more water is transferred across the Delta. However, most of the required outflow could be salvaged by constructing a physical barrier against salinity incursion, or by transferring the water more directly across the Delta to prevent commingling with brackish water near the outlet of the Delta.

The quality of water available for export, as well as for use in the Delta, must be suitable for various purposes. Standards for mineral quality, adopted by the Department of Water Resources and incorporated in water service contracts, permit not more than 400 parts of total dissolved solids and 100 parts of chlorides per million parts of water.

FLOOD AND SEEPAGE CONTROL

Flood stages in the Delta result from a combination of high tides, amplified by heavy winds on the ocean and Bay system, and inflow to the Delta. Historic inundations have generally resulted from levee failures, rather than overtopping. As the land behind the levees continues to subside, the stability of the levees decreases.

Physical and economic factors dictate an extended construction period for improvement of levees on organic soils. To reduce the extent and cost of levee improvements, it is prudent to limit flood waters to principal improved flood channels. Additional flood control reservoirs on rivers entering the Delta are contemplated for construction in the near future. Therefore, it is economical to design Delta flood channels for rates of flow anticipated after construction of upstream storage. Design of improved flood channels was predicated on additional regulation of the Cosumnes, Mokelumne, Calaveras, Stanislaus, and Tuolumne Rivers. Although the "design" floods reaching the Delta after completion of these works may generally be expected to occur on an average of once every fifty years, the degree of frequency is not particularly meaningful in the tidal channels of the Delta, since protection is largely dependent on levee stability. It should be recognized that complete flood protection generally cannot be assured by construction of control works. Continued emphasis should be placed on flood plain zoning in the Delta for low value improvement uses as generally associated with farming.

Construction of principal flood channels and creation of interior channels would afford an opportunity to regulate water stages in the interior channels. Since the rate of seepage inflow to the islands is directly related to the level of water in the surrounding channels, seepage could be reduced by lowering the water levels.

However, project operation might cause increased seepage problems in certain locations. Where these problems are evidenced by future operation, remedial measures would be necessary. Allowances for cost of such works were included in planning for areas of anticipated damage.

VEHICULAR TRANSPORTATION

Improvements in the road network of the Delta to enhance recreational opportunities and reduce costs of farm-to-market travel, could conveniently and economically be incorporated in master levee construction for flood and seepage control. Construction of the master levees would involve a wide berm on the landward side of existing levees in most locations. This berm would provide a suitable base for a road. Parking areas off the roadway could also be constructed at many locations. Channel closures in the master levee system would eliminate the need for ferries in certain locations.

Where existing roads would be rendered unusable by construction and operation of the Delta water facilities, equivalent service would be provided. Road improvements which would enhance the existing system, such as better road surfacing or extensions to connect with nearby routes, could be incorporated, if local agencies desire these improvements and participate in the costs.

RECREATION

The Delta is extensively used for recreation at this time, yet its potential use is several times greater. Planning for any facilities in the Delta should seek to minimize adverse effects on recreation, consistent with sound economics, and to enhance the attractiveness and advantages of the Delta for further recreational development. It is recognized that flood and seepage control measures, or other works which restrict free movement of boats, tend to limit recreation activity. While such effects could be reduced by providing small craft locks and portage facilities, some inconvenience would remain. Where such conflicts occur, local choice will be necessary between flood and seepage control works or open channels for recreation. Additional recreation facilities and joint use of certain lands for recreation and other purposes should be planned to enhance the potential recreational development. Local desires, as evidenced by questionnaires and discussions with county recreation agencies, guided planning for recreation facilities.

NAVIGATION

Principal ship channels in the Delta serve deep-draft commercial and military shipping. Shallow-draft tug and barge traffic utilizes the ship channels and many other channels in the Delta. The effects of alternative plans on commercial navigation can be readily evaluated, and the nature and extent of compensating measures or benefits can be determined. Unfortunately, it is not possible to evaluate in comparable terms the effects of war-damaged facilities on national defense. However, comparisons of alternative plans must include recognition of national defense aspects.

FISH

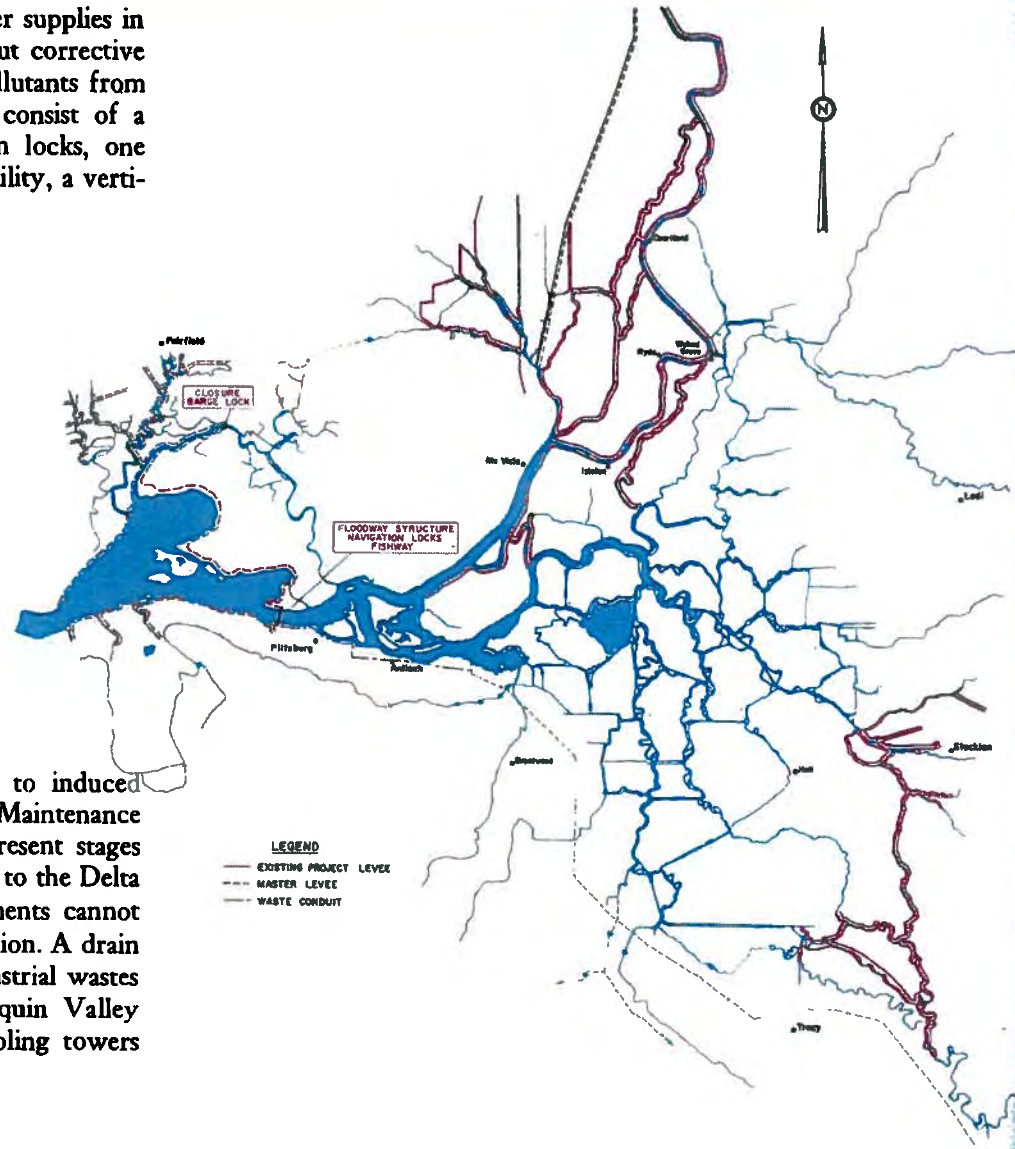
The Delta is a dominant factor in the habitat of several anadromous species of fish and the residence of several additional sport fish. All reasonable measures must be taken to minimize the adverse effects of planned facilities on the fisheries in the Delta and, when possible, to provide for their enhancement.

Courtesy of Los Angeles Times

Chipps Island Barrier Project—physical works

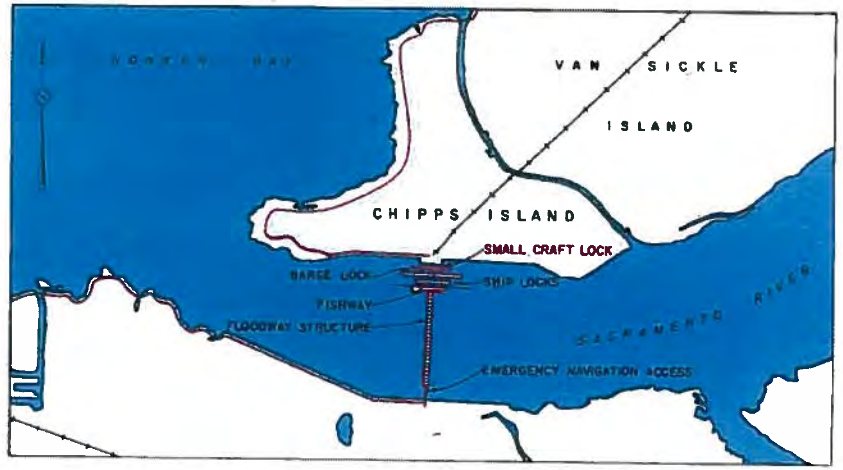
A barrier at Chipps Island would insure the water supplies in the Delta against salinity incursion from the Bay, but corrective features would be necessary to dispose of other pollutants from sources upstream. The principal structure would consist of a gated floodway section, two deep-draft navigation locks, one barge lock, one small craft lock, a tug assistance facility, a vertical baffle fishway, emergency navigation access, and appurtenant operating facilities. The floodway section would have a net area of openings equivalent to the existing channel in order to preclude interference with flood flows. The conventional navigation locks would allow a limited amount of denser saline water to enter the upstream pool, but this water would be removed from a sump by a salt-scavenging system of pipes and pumps. A barge lock would be located on Montezuma Slough near the new Grizzly Island bridge, about ten miles north of Chipps Island.

A barrier at the Chipps Island site would require a master levee system along principal channels in Suisun Bay to contain the high tidal stages, which would be higher than the present high stages. Additional dredging of navigation channels also would be necessary, due to induced lower low tidal stages downstream from the barrier. Maintenance of water levels in Delta channels at lower than present stages during summer months would require improvements to the Delta levees, but the nature and extent of the improvements cannot be accurately evaluated without the project in operation. A drain would be constructed to convey municipal and industrial wastes and agricultural drainage water from the San Joaquin Valley into tidal water downstream from the barrier. Cooling towers

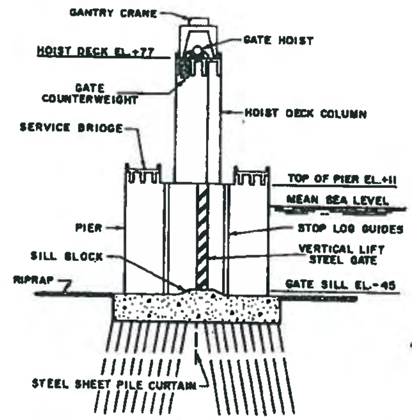


would be required for the two principal power plants which would discharge warm water into the barrier pool.

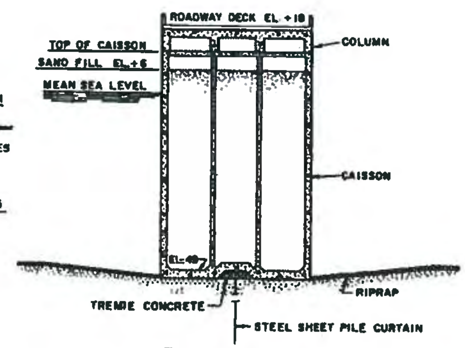
The type and design of the facilities described in this report incorporate results of preliminary designs and quantity estimates of the Corps of Engineers in current work on barriers in the San Francisco Bay system. Estimates of the capital cost of the facilities were based on construction costs prevailing in 1960, plus 15 percent for contingencies and 15 percent for engineering and overhead. The anticipated schedule of construction of the facilities is indicated in the tabulation of estimated capital costs.



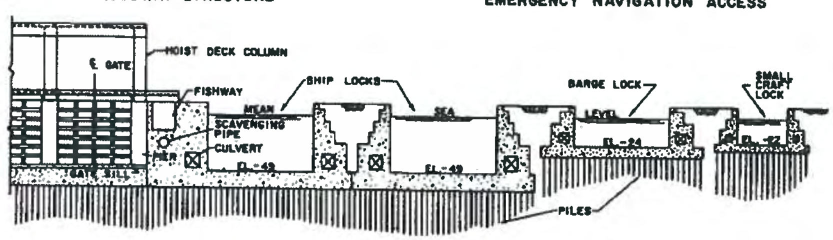
CHIPPS ISLAND BARRIER SITE



TYPICAL SECTION
FLOODWAY STRUCTURE



TYPICAL SECTION
EMERGENCY NAVIGATION ACCESS



TYPICAL SECTION OF FISHWAY AND LOCKS

SUMMARY OF ESTIMATED CAPITAL COSTS
CHIPPS ISLAND BARRIER PROJECT

Feature and date of construction	Capital cost
On Site Features	
Floodway structure (1964-70)	$44,119,000
Locks (1964-70)	74,278,000
Salt-scavenging system (1968-70)	3,768,000
Emergency navigation access (1964-66)	6,092,000
South abutment and access facilities (1964-65)	723,000
Fishway (1969)	79,000
Buildings and miscellaneous (1966)	2,062,000
Montezuma Slough closure and barge lock (1968-70)	3,492,000
Subtotal, On Site Features	$134,613,000
Off Site Features	
Waste disposal facilities (1967-70)	$26,914,000
Extension San Joaquin Valley drain (1967-70)	17,356,000
Suisun Bay levee system (1964-73)	21,608,000
Shoreline facilities and dredging (1968-70)	1,481,000
Subtotal, Off Site Features	$67,359,000
TOTAL CAPITAL COST, CHIPPS ISLAND BARRIER PROJECT	$201,972,000

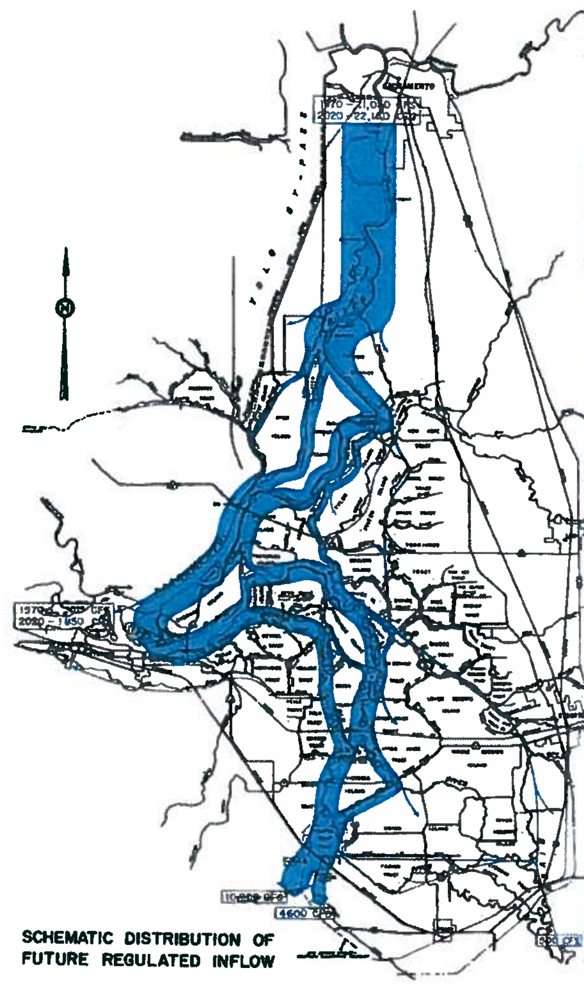
Chipps Island Barrier Project — operation

A barrier at Chipps Island would provide a definite separation between saline water in the Bay system and fresh water in the Delta channels, thereby preventing salinity incursion and assuring adequate water supplies in the Delta. However, there would be attendant operating problems, and the barrier and appurtenances would not provide flood control and related benefits to the Delta.

With the floodway gates closed, the inflow to the Delta to supply local uses and export pumping plants would be distributed in the channels as shown in the schematic diagram. Large quantities of water would be directed through channels in the western Delta to remove heat wastes and maintain satisfactory water quality conditions. Storage in the channels could be utilized to achieve a limited amount of regulation. However, navigation requirements would prevent controlling the water level lower than one foot below mean sea level, without additional dredging. Seepage and levee stability problems would limit the maximum level for sustained storage to about two feet above mean sea level. Economic analyses of various operating ranges indicate that a three-foot range in water levels for conservation of flood water would be most economical.

Electric analog model studies reveal that the barrier would increase the tidal amplitudes downstream from the structure. An unusually large amplitude of 6.3 feet at Chipps Island under present conditions would be increased to about 12 feet by a barrier. Changes indicated on the electric analog model were generally confirmed by preliminary tests by the U. S. Corps of Engineers on a hydraulic model which indicated slightly smaller increases in tidal amplitudes and a slight decrease in the mean tide level. The lower low water would seriously affect navigation depths, and the higher high water would seriously affect levees along the downstream bays and municipal, industrial, and military installations along the shore lines. Remedial measures would be necessary.

Disposal of cooling water from power plants and other industries would cause an increase in temperature in the nearly quiescent barrier pool. This increase in temperature would reduce the efficiency of cooling equipment and adversely affect fish, and could cause significantly increased corrosion in equipment exposed to the warmer water. The monetary magnitude of these effects would be dependent upon the amount of heat energy dissipated in the pool by existing and future industries, and many other factors which cannot be fully evaluated at this time. Satisfactory conditions could probably be achieved by passing cool-



SCHEMATIC DISTRIBUTION OF FUTURE REGULATED INFLOW

ing water from the principal power plants over cooling towers.

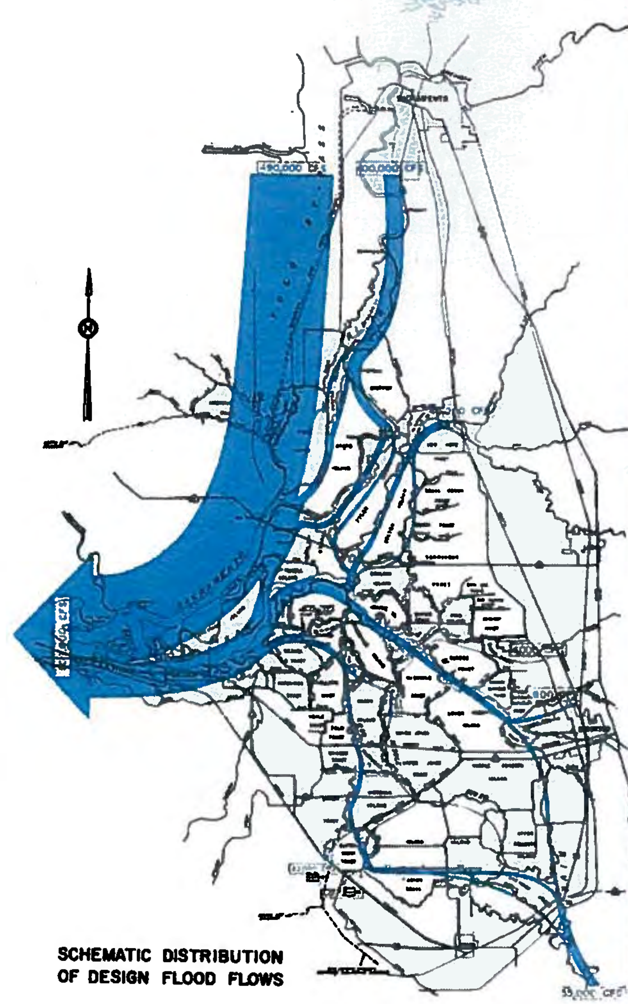
To maintain satisfactory water quality conditions in the barrier pool, it would be necessary to convey industrial and municipal wastes to tidal water. Drainage water from the San Joaquin Valley would also have to be discharged into tidal water.

Saline water entering the pool through the locks would be allowed to settle in a sump from which it would be pumped by a salt-scavenging system. Operation of locks would cause delays of about 35 minutes per transit for deep-draft vessels and 20 minutes for tugs and smaller vessels. Assistance would have to be provided to maneuver deep-draft ships through the locks. A tug and operating crew for this purpose would be necessary at all times.

National defense aspects dictate that an emergency navigation access be incorporated in the barrier. This access would consist of concrete bins filled with sand in a section of the barrier. In an emergency, the sand would be pumped out and the bins towed out of the channel.

Anadromous fish would be passed through a vertical baffle fishway, comprising a series of baffles with vertical slots extending to the bottom to provide passages for water and fish. The baffles would dissipate the energy of the water and create a series of bays with a slightly lower water level in each adjacent downstream bay. The bays would provide resting areas for the fish after passing through short distances of high velocity water in the slots. During high tides downstream from the barrier, the fishway would be closed by a gate to prevent saline water from entering the pool.

During flood conditions the gates in the barrier floodway would be opened. Flood stages in the Delta would be essentially the same as under present conditions for comparable flood flows. Since master levees in the Delta are not incorporated in this plan, high flood water would occur in all the channels. Although the flood stages would not be changed, levee stability problems would increase. Tidal fluctuations presently keep the levees saturated a few feet above the mean tide elevation, but under barrier conditions the peat levees would dry out and crack when water levels would be drawn down to about one foot below sea level. Should a sudden flood occur the open barrier gates would permit tidal fluctuations throughout the Delta and sections of some dried-out levees might become unstable and fail as the water levels rapidly rise and fall. Remedial work would be required as problems develop. Allowances for cost of this as yet undefined work are not included in the cost estimate.



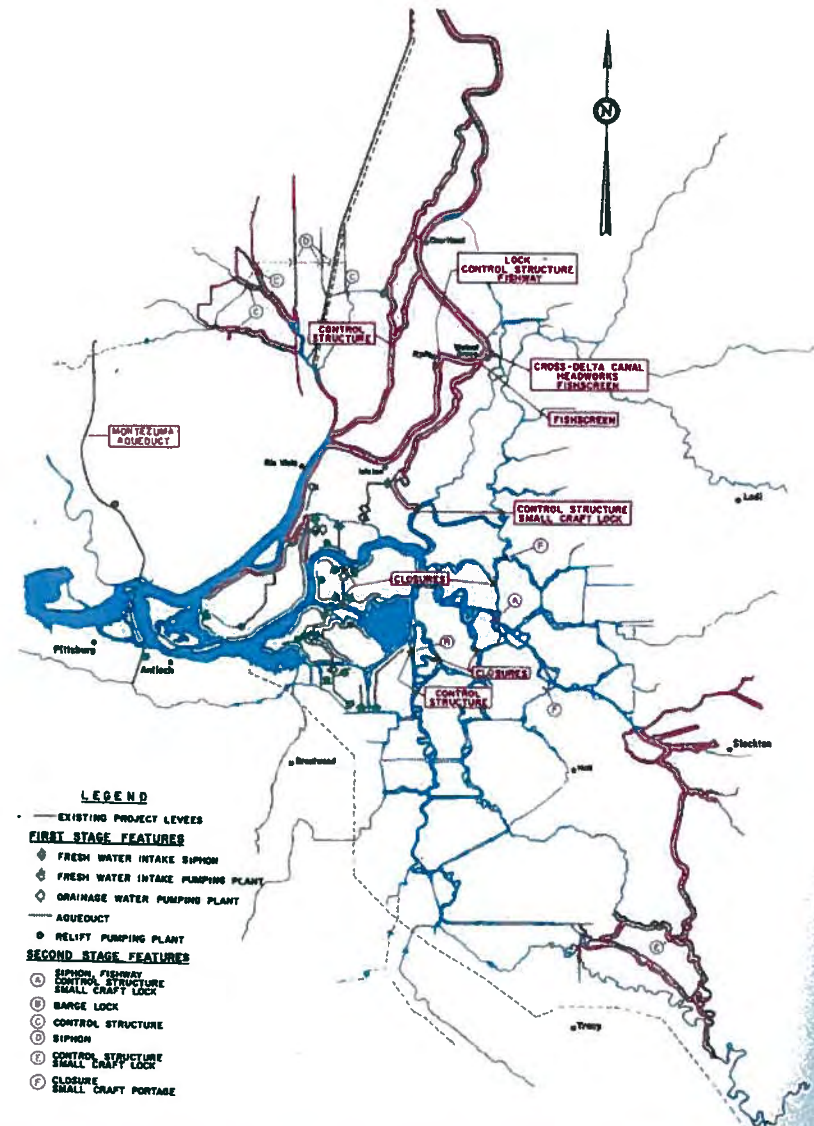
SCHEMATIC DISTRIBUTION OF DESIGN FLOOD FLOWS

Single Purpose Delta Water Project—physical works

This system of works would accomplish essentially the same results as a barrier at Chipps Island, that is, adequate water supplies for the Delta and for export therefrom, but would not necessitate costly remedial works. Good quality water supplies for the Delta and export pumps would be separated from saline water by control structures operated with a relatively small rate of fresh water outflow. Water would be supplied in the western Delta area through new supply facilities, and in the rest of the Delta existing irrigation and drainage works would continue in operation. There are no flood control features in this plan.

Control structures with gated openings for discharging flood flows would be located on channels of the Sacramento, Mokelumne, and San Joaquin Rivers. A barge lock and fishway would be incorporated in the Sacramento River control structure. Earth fill channel closures would be constructed at four locations. In 1980-82, additional gates would be constructed at the existing headworks of the Delta Cross Channel of the Central Valley Project. Small craft locks and portage facilities would be incorporated in certain control structures and channel closures. Vertical louver fish screens would be constructed at the head of Georgiana Slough and at the Delta Cross Channel near Walnut Grove, and rotary drum fish screens would be constructed at other diversions.

Water supply facilities would serve areas in the western Delta. The Montezuma Aqueduct would be constructed in about 1968-71 and in subsequent stages to serve water to potential industrial land and some agriculture in central southern Solano County, and to supplement supplies in Contra Costa County. Works would also be included to remedy detrimental effects of project operation, such as seepage alleviation along the Sacramento River channels and modifications to existing irrigation and drainage works made necessary by the project.



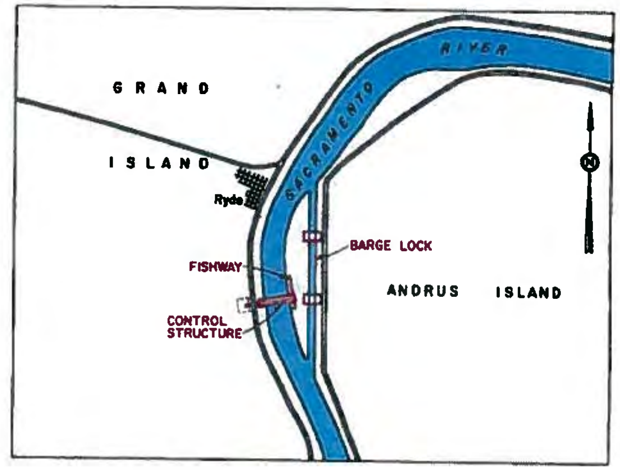
About 1,900 acres of land in the Delta, mostly small unreclaimed islands, would be used for disposal of excess dredged material. Many of these areas would be available and desirable for development as recreation areas.

Additional water could be salvaged by completely separating good quality cross-Delta flows from tidal water, and thereby reducing the amount of fresh water outflow needed for salinity repulsion. These second stage features would include a siphon under the San Joaquin River, additional channel closures, control structures and appurtenances, and water supply facilities. These works may be indefinitely deferred, depending on their need.

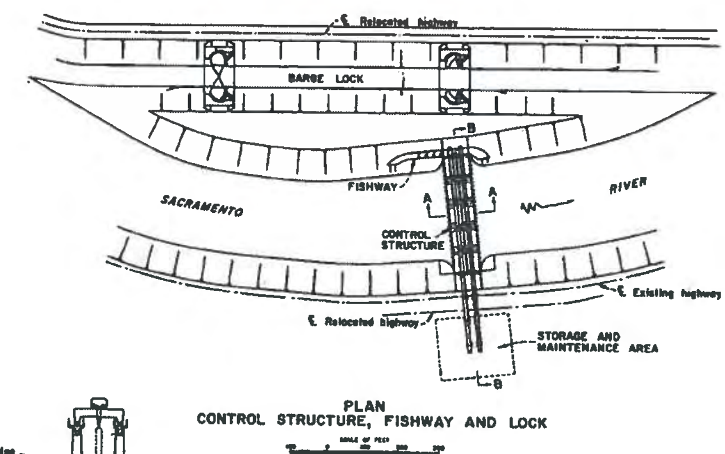
Estimates of the capital costs reflect 1960 construction costs, plus 15 percent for contingencies and 15 percent for engineering and overhead. The anticipated construction schedule is indicated in the following tabulation:

SUMMARY OF ESTIMATED CAPITAL COSTS
SINGLE PURPOSE DELTA WATER PROJECT

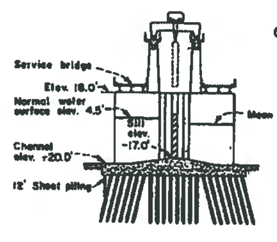
Feature and date of construction	Capital cost
Steamboat Slough control structure (1968-70)	$2,943,000
Miner Slough closure (1970)	108,000
Ryde control structure, barge lock, and fishway (1968-71)	5,653,000
Holland Cut control structure (1973-75)	2,761,000
Mokelumne River control structure and small craft lock (1973-75)	1,951,000
Cross-Delta Canal headworks (1980-82)	1,223,000
Fish screens: Cross-Delta Canal and Georgiana Slough (1968-70)	3,500,000
Closures: Potato Slough, Old River, and Middle River (1974-76)	404,000
Fishermans Cut closures (2) (1964)	133,000
Agricultural water facilities (1963-65)	4,300,000
Municipal and industrial water facilities (1968-71, 1980, 1995, 2010)	13,952,000
Channel dredging (1974-78)	7,154,000
Bank protection (1976-78)	1,880,000
Seepage alleviation facilities (1971)	593,000
TOTAL CAPITAL COST, FIRST STAGE FEATURES	$46,555,000
TOTAL CAPITAL COST, SECOND STAGE FEATURES	$23,765,000



RYDE STRUCTURE SITE



PLAN
CONTROL STRUCTURE, FISHWAY AND LOCK



SECTION A-A
CONTROL STRUCTURE

SECTION B-B
CONTROL STRUCTURE AND FISHWAY

Single Purpose Delta Water Project—operation

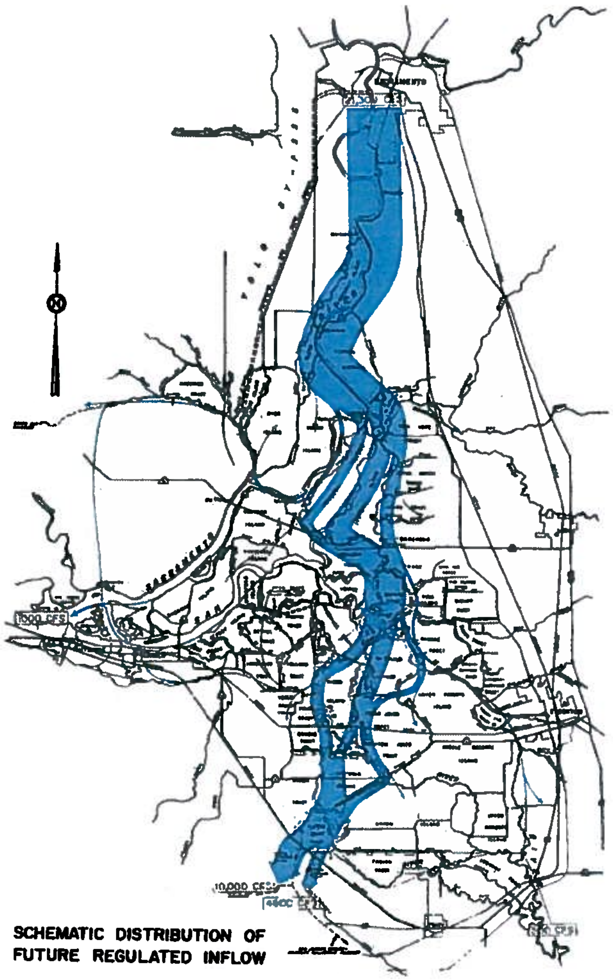
A Single Purpose Delta Water Project would salvage water otherwise wasted to Suisun Bay for salinity control, and would provide water supplies for the Delta and for export and use in areas of deficiency. The project would allow salinity to encroach somewhat farther into the Delta than under present operations; however, the area affected by this controlled incursion would be supplied water by new facilities. Certain aspects of operation described in the following paragraphs would also apply to other variations of the Delta Water Project.

Control structures on the Sacramento River system would divert water southward toward the center of the Delta. Control structures and closures on channels east of Franks Tract would cause the water to flow toward the export pumping plants in channels in the center of the Delta. With this type of operation, it would be necessary to prevent brackish saline water from mixing with fresh water in the center of the Delta. This control could be accomplished by providing fresh water outflow in the Sacramento and San Joaquin Rivers.

The salinity control line, with control to a mean concentration of 1,000 parts of chlorides per million parts of water (1,000 ppm), would be maintained in the San Joaquin River near the mouth of False River, about 7 miles upstream from Antioch and in the Sacramento River at Decker Island, about 1½ miles below Threemile Slough. Salinity control at these locations could be accomplished by maintaining an outflow from the Delta of 1,000 second-feet, of which about 60 percent would be released through the San Joaquin River and the remainder through the Sacramento River.

Good quality water from the cross-Delta flows would be available in existing channels throughout 90 percent of the Delta lowlands. Water would be provided to all agricultural lands downstream of the line of *maximum* salinity encroachment of 500 ppm of chlorides. The mean concentration of chlorides would be about 250 ppm at locations on this line. Research studies by the University of California indicate that seepage of any brackish water from the channels into the Delta islands can be controlled below the plant root zone by application of good quality water on the surface. The supplies diverted from the cross-Delta flows would normally contain between 20 and 80 ppm of chlorides.

Water would also be provided to municipalities and for certain industrial uses in the western Delta area. Most of the required industrial cooling water could be supplied from the adjacent channels. The Contra



SCHEMATIC DISTRIBUTION OF FUTURE REGULATED INFLOW

Costa Canal could serve the projected industrial requirements in its service area until about 1970, and significant industrial development in southeastern Solano County is not anticipated before 1980. The Montezuma Aqueduct would be constructed to convey supplemental water from the proposed North Bay Aqueduct and would be linked to the Contra Costa Canal near Pittsburg in 1980. The capacity of the Contra Costa Canal would then be utilized primarily between the Delta and the connection with the Montezuma Aqueduct. The estimated quality of the water would be very good, with a chloride content generally ranging between 15 and 80 ppm, total dissolved solids ranging between 125 and 300 ppm, and with total hardness of between 40 and 160 ppm.

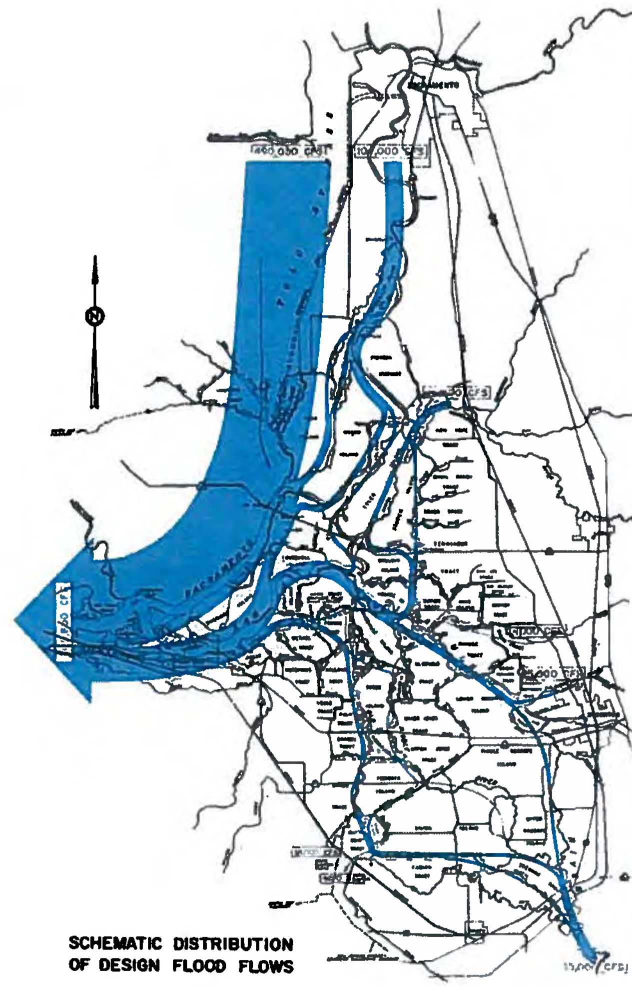
Existing irrigation water supply facilities throughout most of the Delta would not be affected by operation of the export pumps, but the average water level in the southern portion of the Delta would be lowered slightly. Irrigation facilities affected thereby would be modified under the project.

Small increases in tidal amplitudes of about 1.5 feet would occur at the Sacramento River and Steamboat Slough control structure sites, but the mean water level would not significantly change. The effects would be very minor at Rio Vista.

The average water level upstream from the control structures would be gradually raised to a maximum of about 2.5 feet under full project operation in about 30 years. The increase would occur during summer months, and any resultant increased seepage from the channels would be fully consumed by crops on adjoining lands without damage.

During flood periods, the control structures would be opened and flood stages throughout the Delta would be similar to those under present conditions. Flood stages on the Sacramento River would be slightly higher for longer periods due to closing of Miner Slough. This effect would tend to increase seepage conditions during a critical crop planting time, and might necessitate installation of seepage alleviation works. Such works would also alleviate existing seepage problems.

The future value of water and quality considerations might justify construction of the second stage features to permit further reduction in the fresh water outflow from the Delta. The outflow could be reduced to the amount of unavoidable losses, or about 750 second-feet. The value of the additionally salvaged water would probably not justify construction of these works before 1990.



SCHEMATIC DISTRIBUTION
OF DESIGN FLOOD FLOWS

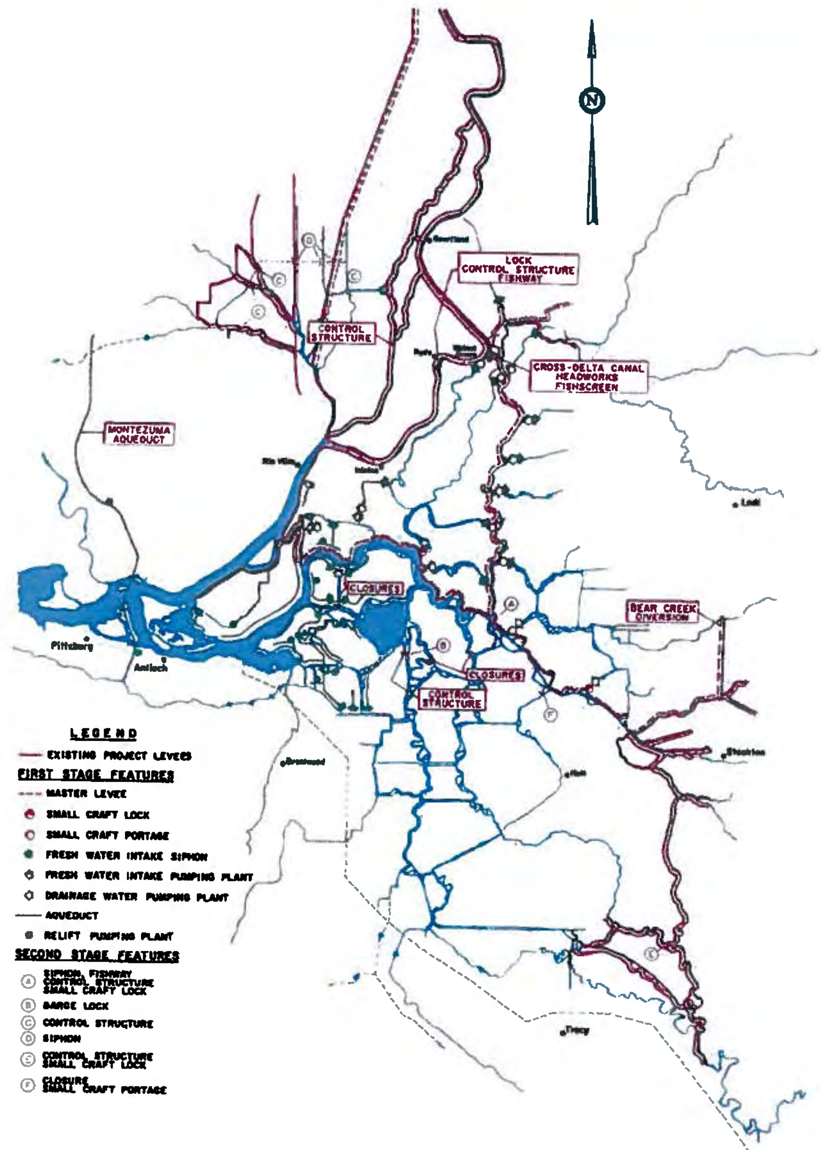
Typical Alternative Delta Water Project — physical works

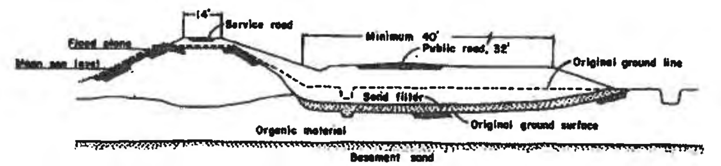
Several additional features can be added to the basic Single Purpose Delta Water Project to provide varying degrees of local benefits, in addition to adequate water supplies. These additional features would be for flood and seepage control, transportation, and recreation. While the economics of construction and operation factors would dictate grouping certain islands within encircling master levee systems, flood protection for any one or more of several groups of islands could be undertaken.

The Typical Alternative Delta Water Project, one of several alternative plans, would include flood protection for the islands in the north central portion of the Delta around Isleton, and for the northeastern islands in the vicinity of Lodi. Fourteen channel closures would be required in addition to those incorporated in the Single Purpose Delta Water Project. Minor modifications and additions would be made in the irrigation water supply and drainage facilities. Rotary drum fish screens would be incorporated where required in all water supply works, and a vertical louver screen would be constructed at the headworks of the Cross-Delta Canal at Walnut Grove. Bear Creek would be diverted into the Calaveras River.

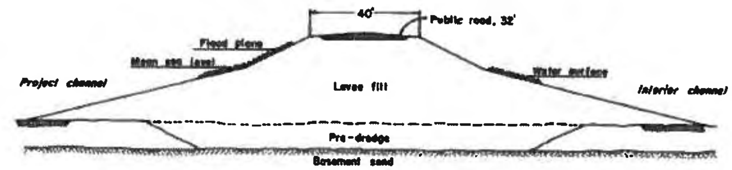
The master levee system would include existing levees of the Sacramento River Flood Control Project. Other existing levees would be improved by constructing a berm on the landward side, and by raising the levee crown where necessary to increase the freeboard. Public roads would be relocated from levee crowns to the berms. A service and maintenance road would be placed on the crown of the levees.

Small craft locks would be constructed at certain channel closures. At locations where rapid transits of boats under 25 feet long would be necessary, a tank elevator boat portage would be installed.

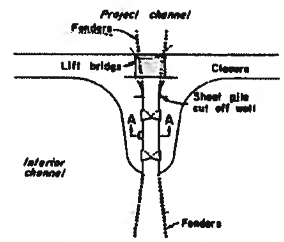




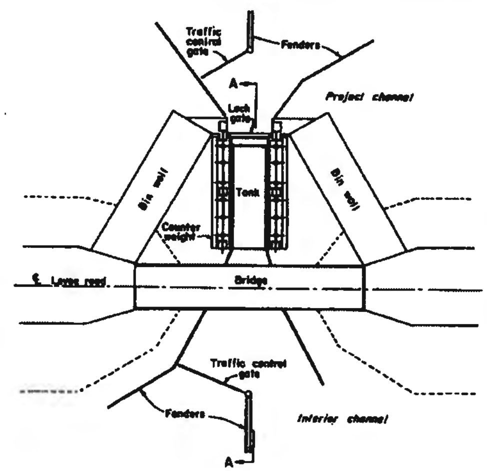
TYPICAL SECTION OF MASTER LEVEE

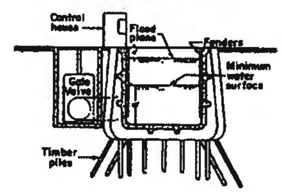


TYPICAL SECTION OF CHANNEL CLOSURE



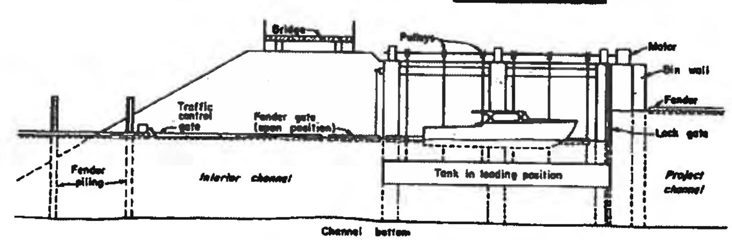
SMALL CRAFT LOCK SITE





SECTION A-A
SMALL CRAFT LOCK

PLAN OF SMALL CRAFT PORTAGE



SECTION A-A OF SMALL CRAFT PORTAGE

About 1,900 acres of Delta land would be filled with excess dredged material, and most of this land would be available for recreational development. The additional gates on the Cross-Delta Canal headworks and the extensions of the adjacent highway and railroad bridges would be constructed with about 16 feet of clearance above the present average water level to improve small craft access between the Sacramento River and channels of the Mokelumne River system.

The second stage features of this project would be similar to those contemplated for the Single Purpose Delta Water Project.

Estimates of capital cost were based on 1960 construction costs plus 15 percent for contingencies and 15 percent for engineering and overhead.

SUMMARY OF ESTIMATED CAPITAL COSTS
TYPICAL ALTERNATIVE DELTA WATER PROJECT

Feature and date of construction	Capital cost
Steamboat Slough control structure (1968-70)	$2,943,000
Miner Slough closure (1970)	108,000
Ryde control structure, barge lock, and fishway (1967-70)	5,653,000
Holland Cut control structure (1973-75)	2,761,000
Cross-Delta Canal headworks (1975-77)	1,998,000
Cross-Delta Canal fish screen (1968-70)	3,500,000
Old River and Middle River closures (1975)	258,000
Fishermans Cut closures (2) (1964)	133,000
Agricultural water facilities (1963-65)	4,282,000
Municipal and industrial water facilities (1968-71, 1980, 1995, 2010)	13,952,000
Channel dredging (1974-78)	7,224,000
Master levee system (small craft locks and portages, irrigation and drainage works)	
Isleton island-group (1964-80)	12,610,000
Lodi island-group (1964-81)	11,439,000
Bear Creek diversion (1967-70)	670,000
TOTAL CAPITAL COST, FIRST STAGE FEATURES	$67,531,000
TOTAL CAPITAL COST, SECOND STAGE FEATURES	$23,635,000

Typical Alternative Delta Water Project — operation

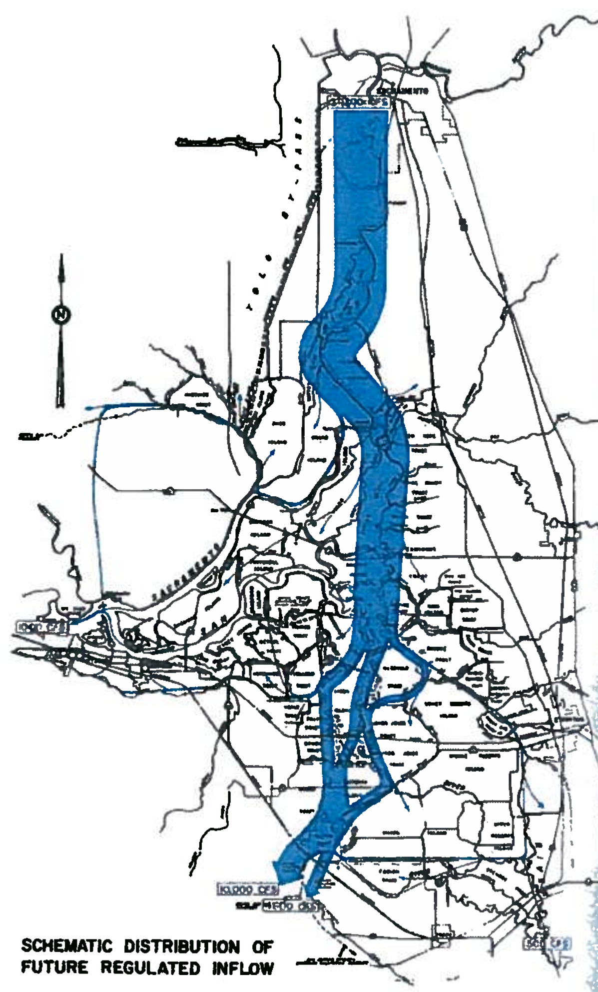
Operation of the Typical Alternative Delta Water Project would be basically the same as with the Single Purpose Delta Water Project. Good quality water would be transferred directly across the Delta and degradation in water quality from salinity incursion would be prevented by limited releases of fresh water with the same degree of control as under the Single Purpose Delta Water Project. Water supplies for the Delta would be distributed from the cross-Delta flows.

Irrigation water for the Isleton island-group and the Lodi island-group would be diverted through siphons from the Cross-Delta Canal into interior channels. Existing diversion works out of the Cross-Delta Canal, which would be rebuilt during construction of the master levees, and diversion works out of the interior channels would continue in operation. Drainage pumping plants at channel closures would have capacity to remove all water pumped from the islands into the interior channels. Under all alternative plans for the Delta Water Project, the irrigation and drainage works would be managed by local districts. Adjustments in costs of operation and maintenance would be made with the districts to reflect costs allocated to interests other than the local districts. Water supply facilities serving several districts or agencies would be operated by the State or by an appropriate master district or agency.

Flood flows would be contained in principal project channels in those portions of the Delta protected by the master levee system, and levees along interior channels would no longer be subject to high flood stages. Levees on interior channels would not need to be as high as for present conditions, and could be allowed to settle. Experience has shown that Delta levees reach a state of equilibrium if they are allowed to settle a limited amount. Thus much of the periodic reconstruction of the interior levees would no longer be necessary. Bank erosion problems due to flood flows also would be eliminated on interior levees.

Storm runoff from upland areas surrounding the Delta would be pumped into flood channels, except in the case of Bear Creek which would be diverted into flood channels.

Water levels in the interior channels could be lowered to achieve reductions in the amount of seepage into the islands. In



SCHEMATIC DISTRIBUTION OF FUTURE REGULATED INFLOW

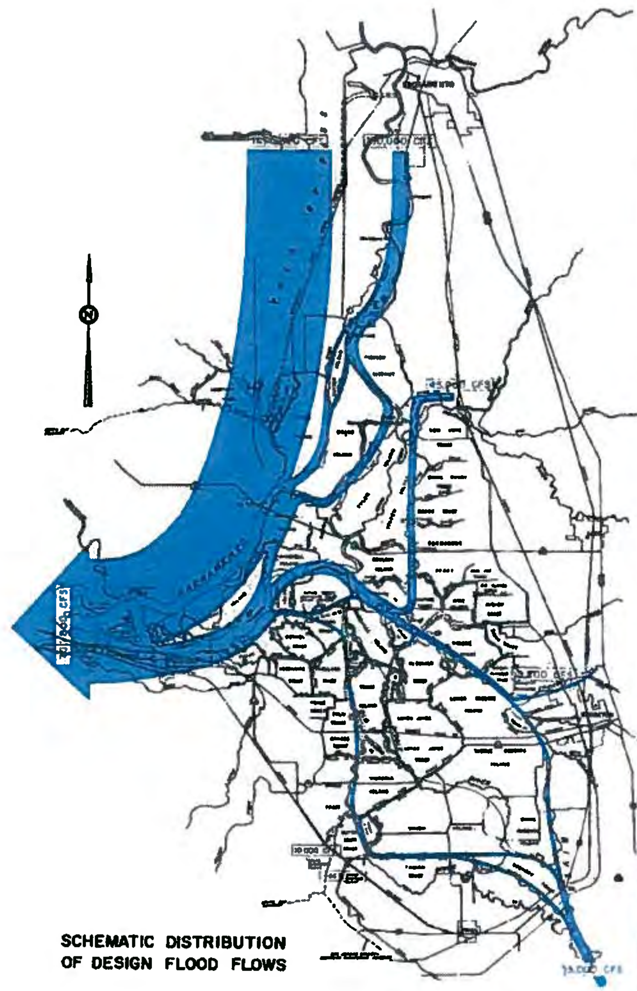
practically all channels the level could be five feet lower than the present average level, or about three feet below sea level, without causing maneuvering problems for small craft. Any resultant shallow depths in specific locations could be increased by dredging.

Small craft locks and portage facilities would be operated without cost to the boating public as the costs would be allocated to beneficiaries of the master levee system. The locks would be operated in a standard manner with pumps for filling and draining. The boat portages would be tank elevators with a gate at one end. The tank would be lowered below the hull of the boat, and the boat would then move between guides over the tank. The counterweighted tank would then be raised to the higher water level and the gate opened to permit the boat to move out under its own power. The time for operation after positioning of the boat over the tank would be less than one minute. The boat would be in the water at all times and there would be no contact with the bottom of the hull.

The operation and maintenance of public roads located on the berm of the master levees would be less costly than for existing roads, which must be periodically reconstructed due to levee settlement and levee rebuilding. Maintenance of the public roads would be by local agencies. Closures in the master levee system of this plan would eliminate the need for continued operation of four ferries.

Reduction of the water surface area under tidal influence would cause limited increases in tidal amplitudes in the Delta, but no significant changes in the average water levels. Such changes on the Sacramento River and Steamboat Slough would be similar to those under the Single Purpose Delta Water Project, and amplitude changes in the San Joaquin River in the heart of the Delta would be less than one foot. However, dredging would be necessary in some navigable channels.

Small islands in bends and side channels, which would be reclaimed and raised by filling, would be available for recreational development after the areas are no longer needed for disposal areas. It is contemplated that arrangements would be made with local governmental agencies for recreational development of the lands, either by direct means or by leasing to concessionaires.



SCHEMATIC DISTRIBUTION OF DESIGN FLOOD FLOWS

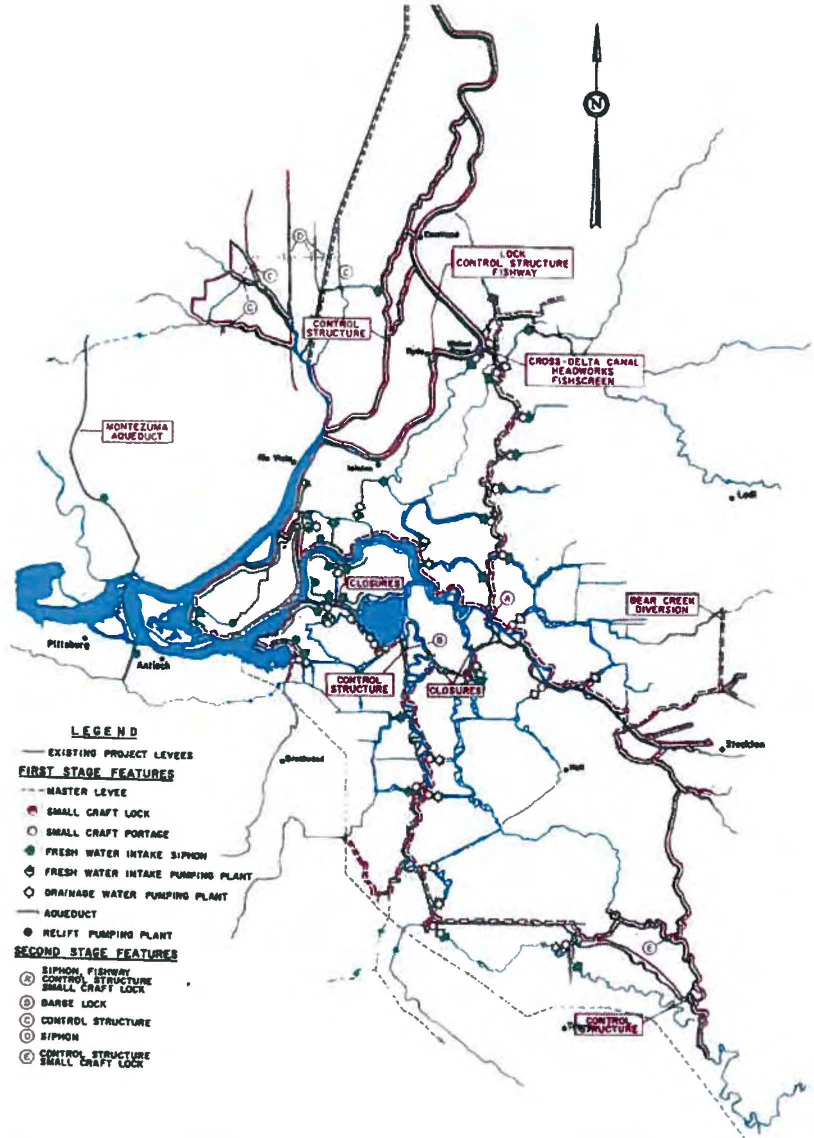
Comprehensive Delta Water Project—physical works

The Comprehensive Delta Water Project would salvage water otherwise needed for salinity control and provide water for the Delta. In addition, the project would provide flood and seepage control, transportation, and recreation benefits for most of the Delta. New master levees would encompass five principal groups of islands and Sherman Island. Works for water supply and drainage in the Delta would include those of the Typical Alternative Delta Water Project, with some modifications, plus other works to serve the newly formed island-groups. Additional small craft facilities would also be constructed.

Flood waters of the San Joaquin River would be divided between the main channel and an improved chain of distributary channels to the west, the two branches coming together in the western Delta. Improved channels of the Lower San Joaquin River Tributaries Flood Control Project would be incorporated.

The master levee along Piper Slough east of Bethel Island would be constructed on old levees on Franks Tract to minimize interference with existing developments on the Bethel Island levee.

The additional interior channels created by the project in northeastern Contra Costa County would contain good quality water, and would serve as a fresh water distribution system for the adjacent islands. Intensive small craft traffic in the vicinity of Bethel Island would necessitate the construction of four small craft portage facilities in adjacent channels and one small craft lock at Sand Mound Slough.

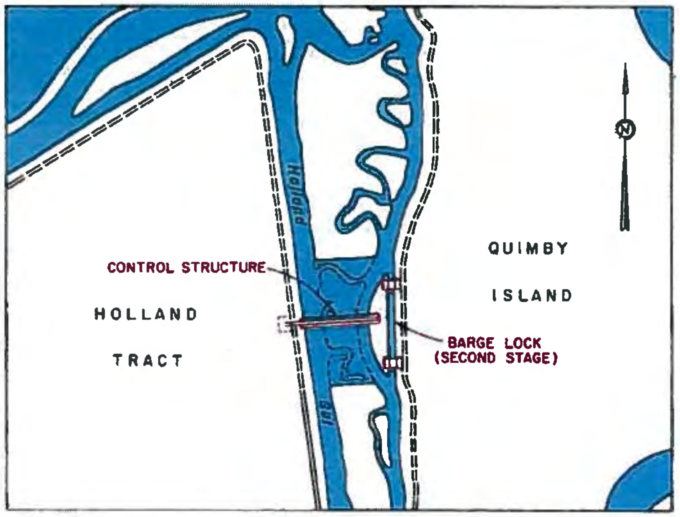


The second stage features of the Comprehensive Delta Water Project would be similar to those in other variations of the Delta Water Project.

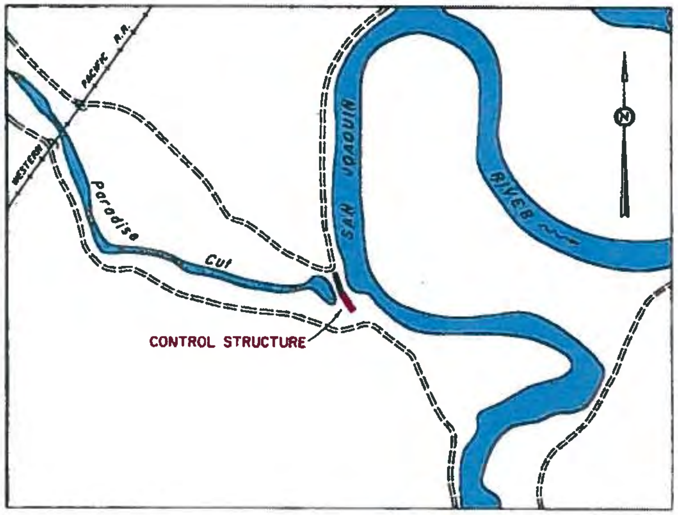
Estimates of the capital costs reflect 1960 construction costs, plus 15 percent for contingencies and 15 percent for engineering and overhead.

SUMMARY OF ESTIMATED CAPITAL COSTS
COMPREHENSIVE DELTA WATER PROJECT

Feature and date of construction	Capital cost
Steamboat Slough control structure (1968-70)	$2,943,000
Miner Slough closure (1970)	108,000
Ryde control structure, barge lock and fishway (1967-70)	5,653,000
Holland Cut control structure (1973-75)	2,761,000
Cross-Delta Canal headworks (1975-77)	1,998,000
Cross-Delta Canal fish screen (1968-70)	3,500,000
Old River and Middle River closures (1975)	258,000
Fishermans Cut closures (2) (1964)	133,000
Agricultural water facilities (1963-65)	2,520,000
Municipal and industrial water facilities (1968-71, 1980, 1995, 2010)	13,952,000
Channel dredging (1968-78)	8,950,000
Master levee system (small craft locks and portages, irrigation and drainage works)	
Isleton island-group (1964-80)	12,610,000
Lodi island-group (1964-81)	11,439,000
Holt island-group (1964-80)	13,810,000
Tracy island-group (1968-74)	4,722,000
Brentwood island-group (1964-79)	9,802,000
Sherman Island (1964-79)	2,030,000
Paradise Cut control structure (1969-71)	121,000
Bear Creek diversion (1967-70)	670,000
Kellogg Creek diversion (1971)	79,000
TOTAL CAPITAL COST, FIRST STAGE FEATURES	$98,059,000
TOTAL CAPITAL COST, SECOND STAGE FEATURES	$21,560,000



HOLLAND CUT STRUCTURE SITE



PARADISE CUT STRUCTURE SITE

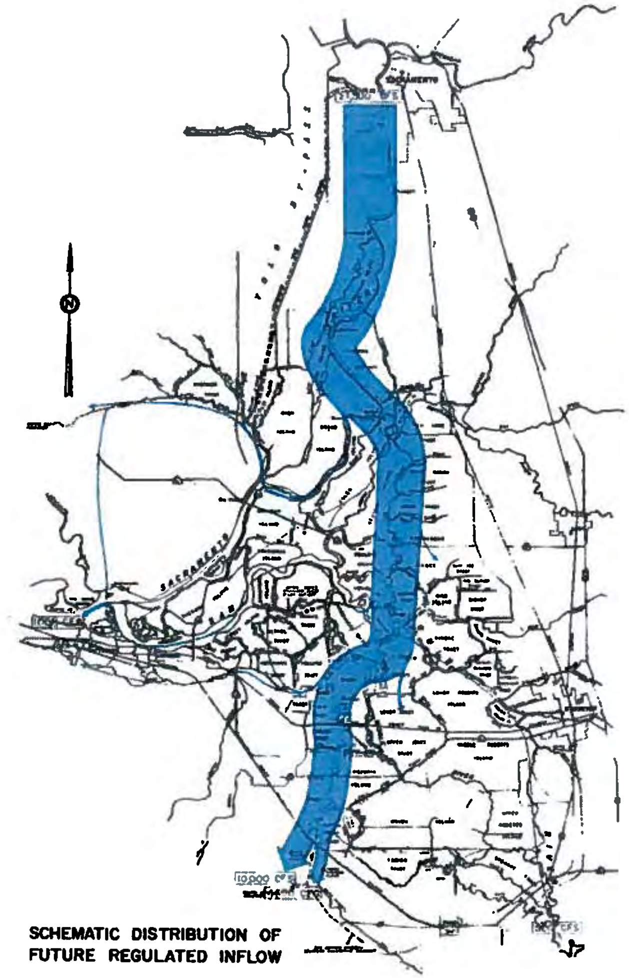
Comprehensive Delta Water Project—operation

Integrated operation of the multipurpose facilities of the Comprehensive Delta Water Project would enhance all principal phases of the Delta's economy, salvage water otherwise needed for salinity control, and provide very good quality water throughout the Delta. Although the project would have some adverse effects on certain segments of the Delta's economy, such as recreation and navigation, the multipurpose works would afford opportunity for enhancement of these same segments in other ways.

Operation of the water supply and transfer facilities during summer months would be similar to that described for the Single Purpose and Typical Alternative plans. Where representative districts or agencies are organized, the facilities could be locally operated and maintained, and appropriate adjustments in costs thereof could be made to achieve equitable distribution of costs to all beneficiaries.

Creation of interior and project channels in the southern portion of the Delta would separate irrigation water supplies from drainage water originating on lands east of the San Joaquin River. Good quality water from cross-Delta flows would be available throughout most of the southern Delta. Lands adjacent to the San Joaquin River upstream from Stockton would continue to divert from the river, but the quality of the water in this area could be improved by upstream flow in the San Joaquin River past Stockton induced by the pumping plants. A small net upstream flow occurs during summer months under present conditions. The quality of water in Paradise Cut could also be improved with circulation induced by pumping from the upper end into the San Joaquin River. Diversions from the river in this vicinity might be affected by operation of a San Joaquin Valley waste conduit. If current studies indicate that substitute supplies would then be necessary, or if further improvement of the quality of the supplies is desired even in the absence of adverse effects of a waste conduit, such supplies could be readily diverted from Delta channels without affecting works described herein.

Lands in the Holt island-group in the south central portion of the Delta range in elevation from several feet below sea level to a few feet above sea level. Irrigation water for the higher islands is pumped from the channels, while siphons are utilized for the lower islands. To achieve seepage control benefits for the lower islands, water



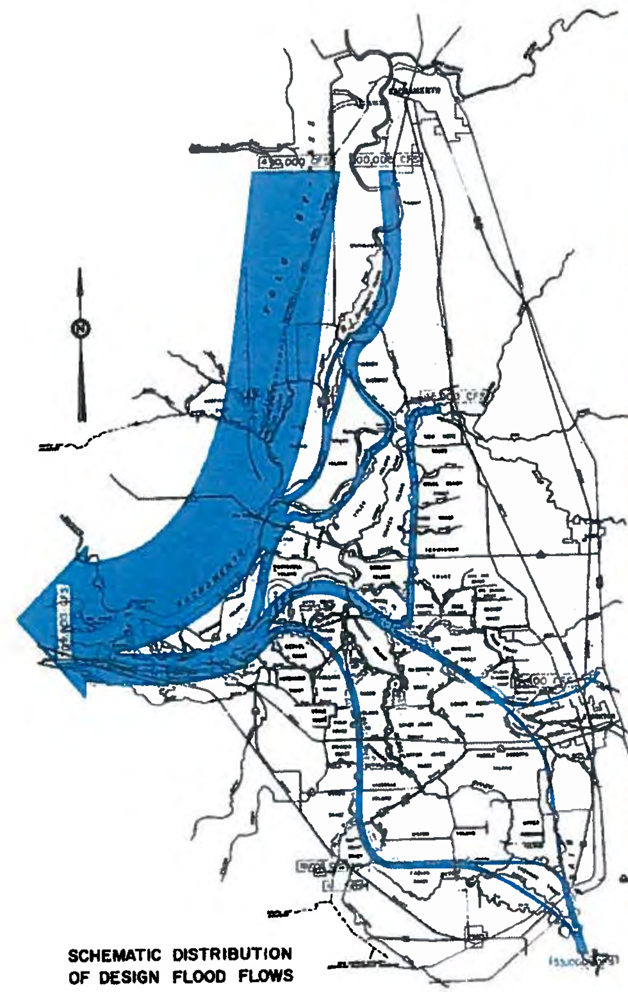
SCHEMATIC DISTRIBUTION OF FUTURE REGULATED INFLOW

levels in the channels could be lowered. This could be accomplished locally without detriment to the higher lands by constructing low dams with pumping plants in the channels and maintaining different water levels in the interior channel system.

Large volumes of small craft and fishing boats move between marinas and resorts in the Bethel Island area and Franks Tract or more distant points in the Delta and San Francisco Bay system. Peak small boat traffic would be served by three small craft portages on Piper Slough, and by one small craft lock on Sand Mound Slough. Lock or portage service for small craft would be provided at various other locations in the Delta when dictated by construction of channel closures. It should be recognized that subsequent developments and changes in patterns of use may necessitate revisions in the planned local service. While the lock and portages would cause some inconvenience to recreationists, creation of interior channels not subject to flood and tidal stages would benefit shore line installations. An expected great increase in boating in the future would intensify problems of patrolling and safety enforcement. Opportunities would be available to local public agencies to designate certain waterways for specific uses, and problems of regulation would be reduced under controlled access.

Master levees of the project in the southern half of the Delta would cause increased tidal amplitudes in the project channels. The maximum increase in the San Joaquin River system would be about one foot at Stockton. There would be no significant change in the mean water level. Some dredging in navigation channels would be necessary.

Tug and barge shipments into the southern Delta would be limited to the Cross-Delta Canal. Most of the present traffic involves beet shipments to a sugar refinery near Tracy, and the Holland Cut channel east of Franks Tract is generally used. The Cross-Delta Canal would be open to the San Joaquin River, and a barge lock at the Holland Cut control structure would not be economically justified. Although a slightly greater travel distance from northern and western Delta points would be involved under the project, the channel to the vicinity of the sugar refinery would be dredged. This would permit use of larger barges, which are presently precluded by shallow channel depths.



SCHEMATIC DISTRIBUTION OF DESIGN FLOOD FLOWS

Project Accomplishments—Delta water supply

Over 90 percent of the Delta lowlands now has adequate water supplies during summer months due in part to operation of the Central Valley Project. However, ten percent of the Delta in the western portion, including lands occupied by large water-using industries and municipalities, does not have adequate good quality water supplies at all times. Moreover, additional regulation and use of water in areas tributary to the Delta, exclusive of Delta exports, will lengthen the average period each year when salinity incursion from the Bay causes increased operating costs, plant shutdowns, and decreased farm production. The concentrations of dissolved minerals in water from the Contra Costa Canal now approach upper limits of acceptable quality during several months of most years, and significant sums of money are expended by industries for demineralization and water softening.

Under any of the foregoing projects, water of very good quality would continue to be supplied to about 90 percent of the Delta lowlands through existing facilities. It is estimated that the mineral quality of the supplies would generally range between about 15 to 80 parts of chlorides and between 100 and 350 parts of total dissolved solids per million parts water. The quality of water in the southern portion of the Delta would be improved.

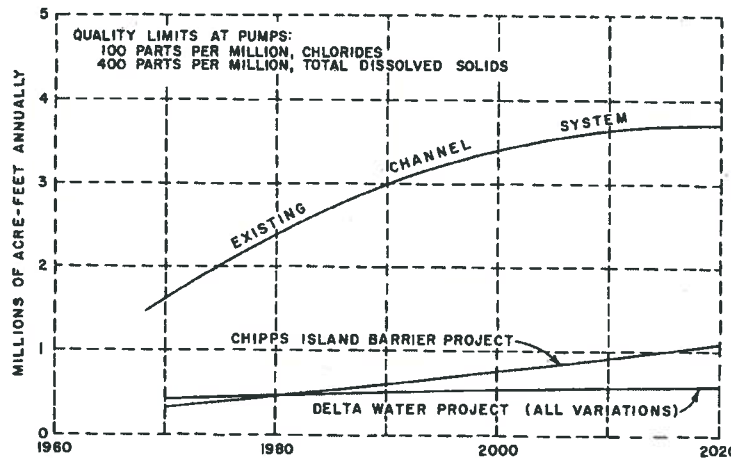
The quality of water in the Pittsburg-Antioch area with the Chipps Island Barrier Project in operation would be uncertain. Although downstream disposal of local municipal and industrial wastes and drainage from the San Joaquin Valley would eliminate the majority of the mineral pollutants, the effects of cooling water and mineral and organic wastes of the Delta might result in water supplies of questionable quality, particularly during critical dry periods. Elimination of the tidal effects in this area by construction of the barrier would also reduce the supply of dissolved oxygen in the water, which is now partly replenished from Suisun Bay.

All of the alternative plans for the Delta Water Project would involve dual water supplies with different water quality characteristics. While the concentrations of minerals in water in certain western channels would increase due to greater ocean salinity incursion, the quality of water from the Contra Costa Canal and from proposed water supply facilities would be excellent. It is estimated that substitute industrial water supplies would generally contain between 15 and 80 parts of chlorides per million parts of water. Similarly, the total dissolved solids would generally range between 125 and 300 parts per million. Irrigation water supplies would be of similar quality. The Contra Costa Canal would annually supply about 195,000 acre-feet of water, including some substitute water in northeastern Contra Costa County. All additionally required supplemental and substitute water would be supplied from the Montezuma Aqueduct. This annual quantity would amount to about 120,000 acre-feet in 1990 and 330,000 acre-feet in 2020. Brackish water supplies in the western Delta channels would vary in quality with location. The mean quality would be about 3,000 parts of chlorides per million parts water at Antioch during summer months. Water containing this much salinity is not necessarily damaging to cooling equipment involving alloy metals. A composite of several factors, most of which would not be modified by alternative plans for the Delta Water Project, controls the rate of corrosion of cooling equipment.

Project Accomplishments—water salvage

Unless physical works are constructed in the Delta to prevent salinity incursion from the Bay system, or to channelize fresh water directly across the Delta channels, it will be necessary to release increasingly greater amounts of fresh water from upstream storage to maintain satisfactory quality conditions. Greater rates of fresh water outflow will be necessary as the rate of export pumping from the Delta increases, and greater quantities of stored water will have to be released as the amount of surplus water for outflow is reduced by upstream depletions and export from the Delta. If Delta works are not constructed, the yield of other features of the State Water Facilities would be reduced and subsequent features for importation of water from north coastal sources would be needed at an earlier date. Any such modifications in the program would increase the cost of water in the Delta.

With any of the plans for the Delta water facilities, the amount of outflow from the Delta otherwise necessary for salinity control would be greatly reduced. It would still be necessary to dispose of municipal and industrial wastes from the western Delta, and drainage from the San Joaquin Valley, into channels downstream from points of usable good quality water. All of the plans are comparable in this respect, except that these wastes would aid in repulsion of ocean salinity incursion with any of the alternatives of the Delta Water Project. Fresh water required for operation of locks and the fishway would be lost with a barrier at Chipps Island, but would be available for use downstream of the control structures with any of the alternatives of the Delta Water Project. A small amount of conservation yield could be obtained from limited storage in Delta channels with a barrier at Chipps Island, but alternatives of the Delta Water Project would not provide conservation storage.



UPSTREAM STORAGE RELEASES FOR PROJECT OPERATION

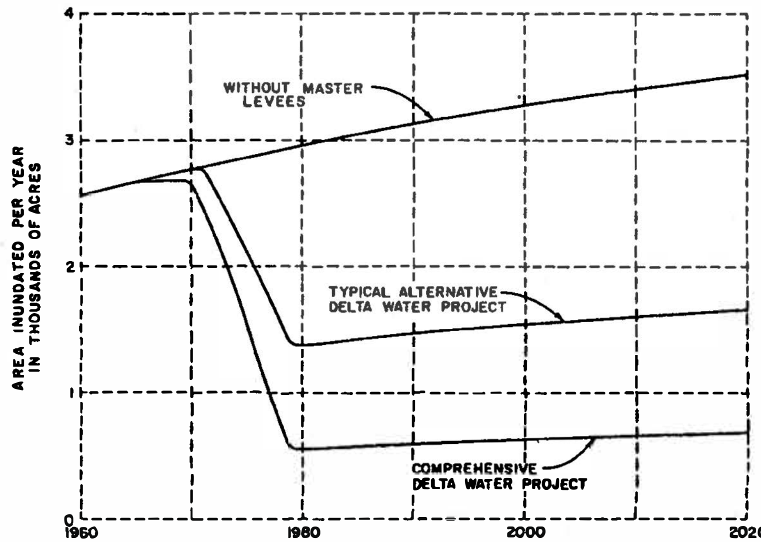
The amount of water otherwise necessary for salinity control which could be salvaged by Delta water facilities would vary with time, as indicated by the above graph. The amount of salvaged water would be the difference between demands on upstream storage for outflow without any works in the Delta, and demands with such works in operation. The estimated average annual salvage during the next 60 years would be 1,900,000 acre-feet with the Chipps Island Barrier Project, and 2,050,000 acre-feet with any of the alternative plans for the Delta Water Project.

Project Accomplishments—flood and seepage control

Only the Typical Alternative Delta Water Project and the Comprehensive Delta Water Project would provide flood and seepage control benefits to the Delta. However, all plans would include remedial works made necessary by adverse effects of flood or tidal water stages changed by project operation. These would be particularly necessary with the Chipps Island Barrier Project.

Project flood control benefits would result from reduction in the frequency of flooding, and from reductions in costs of maintaining Delta levees. It is emphasized that complete flood protection could not be assured, as the inflow to the Delta could exceed the designed capacity of the channels. Furthermore, although the stability of the master levees would be significantly greater than the stability of existing levees, the character of organic foundation soils is such that unforeseen stability problems might develop in some areas. For these reasons, emphasis should be given to zoning Delta lands lying below flood levels for uses involving low-value improvements such as farming, and precluding residential development. While complete flood protection for the Delta lands could not be assured under project conditions, there would be a marked improvement in protection over existing conditions which will worsen as land elevations in the Delta continue to subside.

About 103,000 acres would be benefited by master levees included in the Typical Alternative Delta Water Project, and about 143 miles of levees along interior channels would no longer require costly maintenance for high flood stages. The estimated average annual benefit of reduced flooding and operation and maintenance costs would be about $4.65 per acre. Master levees of the Comprehensive Delta Water Project would benefit about 252,000 acres and would reduce expensive maintenance on 295 miles of interior channel levees. The estimate of average annual flood control benefits is about $3.60 per acre.



PROJECTED AVERAGE ANNUAL AREA OF FLOODING

Seepage control benefits would be made available by lowering water levels in interior channels created by the Typical Alternative Delta Water Project or by the Comprehensive Delta Water Project. In addition, lower water levels would prolong the economic life of certain islands. These benefits and the extent of increased economic life would depend upon lowering average water levels in the interior channels. A general lowering of five feet could be made without adversely affecting depths for small craft, except in isolated locations, or the majority of water supply siphons. Based upon a five-foot lowering of water levels, seepage control benefits, averaging an estimated $0.50 per acre for 103,000 acres, would be available with the Typical Alternative Delta Water Project. The Comprehensive Delta Water Project would afford seepage benefits to 252,000 acres, and the estimated average annual benefit would be $0.45 per acre.

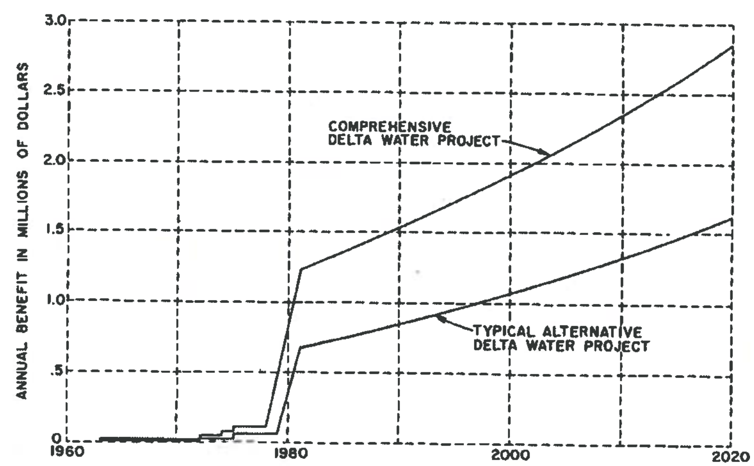
Project Accomplishments — vehicular transportation

The two basic problems of the existing road system in the Delta are (1) inadequate channel crossings and circuitous routes, with resultant excessive travel times, and (2) disproportionately high costs of maintenance. Projects involving master levees for flood control in the Delta would afford means for reducing both of these problems. However, the Chipps Island Barrier Project would provide no benefits to vehicular transportation, and the Single Purpose Delta Water Project would provide only incidental benefits of this kind.

The master levee system of the Typical Alternative Delta Water Project would include twenty-two channel closures upon which roads could be placed, and operation of four existing ferries could be terminated. The Comprehensive Delta Water Project would include thirty-nine channel closures providing new access and would eliminate the need for six ferries.

Roads on the landward berms of the master levees would be more stable and less difficult to maintain than existing roads on levee crowns. Driving on present levee roads is hazardous, as evidenced by frequent drownings when vehicles run off levees into adjacent channels. Passing clearance is often limited by parked vehicles. In addition to improved safety with roads on the levee berms, there would be ample width for parking off the roadways.

To realize the anticipated and needed development of recreation in the Delta, it will be necessary to greatly improve vehicular access. Realization of about 7,000,000 recreation-days each year by 1990, and almost 14,000,000 by 2020 will, in large degree, be dependent upon the improved vehicular access that could be provided by multipurpose use of the master flood control levees.



BENEFITS OF VEHICULAR TRANSPORTATION IMPROVEMENTS

The project benefits from enhancement of the road system would be a combination of savings in maintenance costs and savings in costs to Delta traffic associated with farming and to the recreationists. Savings to Delta interests reflect reduced costs of general travel and produce shipments through decreased travel times and distances. Savings to the recreationists were based upon projected recreation use and decreased travel times and distances.

Project Accomplishments—recreation

While some detriments to recreation are inherent in construction of any facilities in the Delta, substantial benefits would also be achieved. As has been stated, improvements in the road network would make more of the Delta accessible to recreationists. Land areas reclaimed by spoiling material from dredging of channels onto small islands would afford space for development of recreation service facilities and picnic areas. Project works at the head of the Cross-Delta Canal would be constructed to provide clearance for the majority of pleasure craft, thereby connecting the Sacramento and Mokelumne River systems. Elimination of flood and tidal effects from interior channels would make it possible to control water levels in those channels, reducing costs of maintaining waterfront recreation facilities. Furthermore, costs of new facilities would be less than for present conditions. The safety of the boating public is becoming a significant problem, and the incompatibility of high-speed boating, cruising, and skiing with fishing and swimming creates related safety problems. Local authorities will find it desirable and even necessary to designate certain Delta channels for specified types of recreation use. The interior project channels would lend themselves to this type of zoning and also to simplified enforcement.

Planning and construction of recreational developments in the Delta should involve local governmental agencies. Most project channel closures would not be constructed for eight or more years, and changing recreation patterns should be considered in future selection of remedial and enhancement facilities. Needs for small craft locks and boat portages should be re-evaluated at the time closures are constructed.

The most important form of recreation in the Delta is fishing. In terms of recreation-days, fishing is three times as important as the next most popular sport—cruising. A project which would cause a major reduction in fish populations might also cause very adverse effects on the recreation. In this connection the Chipps Island Barrier Project would result in losses of striped bass several times as great as those anticipated with any of the alternative plans for the Delta Water Project.

It is recognized that cruising, sailing, and water skiing are rapidly gaining in popularity in the Delta, and that construction of master flood control levees and channel closures would interfere with unrestricted boating access to certain channels. However, access would be provided through small craft locks or portage facilities at many of the channel closures, thus reducing the detriment primarily to short delays. Studies in other areas indicate that lockage delays are not too important to the majority of pleasure boatmen.

The following tabulation summarizes physical features of the several alternative projects which would affect recreational activity and growth in the Delta.

Item	Chipps Island Barrier Project	Single Purpose Delta Water Project	Typical Alternative Delta Water Project	Comprehensive Delta Water Project
Control structures	1	4	3	4
Channel closures	1	10	23	41
New master levees (miles)	0	0	90	185
Fishways	1	1	1	1
Principal fish screens	0	2	1	1
Barge locks	1	1	1	1
Small craft locks	0	0	2	5
Small craft portage facilities	0	0	5	17
Open navigable area (acres)	49,500	49,400	45,800	42,600
Navigable interior area (acres)	0	100	3,700	6,900
Open navigable channels (miles)	700	695	590	450
Navigable interior channels (miles)	0	5	110	250
Project roads (miles)				
Paved	0	0	33	70
Graveled	0	1	47	109
State and county levee roads (miles)	295	295	279	265
New inter-island accesses (closures)	0	6	22	39
New public waterfront land (acres)				
From master levees	0	0	1,900	3,600
From dredge spoils	0	1,900	1,900	2,300
Normal overhead clearance through Delta Cross Channel (feet)	6	16	16	16

Project Accomplishments — fish and wildlife

Any Delta water facilities would affect the habitat of fish in the Delta, but would have little effect, if any, on Delta wildlife. While it is known that the Delta plays an important role in the life cycle of migratory fish, and also supports resident sport fish, insufficient biological information is available with which to clearly define the potential effects of Delta water facilities. Nevertheless, relative comparisons of the alternative projects can be made.

Studies of effects of the Delta water facilities and export pumping plants were made by the California Department of Fish and Game in co-operation with the Department of Water Resources. Cooperative experiments with a full-scale vertical baffle fishway indicate that all migratory species would use this type of fishway. The conclusions of the Department of Fish and Game regarding the alternative projects are as follows:

"Chipps Island Barrier

"This project would be the most damaging of the four studied. It would probably cause a disastrous reduction of almost all species of fish found in the Delta. These losses would be brought about by the rapid salinity and temperature change across the barrier, loss of current in the fresh-water pool for migration direction, striped bass spawning eliminated due to lack of current behind the barrier, loss of important food items, and a threefold increase in pumping of water at Tracy. The amount of Sacramento River water being drawn around the tip of Sherman Island to the pumping plant would be greatly increased. Downstream migrants of the Sacramento River would be diverted to the pumps in large numbers. These fish would have to be screened at the pumps and returned to the river channel below the influence of this current. This condition would be a serious detriment to all fish using the Delta.

"Single Purpose Delta Water Project

"This project would be the least detrimental of the four projects studied. The reversal of flow around Sherman Island would be eliminated. Major fish screens would be installed at the Cross-Delta Canal headworks and at the head of Georgiana Slough. Therefore, downstream migrants in the Sacramento River would be guided down the western side of the Delta out of the influence of the pumps. In general, fish and eggs in the western portion of the Delta would no longer be affected by the pumps. The replacement of the hundreds of existing small irrigation siphons in the western Delta by screened irrigation supply systems would further reduce losses of small fish. In these respects conditions for fish in the Delta would be improved.

"Fish habitat would not be reduced in the Delta. The one channel that would be isolated under this project would be insignificant. An important effect of the project would be the increased reversal of flow in the San Joaquin River above the Cross-Delta Canal crossing. This reversal of flow would occur during an average of seven months of the year under full project operation. We were unable to evaluate the effect of the reversal. However, it could result in serious losses to salmon that now spawn in San Joaquin River tributaries south of the Mokelumne River. Most seriously affected would be upstream migrating salmon. The amount of water pumped from the Delta would be increased threefold. This increased withdrawal of water would divert proportionately more fish than is presently being diverted.

"Typical Alternative Delta Water Project

"This project would be the second least detrimental. Losses would be expected to be greater than the Single Purpose Project because of the reduction of 8 percent of the fish habitat through channel closures, and partial channelization of the Cross-Delta Canal. The channelization would cause a detriment by channeling the fish toward the pumps by a more direct route. Water diversions into isolated channels would be screened and loss of fish would be reduced. However, loss of eggs and fry would be unavoidable. Other project conditions would be the same as the Single Purpose Project.

"Comprehensive Delta Water Project

"This project would be the third least detrimental. It would cause greater loss than the Typical Alternative Project because of the reduction of 14 percent of the fish habitat, and the complete channelization of the Cross-Delta Canal. This would channel the fish directly to the pumps. Other project conditions would be the same as in the Single Purpose Project.

"From the foregoing, if one of the above-named projects is to be built in the Delta, the Department of Fish and Game would favor the Single Purpose Delta Water Project. However, all projects will cause serious fisheries problems and an intensive study would be required to solve these problems."

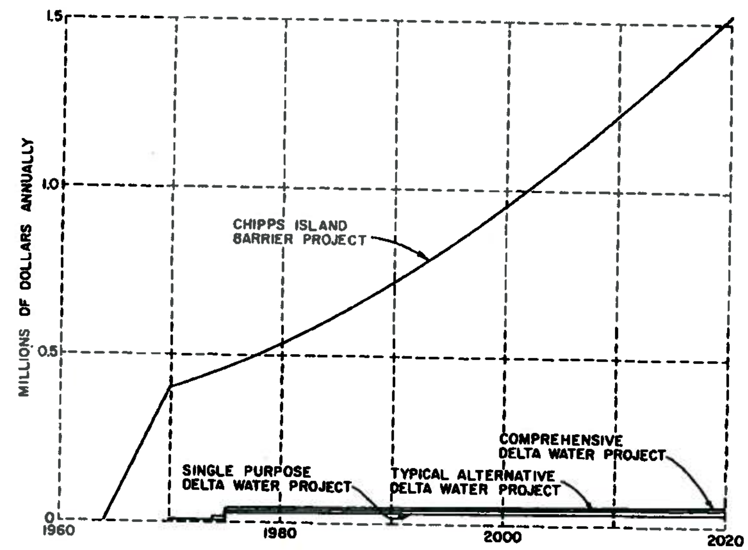
Formulation of project plans reflects comments and recommendations of the Department of Fish and Game. Fish screens would be installed at the heads of channels diverting water southward from the Sacramento River. Such screens would reduce the present rates of fish losses at the Tracy Pumping Plant and in numerous other diversions in the Delta. Project pumping plants would also be screened. Hundreds of diversion siphons and pumping plants in the Delta are not screened at this time. However, project diversions into interior channels would be screened, and the fish populations enhanced thereby.

Project Accomplishments—navigation

Commercial and military navigation in the Delta would be adversely affected in varying degrees by any Delta water facilities, but some potential benefits would also be realized through increases in channel depths and widths.

The Chipps Island Barrier Project would cause the greatest detrimental effect to navigation, since all traffic between the San Francisco Bay system and Delta points would have to pass through locks. At present, an average of about 570 deep-draft commercial vessels, and 10,300 tug and barge tows and small vessels pass Chipps Island each year. It is estimated the annual transits would increase to 2,800 and 40,000, respectively, by 2020. The volume of future military traffic cannot be realistically estimated, nor is it possible to place a reasonable value on its lost time. The increased tidal amplitude downstream from a barrier at Chipps Island would necessitate additional dredging in some areas to provide the required minimum navigation depth. This increased depth might cause additional maintenance dredging which frequently results from deepening navigation channels.

Completion of the Sacramento Deep Water Channel will divert most of the tug and barge traffic away from the Sacramento River between the vicinities of Rio Vista and Sacramento. The traffic which would pass the site of the Sacramento River control structure would generally be limited to that originating from or destined to points of call downstream from the vicinity of Freeport. It is anticipated that the volume of this traffic would increase from 600 transits per year after completion of the Sacramento Deep Water Channel to about 900 transits per year by 2020.



DETRIMENTS TO COMMERCIAL NAVIGATION

Construction of control structures and closures on channels south of the San Joaquin River in the heart of the Delta would increase time and distance for tug and barge travel to a sugar refinery near Tracy. However, channel improvements would permit use of larger barges, if shipping concerns should elect to do so. As this advantage would be subject to many factors in an operator's business which cannot be readily predicted, benefits were not claimed for possible use of larger barges.

Construction of a master levee system would necessitate relocation of some sugar beet loading docks in the Delta. However, improved roads would tend to compensate for increased hauls to relocated docks.

Economic Aspects—benefits, detriments, and costs

Only direct, tangible benefits and detriments to the initial recipient were evaluated for comparison with direct costs. However, it must be recognized that direct, intangible benefits and detriments would also result from project operation. The ratios of benefits to costs provide a guide to project selection, but consideration should also be given to the net benefits in making the final project selection. Although variations in benefit-cost ratios can result from different basic economic premises, the relative comparison of alternative projects would not change.

Certain significant benefits and detriments were not evaluated. All alternative plans would improve the quality of water exported to the San Joaquin Valley and reduce the drainage problems there. Only direct benefits of flood protection to agriculture were evaluated, but this protection would also benefit principal highways and urban developments. The estimated recreation benefits from land made available for development were considered to be equivalent to the value of the land. Intangible benefits would also accrue to recreation, and intangible detriments would result from reduced convenience of access into some channels. Only detriments to commercial fishing are shown, but intangible detriments to sport fishing would also accrue.

All estimates of benefits, detriments, and costs, including amortization, operation, and maintenance, reflect annual equivalent values for the period 1960-2020. An interest rate of four percent per annum was used in the analysis.

Attention is invited to the net benefits of the Comprehensive Delta Water Project which are less than the net benefits of the Typical Alternative Delta Water Project. This condition results from inclusion of economically unjustified flood control for large areas south of the San Joaquin River wherein the direct benefits would be less than the costs. However, flood control for some of the critical areas south of the San Joaquin River warrants further study.

ESTIMATED ANNUAL BENEFITS, DETRIMENTS, AND COSTS
(In thousands of dollars)

Item	Chipps Island Barrier Project	Single Purpose Delta Water Project	Typical Alternative Delta Water Project	Comprehensive Delta Water Project
Benefits				
Water salvage (for export)	8,337	8,963	8,963	8,963
Improved water quality—municipal, industrial, and irrigation	880	880	880	880
Supplemental municipal and industrial water supply	503	1,343	1,343	1,343
Flood and seepage control	----	----	530	1,022
Vehicular transportation	----	----	410	734
Recreation	----	19	37	58
Total Benefits	9,720	11,205	12,163	13,000
Detriments				
Commercial navigation	617	18	24	27
Commercial fisheries	844	203	254	287
Total Detriments	1,461	221	278	314
BENEFITS MINUS DETRIMENTS	8,259	10,984	11,885	12,686
Costs				
Capital amortization	6,825	1,358	1,965	2,846
Annual operation and maintenance	2,077	691	884	1,136
Total Costs	8,902	2,049	2,849	3,982
NET BENEFITS	−643	8,935	9,036	8,704
BENEFIT–COST RATIO	0.93:1	5.36:1	4.17:1	3.19:1

Economic Aspects—allocation of costs

The capital and operational costs of each of the alternative projects were allocated among the project functions by the Separable Costs-Remaining Benefits method. In this method, all costs assignable to single functions are identified, and the remaining multipurpose costs are distributed among the functions in proportion to the benefits provided by the project, or in proportion to the lowest cost alternative means of providing equivalent benefits. The lowest value of either the benefits or alternative means is used as a limit.

The basic allocations were made in terms of present worth values (1960) of all costs and benefits. This procedure properly accounts for the time-value of money (interest) and the wide variation in dates of expenditure of money and realization of benefits. Allocations of the capital and operational costs in terms of actual expenditures, rather than present worth, are indicated in the accompanying tabulations to permit convenient comparisons with total amounts of these costs.

Attention is invited to the allocated costs of the Chipps Island Barrier Project. The costs which would be allocated to water salvage and western Delta water supply were limited by the lowest cost alternative means of providing equivalent benefits, which would be the Single Purpose Delta Water Project. The values

ALLOCATION OF ESTIMATED CAPITAL COSTS
(In thousands)

Item	Chipps Island Barrier Project	Single Purpose Delta Water Project	Typical Alternative Delta Water Project	Comprehensive Delta Water Project
Water salvage (for export)	$38,384	$38,444	$38,662	$41,655
Western Delta water supply [1]	8,098	8,111	8,156	8,788
Flood and seepage control	none	none	11,900	25,159
Vehicular transportation	none	none	8,132	18,083
Recreation land	none	none	681	1,429
Unassigned local costs	155,490	none	none	2,945
TOTALS	$201,972	$46,555	$67,531	$98,059

[1] For improvement in quality and supplemental water supplies. Allocated costs include portions properly attributable to upstream water users for future effects on the western Delta area due to increased water use in areas tributary to the Delta. Definite values attributable to upstream water users would be dependent upon resolution, negotiated or otherwise, of water rights problems.

shown for the Chipps Island Barrier Project are slightly less than those for the lowest cost alternative, since the funds for the former would be expended at an earlier date. The allocations to both projects in present worth values would be the same. As the costs which may be properly allocated to water salvage and western Delta water supply are less than the total cost, a portion of the costs of the Chipps Island Barrier Project are shown as unassigned local costs. If these costs are not repaid from sources other than water users, the Chipps Island Barrier Project would be financially infeasible.

Attention is also invited to the allocated costs of the Comprehensive Delta Water Project which indicate certain unassigned local costs. In this case the costs of flood and seepage control in areas south of the San Joaquin River exceed the direct benefits of flood and seepage control in these areas. Therefore, the allocation to flood and seepage control for these areas was limited to the benefits. These flood and seepage control features of the Comprehensive Delta Water Project are not economically justified.

After the costs were allocated to principal project functions, it was necessary to make suballocations among particular groups of beneficiaries. These suballocations, which are indicated on the following pages, were also made by the Separable Costs-Remaining Benefits method and were the basis for computing the average annual costs to beneficiaries throughout a 60-year period. In the adjoining tabulations the amounts allocated to vehicular transportation include some costs which would be suballocated to recreation access to reflect the benefits to the public for improved access to recreation areas of the Delta. It is estimated that about $7,075,000 of the capital costs and $92,000 of the annual operational costs for vehicular transportation under the Typical Alternative Delta Water Project would be suballocated to recreation access. Under the Comprehensive Delta Water Project these respective amounts would be $15,123,000 and $176,000. These foregoing amounts would be in addition to the basic allocation to recreation land, which reflects the value of lands made available for recreational development.

ALLOCATION OF ESTIMATED AVERAGE ANNUAL OPERATIONAL COSTS
(In thousands)

Item	Chipps Island Barrier Project	Single Purpose Delta Water Project	Typical Alternative Delta Water Project	Comprehensive Delta Water Project
Water salvage (for export)	$395	$571	$506	$483
Western Delta water supply [1]	83	120	107	102
Flood and seepage control	none	none	156	292
Vehicular transportation	none	none	106	210
Recreation land	none	none	9	16
Unassigned local costs	1,599	none	none	34
TOTALS	$2,077	$691	$884	$1,137

[1] For improvement in quality and supplemental water supplies. Allocated costs include portions properly attributable to upstream water users for future effects on the western Delta area due to increased water use in areas tributary to the Delta. Definite values attributable to upstream water users would be dependent upon resolution, negotiated or otherwise, of water rights problems.

Economic Aspects—costs of project services

It was assumed that all project costs not specifically declared nonreimbursable would be repaid by all beneficiaries of project functions. In accordance with the contracting principles established for water service under the State Water Resources Development System, the conservation features of the Delta water facilities will be financially integrated with other conservation features of the system. The cost of supplemental water required by Delta water users will include the Delta Water Charge and an allocated transportation charge.

Estimates of present and future costs of water supply in the western Delta area were predicated on continuation of current federal salinity control policy, which limits the minimum regulated outflow from the Delta to 1,500 second-feet, considered necessary to afford satisfactory quality control at the Central Valley Project pumping plants. Estimates of increased future costs without the State Water Facilities reflect continued upstream depletion of surplus water in the Delta, and represent average costs during the next 60 years. Estimates of costs shown for project conditions also reflect average costs during the next 60 years. It is emphasized that the estimates are comparative average annual *costs* during a 60-year period and do not reflect estimates of year by year *prices* which may be established.

The amounts allocated for repayment were limited by the lowest cost alternative means of accomplishing equivalent benefits. It may be noted that the costs of water supply in the western Delta area would be the same for the Chipps Island Barrier Project, Single Purpose Delta Water Project, and Comprehensive Delta Water Project. The Single Purpose Delta Water Project would be the lowest cost alternative means of providing water supplies and it limits the amount which may be allocated under the other two projects.

The costs of the Typical Alternative Delta Water Project allocated to water salvage would amount to an average of $0.64

COMPARATIVE SUMMARY OF ESTIMATED AVERAGE ANNUAL COSTS OF WATER SUPPLY IN WESTERN DELTA AREA WITH AND WITHOUT STATE WATER FACILITIES DURING 1960-2020 [1]

Item	Future cost without State Water Facilities	Chipps Island Barrier Project	Single Purpose Delta Water Project	Typical Alternative Delta Water Project	Comprehensive Delta Water Project
Contra Costa Canal service, $/acre-foot [2]	14.52 [3]	11.66	11.66	11.64	11.66
Substitute municipal and industrial water supply, $/acre-foot	[4]	[4]	3.45	3.33	3.45
Supplemental water supply [5]					
Contra Costa County, $/acre-foot	15.20	9.06	9.06	8.92	9.06
Solano County, $/acre-foot	17.00	8.82	8.82	8.68	8.82
Agricultural water supply, $/acre [6]	7.91 [7]	1.50	1.50	1.45	1.50

[1] Average of estimated costs during a 60-year period. Values do not necessarily reflect *prices* for project services.
[2] For all municipal and industrial water served from the Contra Costa Canal. All costs include $11 per acre-foot for water from the canal. Allocated costs reflect benefits from improved quality.
[3] Includes estimated excess water treatment due to salinity degradation.
[4] Estimated future cost of high quality water from Delta channels will vary between $2.00 and $5.00 per acre-foot, depending upon plant locations and operations.
[5] All supplemental project water available through operation of the Montezuma Aqueduct.
[6] Costs reflect average for about 34,000 acres in the western Delta lowlands.
[7] Cost expressed as loss per acre due to salinity incursion.

per acre-foot for all water exported from the Delta by the State Water Facilities. Similar costs with the other projects would be about $0.66 per acre-foot.

It is anticipated that a federal contribution would be provided for flood and seepage control. This contribution, tentatively estimated at $10,123,000 for the Typical Alternative Delta Water Project and $16,020,000 for the Comprehensive Delta Water Project, would probably reflect current federal policy for allocation of costs of levee improvements, and would be based on reduced flood damages and net savings from reduced levee maintenance costs. Local costs of maintaining existing levees incorporated in the master levee system probably would not be directly met by local districts. Maintenance would be included in the total project costs, and a portion of these costs would be allocated to local beneficiaries.

The total project costs allocated to vehicular transportation were suballocated to the benefited counties and to the general public. The allocation to the general public reflects enhancement of recreation, and was considered nonreimbursable.

COMPARATIVE SUMMARY OF ESTIMATED ANNUAL COSTS OF FLOOD AND SEEPAGE CONTROL WITH AND WITHOUT DELTA WATER FACILITIES DURING 1960-2020 [1]

(Per acre)

Item	Island-group					
	Isleton	Lodi	Holt	Tracy	Brentwood	Sherman
Present control cost	$8.00	$8.00	$7.50	$6.50	$7.50	$9.00
Future control cost without a project	10.85	10.29	9.16	7.50	8.83	13.10
Annual damage savings with a project	2.80	1.65	0.35	0.20	1.32	3.12
Typical Alternative Delta Water Project						
Allocated project cost	2.04	2.17				
Interior levees and pumping cost	7.96	7.34				
Total control cost	$10.00	$9.51				
Net savings	3.65	2.43				
Comprehensive Delta Water Project						
Allocated project cost	2.15	2.29	2.09	2.29	2.38	2.53
Interior levees and pumping cost	7.96	7.34	6.66	4.97	6.04	10.57
Total control cost	$10.11	$9.63	$8.75	$7.26	$8.42	$13.10
Net savings	3.54	2.31	0.76	0.44	1.73	3.12

[1] Average of estimated costs during a 60-year period. Values do not necessarily reflect prices for project services.

COMPARATIVE SUMMARY OF ESTIMATED ANNUAL COSTS AND SAVINGS WITH VEHICULAR TRANSPORTATION IMPROVEMENTS DURING 1960-2020 [1]

Item	Contra Costa County	San Joaquin County	Sacramento County
Typical Alternative Delta Water Project			
Allocated project cost	$—	$41,400	$4,500
Operational savings to present road system	—	38,500	1,100
Savings to road users	—	265,700	105,200
Net savings	—	268,800	101,800
Comprehensive Delta Water Project			
Allocated project cost	13,300	95,700	11,200
Operational savings to present road system	2,900	59,300	5,000
Savings to road users	82,000	465,600	119,700
Net savings	71,600	429,200	113,500

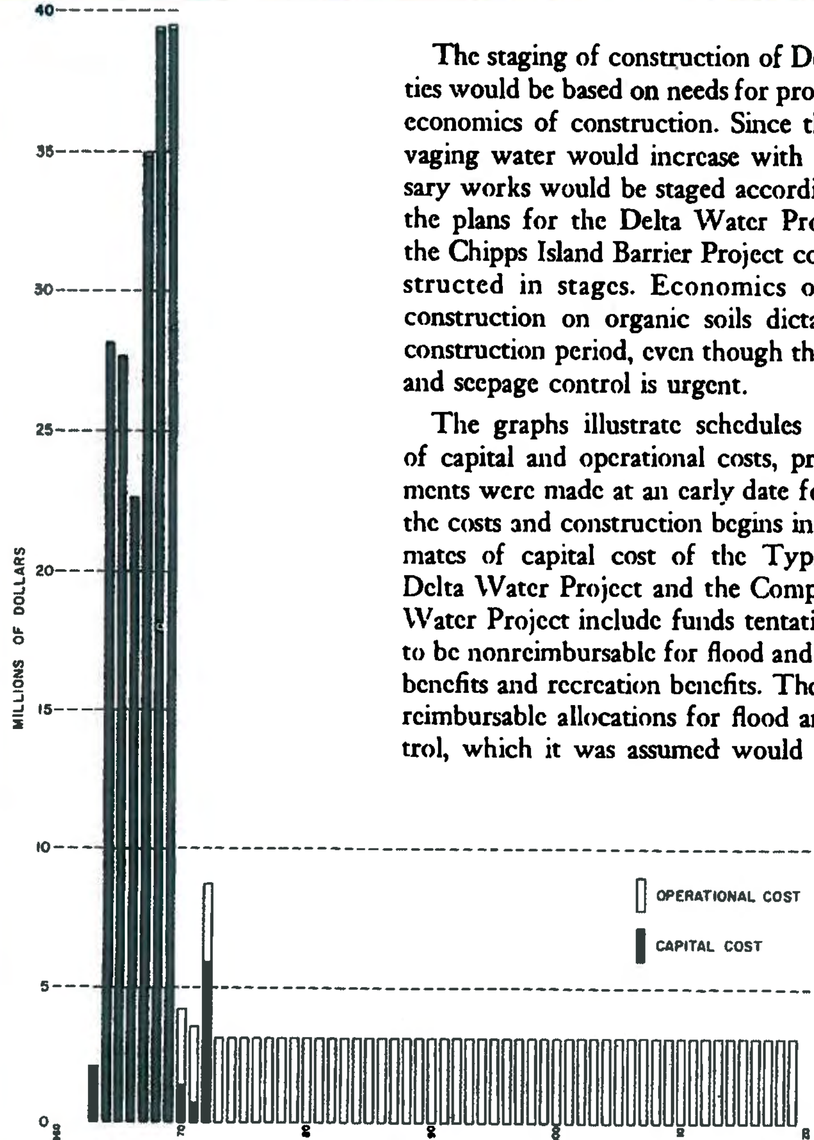
[1] Average of estimated costs during a 60-year period. Values do not necessarily reflect prices for project services.
NOTE: There would not be any vehicular transportation improvements in portions of other counties within the Delta.

Economic Aspects—repayment

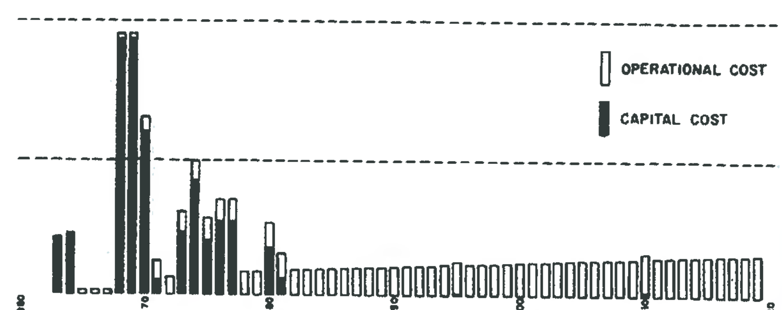
The staging of construction of Delta water facilities would be based on needs for project services and economics of construction. Since the need for salvaging water would increase with time, the necessary works would be staged accordingly for any of the plans for the Delta Water Project. However, the Chipps Island Barrier Project could not be constructed in stages. Economics of master levee construction on organic soils dictate an extended construction period, even though the need for flood and seepage control is urgent.

The graphs illustrate schedules of expenditures of capital and operational costs, provided arrangements were made at an early date for repayment of the costs and construction begins in 1963. The estimates of capital cost of the Typical Alternative Delta Water Project and the Comprehensive Delta Water Project include funds tentatively considered to be nonreimbursable for flood and seepage control benefits and recreation benefits. The estimated nonreimbursable allocations for flood and seepage control, which it was assumed would be provided by the Federal Government, amount to about $10,123,000 for the Typical Alternative Delta Water Project and $16,020,000 for the Comprehensive Delta Water Project. The estimated allocation of capital costs to recreation land and access would be $7,756,000 with the Typical Alternative Delta Water Project and $16,552,000 with the Comprehensive Delta Water Project. The corresponding allocations of annual operational costs would be $101,000 and $192,000, respectively. It was assumed that the allocated capital costs for recreation land and access would be nonreimbursable and be borne by the State of California. It was also assumed that the annual operational costs would be reimbursable from gas tax funds and nominal rental charges on land made available for recreation development.

The allocated reimbursable costs for water salvage and western Delta water supply would be repaid by water charges. The charges would be based on integrated repayment of other necessary State Water Facilities. The reimbursable costs of flood



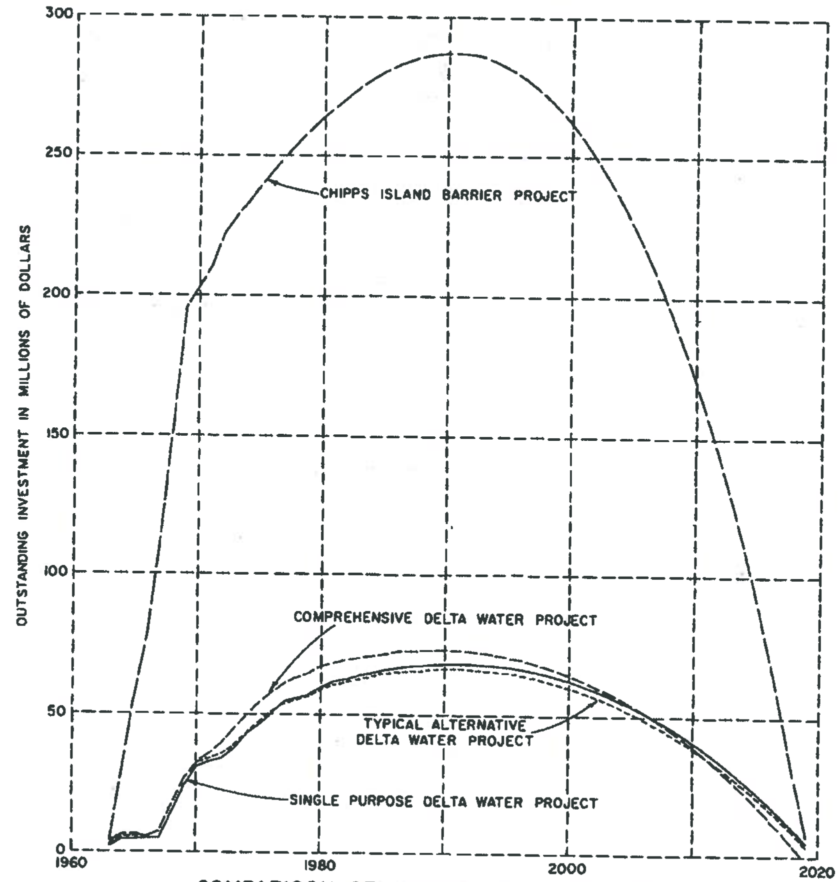
CHIPPS ISLAND BARRIER PROJECT



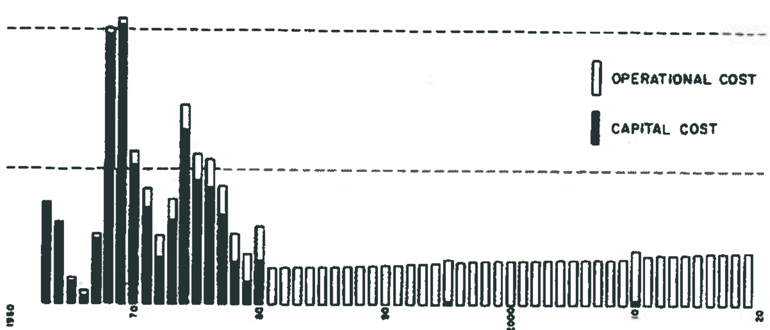
SINGLE PURPOSE DELTA WATER PROJECT

and seepage control and vehicular transportation improvements would be repaid by annual payments from the beneficiaries of flood and seepage control and from the counties, respectively. It was assumed that unassigned local costs of the Chipps Island Barrier Project would be recovered in annual payments in proportion to the projected industrial tax base. This assumed method of repayment would necessitate a rate of about $1.19 per $100 of assessed valuation throughout a 60-year period. It was also assumed that unassigned local costs of the Comprehensive Delta Water Project would be recovered in annual payments based upon the total acreage of land south of the San Joaquin River which would benefit from flood and seepage control. An annual payment of $0.86 per acre would be required.

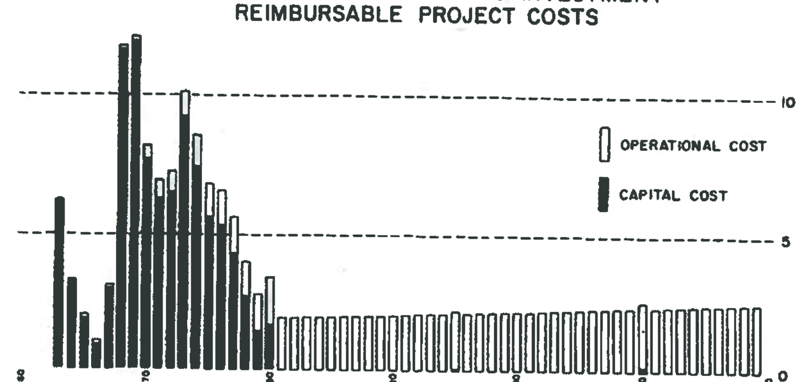
The comparative investment requirements for allocated reimbursable costs, including interest and operational costs, of the several projects are shown in the accompanying graph.



COMPARISON OF OUTSTANDING INVESTMENT
REIMBURSABLE PROJECT COSTS



TYPICAL ALTERNATIVE DELTA WATER PROJECT



COMPREHENSIVE DELTA WATER PROJECT

Conclusions and Recommendations

CONCLUSIONS

GENERAL

The plans for Delta water facilities described in this report are consistent with and would accomplish the water development purposes embraced in the California Water Resources Development Bond Act approved on November 8, 1960. Additional features could be incorporated to provide flood and seepage control, transportation, and recreation benefits.

WATER SUPPLY

Problems of water quality in the western portion of the Delta necessitate early construction of facilities to provide suitable water supplies for present and future uses.

WATER SALVAGE

Without physical control works in the Delta, increasingly greater quantities of fresh water from upstream storage will be required to repel ocean salinity and maintain good quality water for use within and export from the Delta. Water salvage will be dependent upon coordinated operation of regulatory storage, export works, and Delta water facilities.

FLOOD AND SEEPAGE CONTROL

The magnitude of flood damage and the costs of flood and seepage control will become increasingly greater as the land surface of many Delta islands continues to subside. A master levee system would reduce these costs. Early initiation of construction is necessary to economically provide stable levees.

VEHICULAR TRANSPORTATION AND RECREATION

Improvements to the road system in the Delta are needed to reduce costs of vehicular shipment and to develop the recreation potential to accommodate an estimated 7,000,000 recreation-days in 1990, and 14,000,000 recreation-days in 2020.

DELTA WATER FACILITIES

1. The Chipps Island Barrier Project would be functionally feasible, would provide adequate water supplies of acceptable quality for the Delta, and would salvage water otherwise needed for salinity control amounting to an estimated annual average of 1,900,000 acre-feet based on a 60-year period. However, the net benefits would be less than the project costs in a ratio of 0.93:1. Therefore, the project would not be economically justified. The project would not be financially feasible, unless revenues could be obtained from local taxes in addition to revenues derived from water sales.

2. The alternative plans of the Delta Water Project would be functionally feasible, would permit export of full water demands on the State Water Facilities, and would provide adequate water supplies, both in quality and quantity, for the Delta. The project would salvage water otherwise needed for salinity control amounting to an estimated annual average of 2,050,000 acre-feet based on a 60-year period.

3. The Chipps Island Barrier Project would probably cause disastrous reductions in the fisheries resource of the Delta. The Single Purpose Delta Water Project would be the least detrimental of all projects and would reduce some losses of fish and

Advanced Planning, Design, and Operation Studies

It is anticipated that the results of the planning studies summarized in this bulletin and described in detail in the supporting office reports will be the basis for selection of a general plan for the Delta Water Project. However, it is recognized that definite plans, designs, and operation programs will be dependent upon further studies and negotiations on certain aspects of the project plans.

LOCAL ACTION

Early consideration should be given by local agencies to the extent of their interest in facilities which could be constructed to provide local benefits. Acute water supply problems in the western Delta, particularly in the agricultural lowlands, warrant early resolution of interest in plans for water supply facilities. Consideration should be given to creation of master districts to represent related areas of interest in flood and seepage control benefits.

UNITED STATES CORPS OF ENGINEERS

Studies for flood and seepage control benefits and estimates of the federal contribution were based on methods and preliminary studies of the Corps of Engineers. Conditions in the Delta do not precisely fit standard procedures, and it will be necessary for the Corps of Engineers to make a detailed review of these studies to determine the extent of federal interest.

UNITED STATES BUREAU OF RECLAMATION

The Delta Water Project would enhance the operation of the Federal Central Valley Project by improving and insuring the quality of water exported from the Delta and by providing good quality water in the western Delta area in lieu of salinity control. The extent of federal interest in these benefits should be jointly analyzed by the Bureau of Reclamation and the Department of Water Resources.

HIGHWAYS

The channel closures and wide landward berms of the master levee system offer excellent opportunities for enhancing the road network in the Delta. Studies should be made by the State Division of Highways and county highway departments of transportation enhancement features, such as better road surfacing and connecting roads, which might be incorporated in the project plans.

FISHERY RESOURCES

To more definitely predict the anticipated project effects on fisheries and to design the fish screens and other remedial measures, it will be necessary to study certain biological aspects of the Delta fisheries. Joint studies of the anticipated project effects should be undertaken by the Department of Fish and Game and the Department of Water Resources.

OTHER STUDIES

Advance planning studies of flow distribution, salinity incursion, water quality, and sedimentation should continue throughout the design and early operation phases of project construction.

Test levee construction now being conducted pursuant to legislative directives will be continued to determine the most economical and efficient means of construction to provide an adequate levee system.

A general plan for remedial recreation facilities and recreation enhancement has been developed. Specific plans for facilities and development of land which can be made available for recreation uses should be prepared by county agencies, the Department of Water Resources, and other appropriate state agencies.

Acknowledgments

BOARD OF CONSULTING ENGINEERS

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Don J. Cretzler, Hytech Corporation
Inglewood, California

COOPERATIVE STUDIES

U. S. Corps of Engineers
Sacramento District––flood control and navigation aspects
San Francisco District––preliminary designs, Chipps Island Barrier Project

U. S. Coast and Geodetic Survey––subsidence surveying

California Department of Fish and Game––fish and game studies

Contra Costa County Water Agency––industrial water use studies

University of California
Berkeley––electric analog model of Delta channels
Davis––organic soil salination research

Stanford University––salinity incursion analyses

Parsons, Brinckerhoff, Hall and Macdonald––recreation studies

WESTERN DELTA ADVISORY COMMITTEE

A special Western Delta Advisory Committee was established at the suggestion of the Director of Water Resources to advise the department, primarily on studies of water requirements and plans in the western Delta. Committee membership, which has not endorsed all aspects of this report, included:

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Thomas M. Carlson
William J. O'Connell

Sacramento County

Arthur L. Kiefer
Jack Mingo
Weber Rothwell, Secretary

San Joaquin County

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U. S. Bureau of Reclamation

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Harvey O. Banks, Director
Department of Water Resources
James F. Wright, Deputy Director
Department of Water Resources
William L. Berry, Chief Engineer
Division of Resources Planning
John M. Haley, Chief
Project Development Branch
Albert J. Dolcini, Chief
California Aqueduct Section

Investigations by Delta Studies Unit

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Don H. Nance, Hydrology
Langdon W. Owen, Planning and Design
Irene E. Bailey, Executive Assistant
Marlene R. Schumaker, Stenographer

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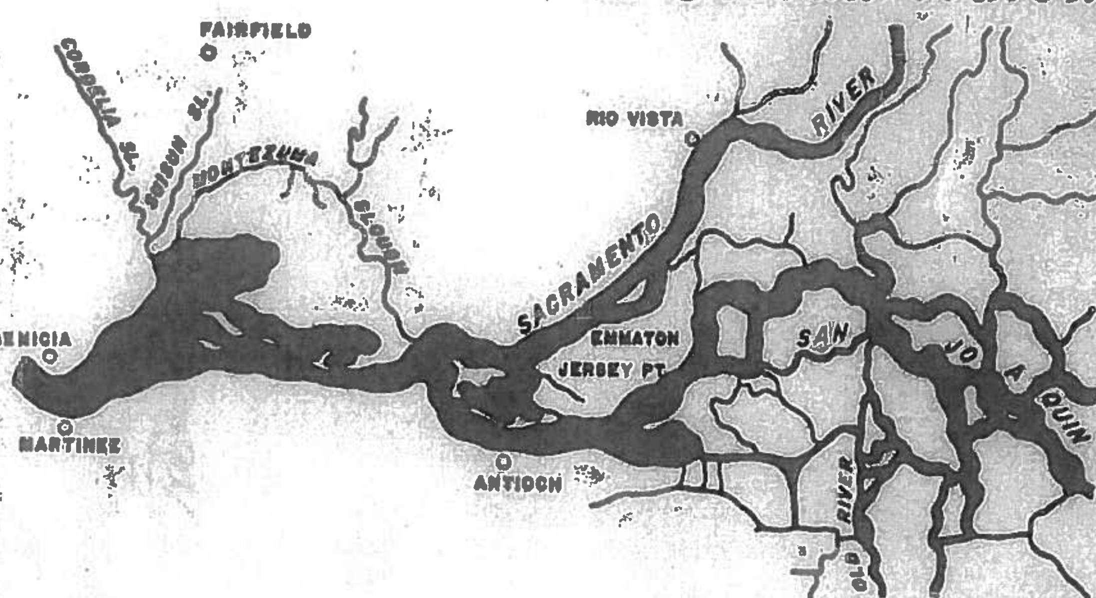
Sam I. Ito
Gene E. Linley
Lee H. Woodward
Edward F. Huntley
Philip T. Zwanck
Virgil D. Buechler
Howard W. Walber

Water Right Decision 1485

In the Matter of Permit 12720 (Application 5625) and Other Permits of United States Bureau of Reclamation for the Federal Central Valley Project and of California Department of Water Resources for the State Water Project.

DECISION IN FURTHERANCE OF JURISDICTION RESERVED IN DECISIONS D 893, D 990, D 1020, D 1250, D 1275, D 1291, D 1308, D 1356, and PERMIT ORDER 124

Sacramento-San Joaquin Delta and Suisun Marsh



August 1978

STATE WATER RESOURCES CONTROL BOARD

Exhibit 21

executed. The criteria in the draft agreement were recommended by Fish and Game and endorsed by the Department, and were extensively analyzed by the Board staff. Based on our most current assessment, the fishery standards provide significantly higher protection than existing basin plans. The Striped Bass Index is a measure of young bass survival through their first summer. The Striped Bass Index would be 71 under without project conditions (i.e., theoretical conditions which would exist today in the Delta and Marsh in the absence of the CVP and SWP), 63 under the existing basin plans, and about 79[3/] under this decision.

D 1485
1978

While the standards in this decision approach without project levels of protection for striped bass, there are many other species, such as white catfish, shad and salmon, which would not be protected to this level. To provide full mitigation of project impacts on all fishery species now would require the virtual shutting down of the project export pumps. The level of protection provided under this decision is nonetheless a reasonable level of protection until final determinations are made concerning a cross-Delta transfer facility or other means to mitigate project impacts.

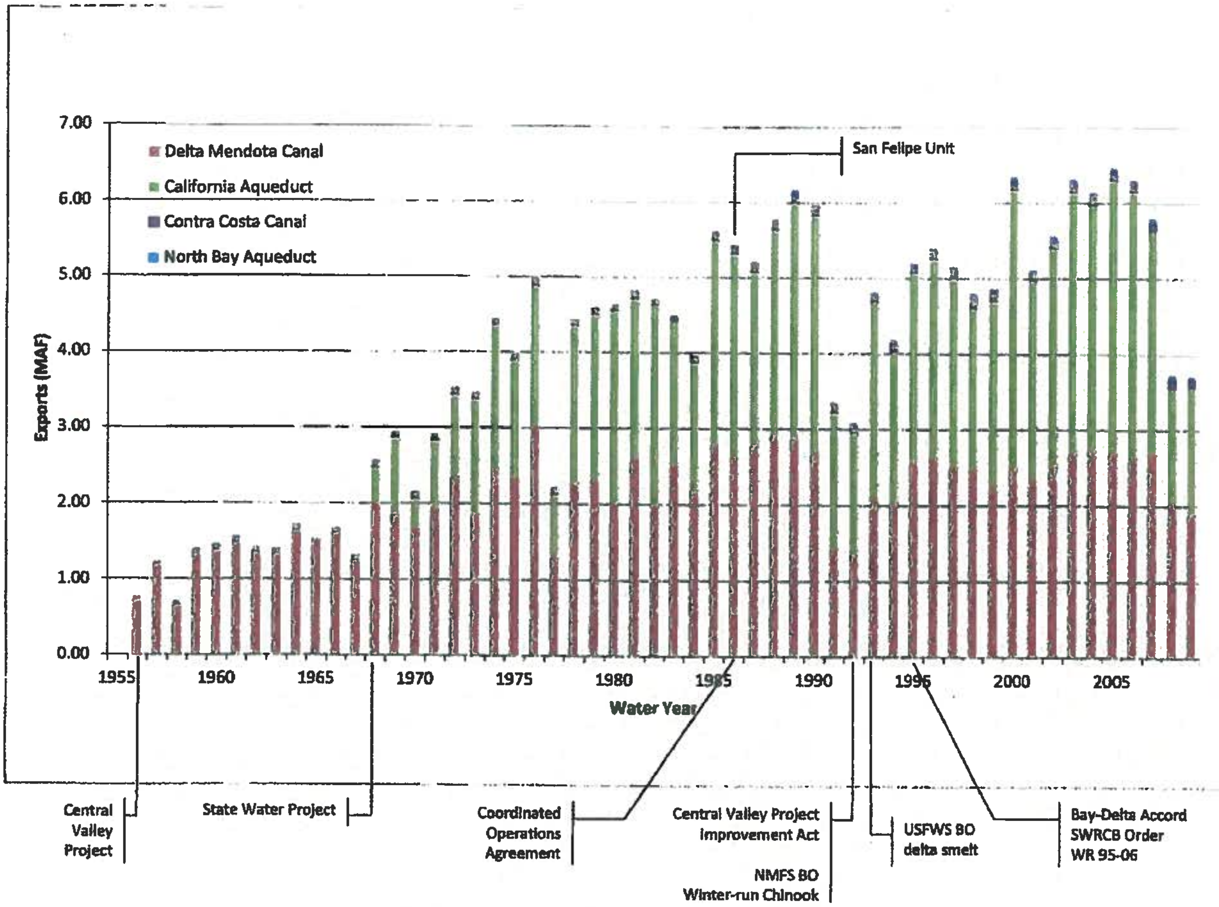
NO SHUT DOWN
INSTEAD
INCREASED EXPORT

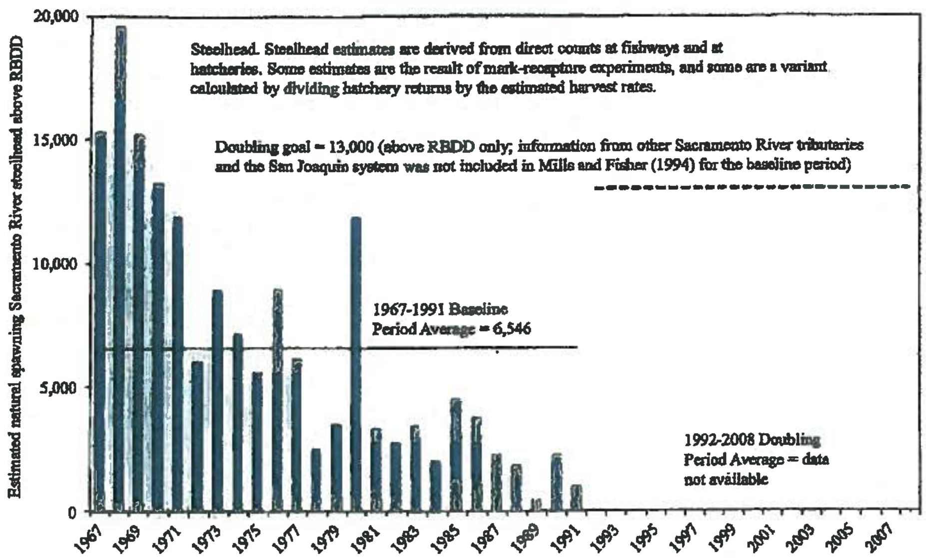
3/ There is some indication that factors other than those considered in the Board's analysis of without project levels may also affect striped bass survival. The effects of these factors are such that the without project levels would be greater than 71. However, the magnitude of this impact is unknown and cannot be quantified at this time.

NOT PROVIDED

Suisun Marsh. Full protection of Suisun Marsh now could be accomplished only by requiring up to 2 million acre-feet of freshwater outflow in dry and critical years in addition to that required to meet other standards. This requirement would result in a one-third reduction in combined firm exportable yield of State and federal projects. In theory, the existing Basin 5B Plan purports to provide full protection to the Marsh. However, during the 1976-77 drought when the basin plan was in effect, the Marsh received little if any protection because the system almost ran out of water and emergency regulations had to be imposed. This decision balances the limitations of available water supplies against the mitigation responsibility of the projects. This balance is based on the constitutional mandate "...that the water resources of the State be put to beneficial use to the fullest extent of which they are capable..." and that unreasonable use and unreasonable diversion be prevented (Article 10, Section 2, California Constitution).

The Bureau, the Department, Fish and Game, and U. S. Fish and Wildlife Service are working together to develop alternative water supplies for the Marsh. Such alternative supplies appear to represent a feasible and reasonable method for protection of the Marsh and mitigation of the adverse impacts of the projects. Under this decision the Department and Bureau are required, in cooperation with other agencies, to develop a plan for Suisun Marsh by July 1, 1979. The Suisun Marsh plan should ensure that the


Delta Mendota Canal
California Aqueduct
Contra Costa Canal
North Bay Aqueduct
San Felipe Unit
Exports (MAF)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Water Year
Central Valley Project
State Water Project
Coordinated Operations Agreement
Central Valley Project Improvement Act
NMFS BO Winter-run Chinook
USFWS BO delta smelt
Bay-Delta Accord SWRCB Order WR 95-06


Estimated natural spawning Sacramento River steelhead above RBDD
20,000
15,000
10,000
5,000
0
Steelhead. Steelhead estimates are derived from direct counts at fishways and at hatcheries. Some estimates are the result of mark-recapture experiments, and some are a variant calculated by dividing hatchery returns by the estimated harvest rates.
Doubling goal = 13,000 (above RBDD only; information from other Sacramento River tributaries and the San Joaquin system was not included in Mills and Fisher (1994) for the baseline period)
1967-1991 Baseline Period Average = 6,546
1992-2008 Doubling Period Average = data not available
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007

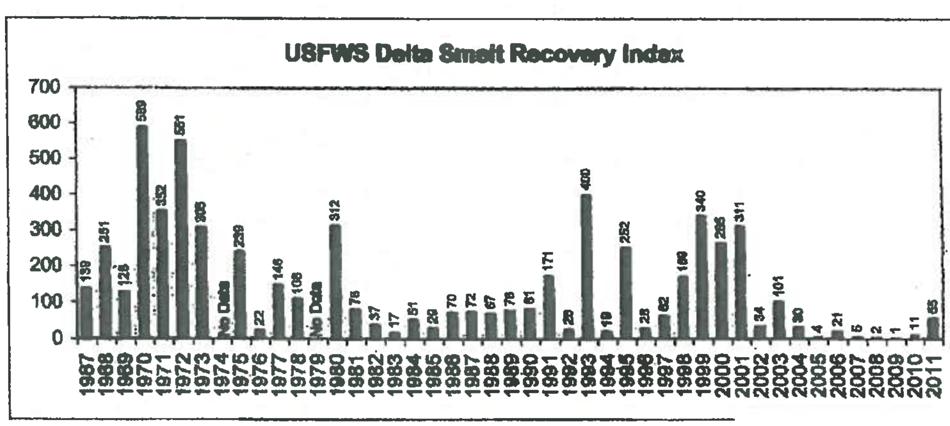

USFWS Delta Smelt Recovery Index
700
600
500
400
300
200
100
0
No Data
No Data
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
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Exhibit 22

2-1-13

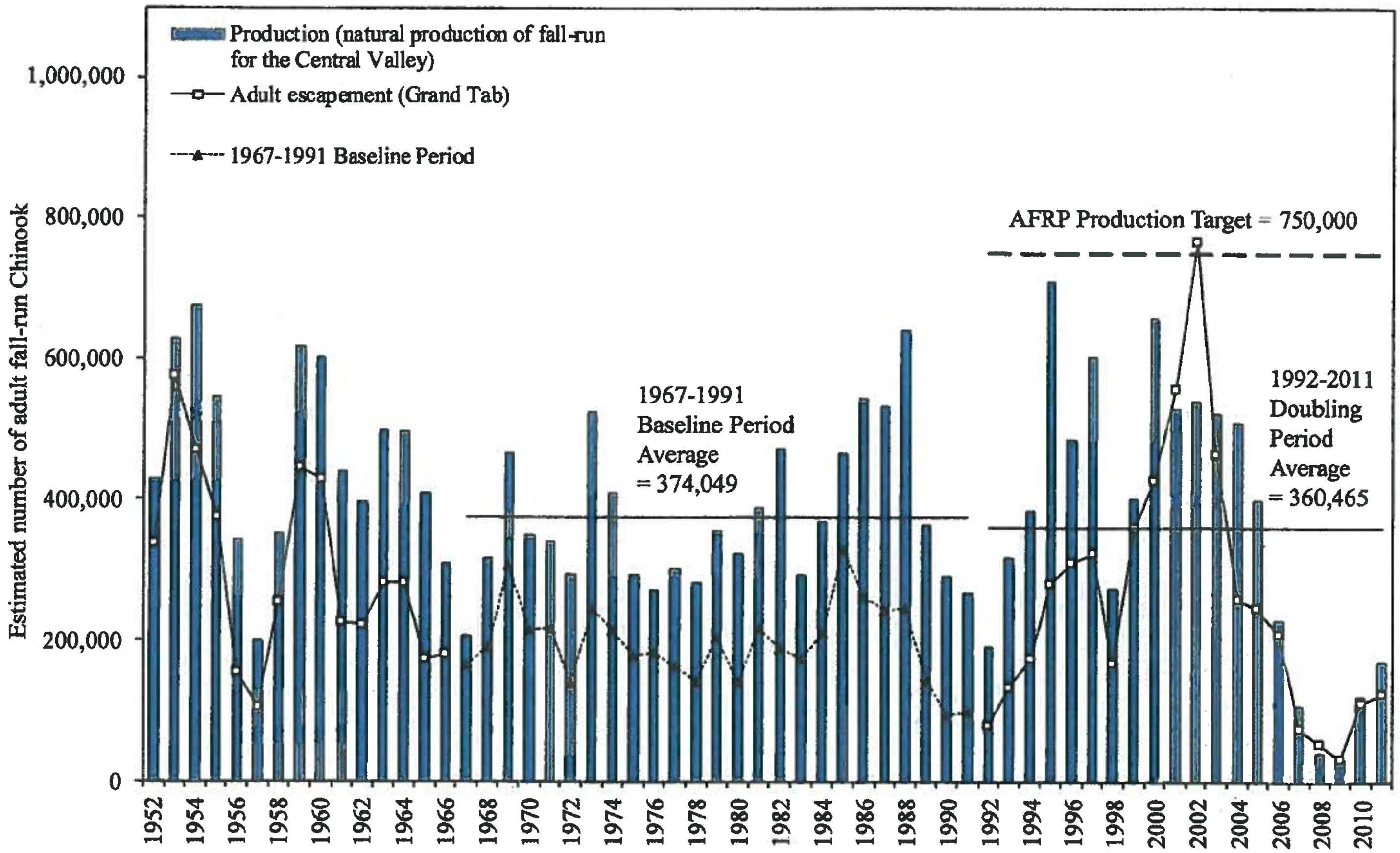


Figure 2. Estimated yearly natural production and in-river escapement of adult fall-run Chinook salmon in the Central Valley rivers and streams. 1952 - 1966 and 1992 - 2011 numbers are from CDFG Grand Tab (Apr 24, 2012). 1967-1991 Baseline Period numbers are from Mills and Fisher (CDFG, 1994).

Exhibit 23

2-1-13

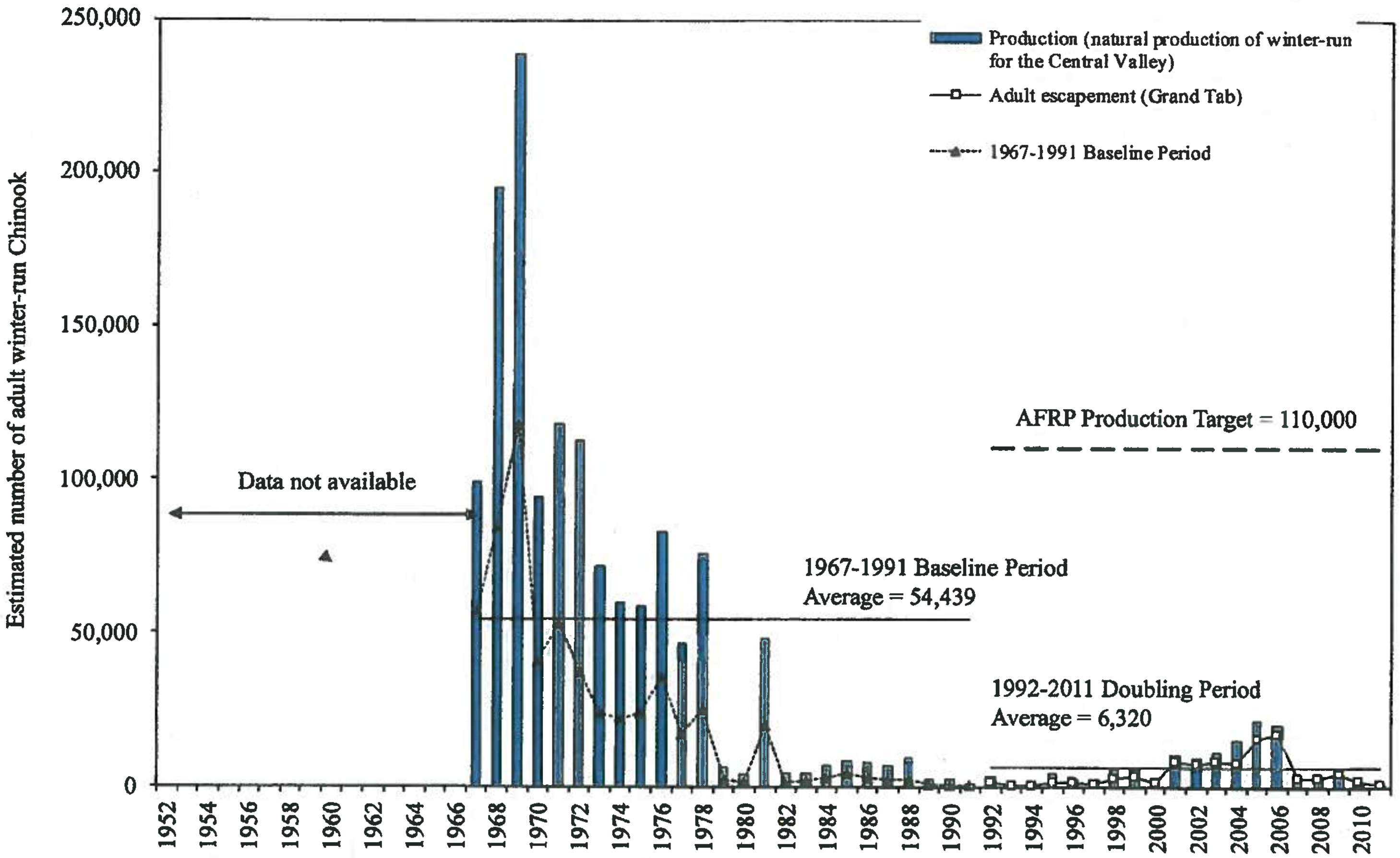
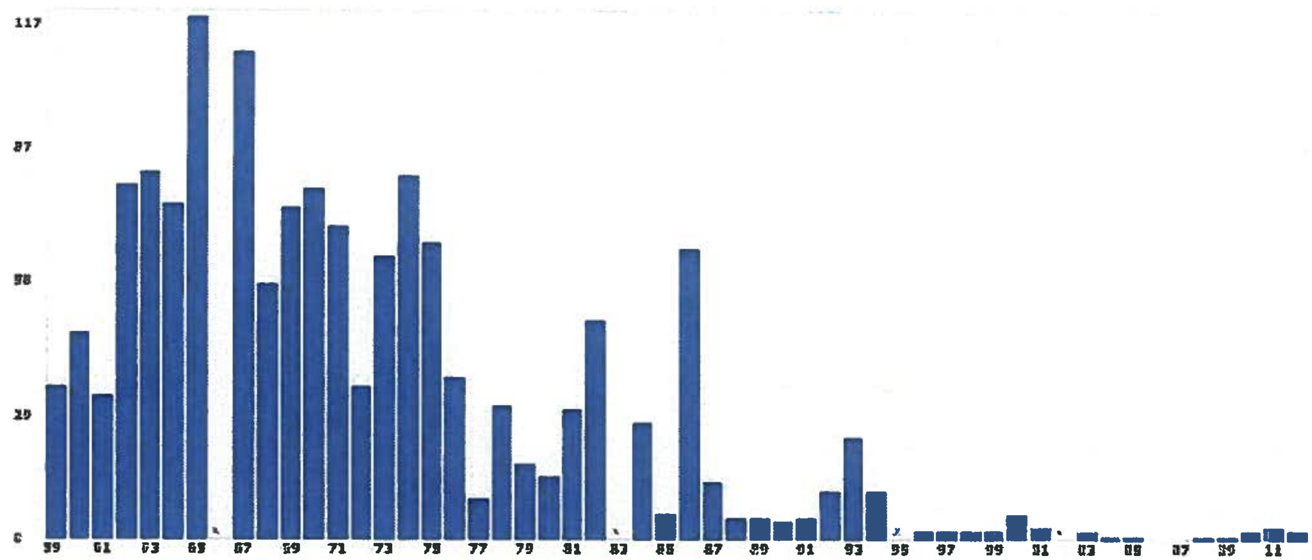


Figure 4. Estimated yearly adult natural production, and in river adult escapements of winter-run Chinook salmon in the Central Valley rivers and streams. 1992 - 2011 numbers are from CDFG Grand Tab (Apr 24, 2012). 1967-1991 Baseline Period numbers are from Mills and Fisher (CDFG, 1994).

Exhibit 24

CALIFORNIA DEPARTMENT OF
FISH and WILDLIFE

Striped Bass Indices



Striped Bass Indices

YEAR	INDEXDATE	DELTA INDEX	SUISUN BAY INDEX	TOTAL INDEX
1959	12-Jul	30.7	3.0	33.7
1960	16-Jul	32.0	13.6	45.6
1961	21-Jul	25.2	6.4	31.6
1962	26-Jul	46.8	32.1	78.9
1963	3-Aug	38.2	43.5	81.7
1964	1-Aug	54.7	20.7	75.4

Exhibit 25

Jeff Opperman
Final Report for Fellowship R/SF-4

My CALFED fellowship (R/SF-4) had three primary research areas: (1) how native fish use California floodplains; (2) developing a method to identify and quantify a particular type of floodplain in the Sacramento Valley; and (3) a white paper for CALFED that reviews, summarizes, and synthesizes research on floodplains generally, and Central Valley floodplains specifically.

1. Native fish and floodplains.

For this research I collaborated with Carson Jeffres, a graduate student at UC Davis (this research was his Master's thesis). We compared the growth rates of juvenile Chinook salmon between various floodplain and riverine habitats. This study built on previous work; (1) in the Yolo Bypass that found that juvenile Chinook grew faster in the flooded Bypass than in the nearby Sacramento River and; (2) in the Cosumnes Preserve which showed that native, wild juvenile Chinook salmon appeared to use the Cosumnes floodplain for rearing when it was inundated.

Juvenile salmon were obtained from a hatchery on the Mokelumne River and placed in enclosures within the Cosumnes River and floodplain (ten fish per enclosure). For two flood seasons (2004 and 2005), six enclosures were placed in each of three different habitat types in the floodplain and two locations in the river (30 enclosures total). Floodplain habitats included an ephemeral pond, flooded terrestrial herbaceous vegetation, and a pond that was permanent during the first year of the study and ephemeral during the second. The river locations were the river channel above the floodplain and the river channel below the floodplain.

The fish were measured at one week intervals, although measurement frequency declined during large flood events that made access difficult. In 2004 fish were measured three times over 4.5 weeks and in 2005 they were measured four times over 8 weeks. After the final measurement the fish were sacrificed and a sub-set were saved for a gut-content analysis.

In general, fish had faster growth rates in floodplain habitats than in the river. During periods of low, clear water, fish growth rates in the river site above the floodplain were comparable to those in the floodplain. However, during higher flows, with more turbid water, growth in the river above the floodplain was significantly lower than on the floodplain. Fish in the river below the floodplain, which was representative of intertidal delta habitat, were consistently low.

The main channel of the Cosumnes River, like those of many Central Valley rivers, is incised and lacks complexity. There are few side channels, backwaters, or accessible floodplain habitats (other than the Cosumnes Preserve). Thus, juvenile fish will tend to be displaced downstream during high flow events. In the Cosumnes, juvenile fish will be flushed downstream to either the intertidal delta or the floodplain. Among these two

Exhibit 26

habitats, the floodplain appears to provide significantly better habitat for rearing (Figure 1).

Figure 1. Juvenile Chinook on the right were reared within an enclosure within the Cosumnes River floodplain while those on the left were reared within an enclosure in the river below the floodplain (intertidal Delta habitat).

This study confirms that juvenile Chinook benefit from access to floodplain habitats. While river habitats comparable to those above the floodplain can support similar growth rates as the floodplain, this habitat is more variable. During high flows the river offers poor habitat and fish living in this type of habitat will tend to be displaced downstream. The floodplain can provide optimal growing conditions during such floods and likely offers superior habitat conditions to the downstream Delta.

The risk of fish stranding on the floodplain merits further research. However, initial research on the Cosumnes suggests that native fish tend to respond to cues that facilitate emigration from the floodplain during draining and that primarily non-native fish become stranded. This work further supports the concept that floodplain restoration can be an important strategy for restoring Central Valley salmon populations.

This research is summarized in:

Jeffres, C., J. Opperman, and P. B. Moyle. *Submitted.* Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook salmon in a California river. Submitted to Environmental Biology of Fishes.

This work has also been presented at the following conferences:

1. Floodplain Management Association 2005
2. Society for Ecological Restoration 2005
3. Riverine Hydroecology (Stirling, Scotland) 2006

2. Identifying and mapping the floodplain inundated by the Floodplain Activation Flood.

Working in collaboration with Phil Williams and Associates (PWA), we worked to define, identify, and quantify a particular type of floodplain: that which is inundated by a Floodplain Activation Flood (FAF). The FAF is a relatively frequent, long duration, spring-time flood that has particular value for native fish and food web productivity (see text on floodplain conceptual model below for further description of a Floodplain Activation Flood).

The FAF was defined as follows:

1. occurs in two out of three years (67% exceedance probability)
2. duration of at least one week
3. occurs between March 15 and May 15.

These criteria were applied to a series of paired gauges along the Sacramento River and within the Yolo Bypass. This process derived a flood stage elevation that corresponded to the FAF criteria. This flood stage was then used to develop a water surface that was applied to topography for the Sacramento River and surrounding floodplain (from US Army Corps of Engineers' Sacramento-San Joaquin Comprehensive Study), estimating the area of floodplain inundated during the FAF.

We found that there is very little floodplain area inundated by the FAF in the current Sacramento Valley. Nearly all floodplain that corresponds to the FAF is found within the Yolo Bypass.

This work is further described in:

Philip Williams & Associates, L., and J. J. Opperman. 2006. The frequently activated floodplain: quantifying a remnant landcape in the Sacramento Valley, San Francisco, CA.

Williams, P., J. Opperman, E. Andrews, S. Bozkurt, and P. Moyle. Quantifying activated floodplain on a lowland regulated river. *In preparation for* San Francisco Estuary and Watershed Science.

3. The Central Valley Floodplain White Paper
I am continuing to work on the floodplain white paper along with my co-author, Peter Moyle. A central part of the white paper is a conceptual model for Central Valley floodplains, briefly described below.

This work has been presented at the following conferences:
1. Floodplain Management Association, 2005
2. American Geophysical Union and the North American Benthological Society, 2005
3. Society for Ecological Restoration, 2005

4. State of the Estuary Conference, 2005
5. CALFED Science Conference, 2006
6. Riverine Hydroecology (Stirling, Scotland), 2006
7. State of Washington, the Ecological Value of High Flows, 2006

<u>Brief overview of conceptual model:</u>

Floodplains support high levels of biodiversity and are among the most productive ecosystems in the world. They provide a range of ecosystem services to human society, including storage and conveyance of flood flows, groundwater recharge, open space, recreational opportunities, and habitat for a diversity of species, many of them of economic importance. Among the world's ecosystem types, Costanza et al. (1997) ranked floodplains second only to estuaries in terms of the ecosystem services provided to society. In the Central Valley, the most important ecosystem services provided by floodplains include reduction of flood risk and habitat for numerous species, including commercially and recreationally valuable species (e.g., chinook salmon and waterfowl) and for endangered species. Recent research has demonstrated that floodplains provide necessary spawning habitat for the Sacramento splittail, an endemic minnow (Sommer et al. 1997) and that juvenile chinook salmon grow faster on floodplains than in main-stem river channels (Sommer et al. 2001b) (Figure 1). Productivity from floodplains can be exported to the Sacramento-San Joaquin Delta, where food limitation is likely one of the factors contributing to the decline of fish species (Jassby and Cloern 2000, Schemel et al. 2004). Further, in places such as the Yolo Bypass, ecologically valuable floodplains can be compatible with productive agriculture (Sommer et al. 2001a).

Recognizing these valuable services, state and federal agencies have expressed policy goals to restore floodplains in the Central Valley (CALFED Bay-Delta Program 2000). Further, flood management projects in the Central Valley now generally include a floodplain restoration component. To guide these restoration efforts, we convened a floodplain working group, composed of floodplain experts drawn from academia, agencies, NGOs, and the private sector, to define ecologically functional floodplains. This group described three primary components of ecologically functional floodplains:

- ***Connectivity*** between river and floodplain.
- ***Hydrological variability***
- ***Sufficient geographic scale*** for associated ecological benefits to be meaningful on a system- or population-scale.

We developed a conceptual model of floodplain processes based on the scientific literature, our collective experiences studying floodplains, and guidance from the floodplain working group (Figure 2). This conceptual model illustrates the linkages between physical and biological processes in floodplains and can be used to inform floodplain restoration projects.

Organization of the conceptual model.
A diverse range of flows influence floodplain geomorphic and ecological processes, ranging from flows below bankfull to large, rare, and highly erosive floods. Numerous aspects of these flows have geomorphic and ecological significance, including magnitude, frequency, duration, rates of change, and seasonality, as well as antecedent conditions on the floodplain. To simplify, our conceptual model focuses on three types of 'representative floods,' characterized by their frequency and magnitude, which are found in the blue boxes in the Hydrology portion of the model. These floods perform geomorphic work, described in the brown-outline boxes in the Geomorphology portion of the model. Hydrologic and geomorphic processes create the conditions for Ecosystem Responses and Processes to occur (green-outlined boxes). The Ecosystem Responses and Processes produce Ecological Benefits, the magnitudes of which are influenced by the geographic scale of floodplain. Two representative floods, the Floodplain Activation Flood and the Floodplain Reorganization Flood are illustrated in Figures 2 and 3 and described below.

Two representative floods
Floodplain Activation Flood. The floodplain activation flood (FAF) is a small-magnitude flood that occurs relatively frequently (e.g., almost every year) (Figure 3)**.** The FAF can be further defined in terms of seasonality and duration—for example a flood that lasts at least one week and occurs in the Spring. The following article by Betty Andrews defines a FAF in terms of frequency, season, and duration and then describes a process to map the floodplain that corresponds to the FAF in the Sacramento Valley. A long duration flood produces characteristic ecological benefits such as habitat for native fish spawning and rearing (Figure 1) and food web productivity. The duration of the flood is important as these processes cannot occur during a short event. The seasonality of the flood also influences which ecological processes occur (see the temporal scale bar (Winter - Late spring) in one of the ecological process boxes). The importance of duration and seasonality for a FAF is indicated by the question mark adjacent to the flood occurring in late January on the hydrograph in Figure 2 (a short, winter-time flood)**.** Because floodplains can remain inundated for a period of time after the loss of direct connection with river flows, a series of short connections can also function as a floodplain activation flood.
Floodplain Reorganization Flood. The floodplain reorganization flood is a greater magnitude flood that occurs less frequently (Figure 3). This higher energy flood produces geomorphic work including extensive erosion and deposition on the floodplain which creates heterogeneous floodplain topography. In turn, these dynamic events and heterogeneous topography create a diverse ecosystem with vegetation patches of varying age, species composition and structure, and floodplain water bodies of varying successional stage and connectivity to the river. The ecosystem processes that occur during a Floodplain Activation Flood take place within the mosaic of habitat features created during Floodplain Reorganization Floods.

Conclusions
The model illustrates the importance of hydrological variability for an ecologically functional floodplain. For example, a floodplain that rarely is inundated by a Floodplain

Activation Flood will not produce the ecological benefits of food web productivity or spawning and rearing habitat for native fish. A floodplain that is not subject to Floodplain Reorganization Floods will not maintain the mosaic of habitats (e.g., vegetation and water bodies of varying successional stages) that help support floodplain biodiversity. Therefore, floodplain restoration projects should not only focus on reintroducing connectivity between rivers and floodplains. Floodplain managers should also ask the following questions about this connectivity: how often, for how long, in what season, and of what magnitude? The answers to these questions will strongly influence the range of ecological benefits that the restored floodplain can provide.

CALFED Bay-Delta Program. 2000. Ecosystem restoration program plan. Volume I: Ecological attributes of the San Francisco Bay-Delta watershed. Pages 532 pp. CALFED.

Costanza, R., R. dArge, R. deGroot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. Oneill, J. Paruelo, R. G. Raskin, P. Sutton, and M. vandenBelt. 1997. The value of the world's ecosystem services and natural capital. *Nature* 387: 253-260.

Jassby, A. D., and J. E. Cloern. 2000. Organic matter sources and rehabilitation of the Sacramento - San Joaquin Delta (California, USA). *Aquatic Conservation: Marine and Freshwater Ecosystems* 10: 323-352.

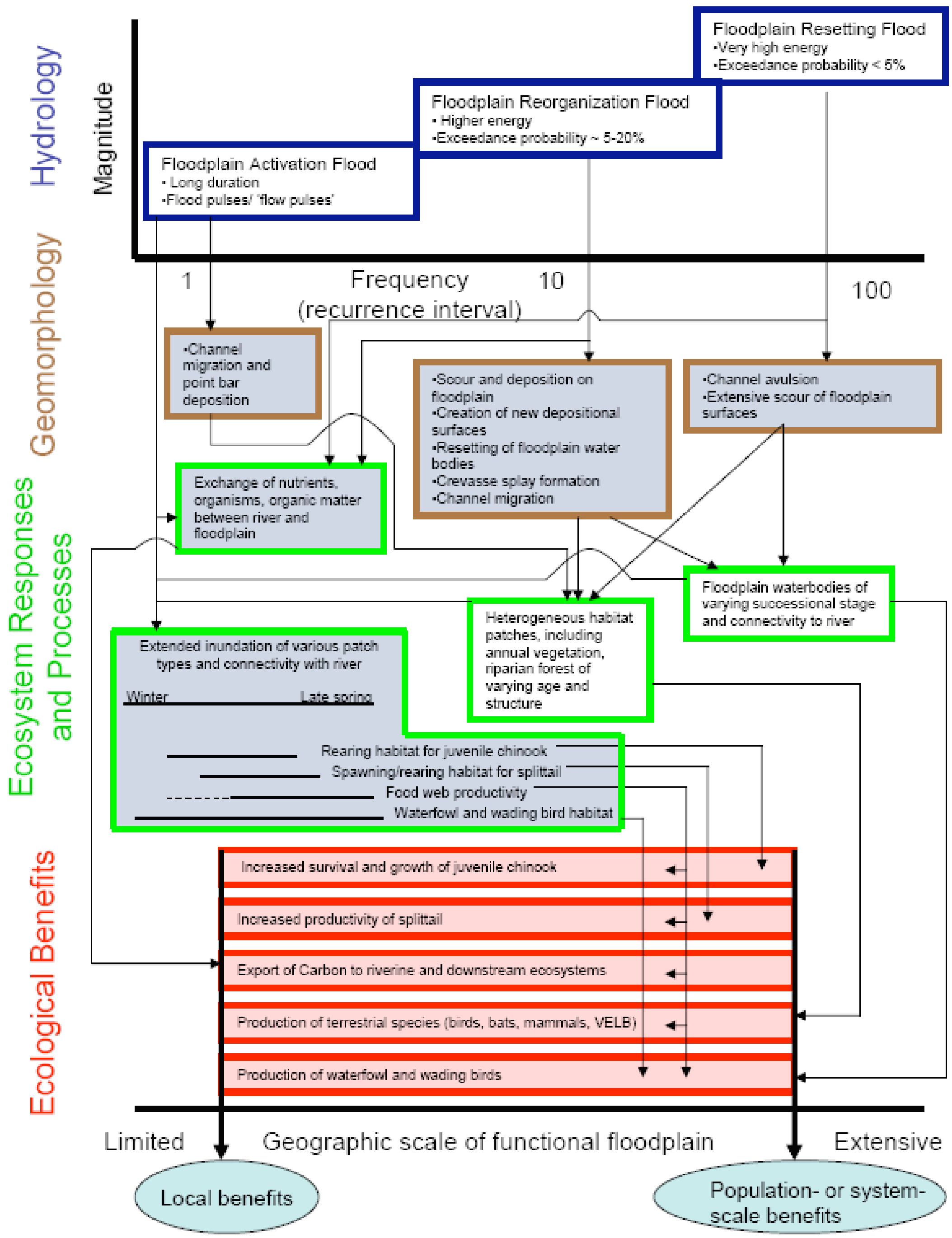
Schemel, L. E., T. R. Sommer, A. B. Muller-Solger, and W. C. Harrell. 2004. Hydrological variability, water chemistry, and phytoplankton biomass in a large floodplain of the Sacramento River, CA, USA. *Hydrobiologia* 513: 129-139.

Sommer, T., R. Baxter, and B. Herbold. 1997. Resilience of splittail in the Sacramento-San Joaquin estuary. *Trans. Am. Fish. Soc.* 126: 961-976.

Sommer, T., B. Harrell, M. Nobriga, R. Brown, P. Moyle, W. Kimmerer, and L. Schemel. 2001a. California's Yolo Bypass: evidence that flood control can be compatible with fisheries, wetlands, wildlife, and agriculture. *Fisheries* 26: 6-16.

Sommer, T. R., M. L. Nobriga, W. C. Harrell, W. Batham, and W. J. Kimmerer. 2001b. Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival. *Canadian Journal of Fisheries and Aquatic Sciences* 58: 325-333.

Figure 2. Floodplain Conceptual Model



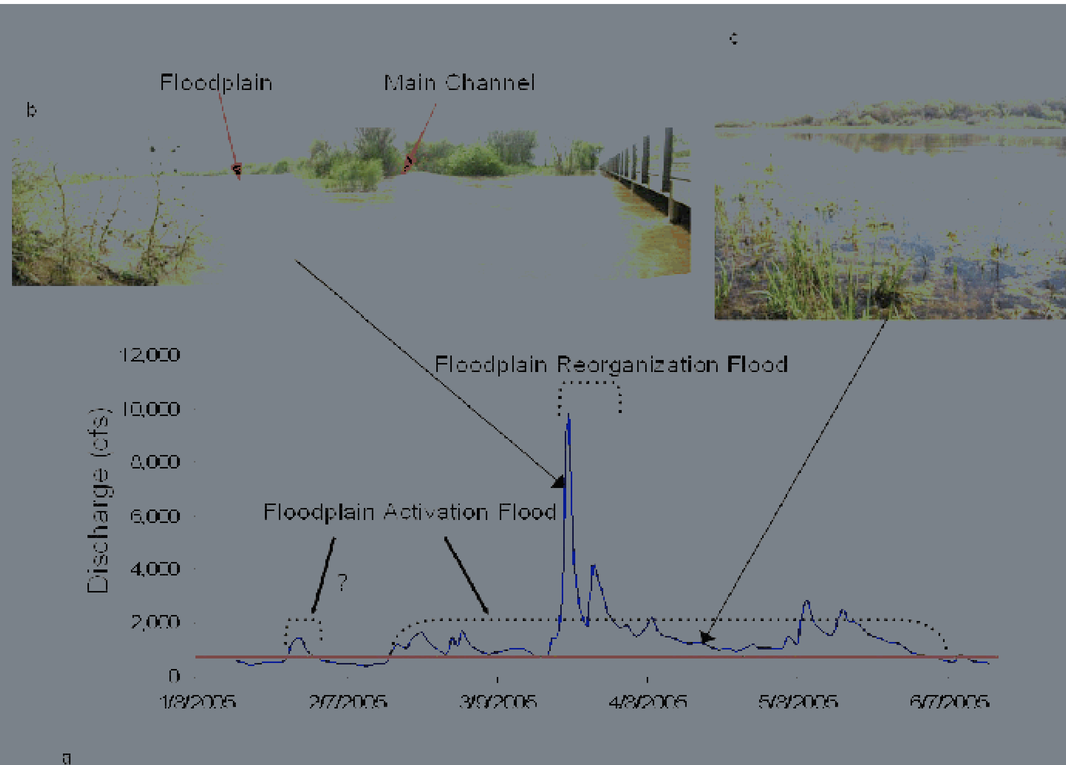


Figure 3. (a) Hydrograph from the Cosumnes River, winter and spring 2005. The red line indicates the approximate discharge at which the river and floodplain are connected. The importance of duration and seasonality for a floodplain activation flood (FAF) is indicated by the question mark adjacent to the flood occurring in late January (i.e., this short, winter-time flood may not provide the ecological benefits associated with a FAF); (b) A floodplain reorganization flood on the Cosumnes River floodplain, March 23, 2005; (c) A floodplain activation flood on the Cosumnes River floodplain, April 2005. Note the development of algal mats in the water and on the vegetation.

Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival

T.R. Sommer, M.L. Nobriga, W.C. Harrell, W. Batham, and W.J. Kimmerer

Abstract: In this study, we provide evidence that the Yolo Bypass, the primary floodplain of the lower Sacramento River (California, U.S.A.), provides better rearing and migration habitat for juvenile chinook salmon (*Oncorhynchus tshawytscha*) than adjacent river channels. During 1998 and 1999, salmon increased in size substantially faster in the seasonally inundated agricultural floodplain than in the river, suggesting better growth rates. Similarly, coded-wire-tagged juveniles released in the floodplain were significantly larger at recapture and had higher apparent growth rates than those concurrently released in the river. Improved growth rates in the floodplain were in part a result of significantly higher prey consumption, reflecting greater availability of drift invertebrates. Bioenergetic modeling suggested that feeding success was greater in the floodplain than in the river, despite increased metabolic costs of rearing in the significantly warmer floodplain. Survival indices for coded-wire-tagged groups were somewhat higher for those released in the floodplain than for those released in the river, but the differences were not statistically significant. Growth, survival, feeding success, and prey availability were higher in 1998 than in 1999, a year in which flow was more moderate, indicating that hydrology affects the quality of floodplain rearing habitat. These findings support the predictions of the flood pulse concept and provide new insight into the importance of the floodplain for salmon.

Résumé : Notre étude démontre que le canal de dérivation Yolo, la principale plaine d'inondation de la région aval de la rivière Sacramento (Californie, É.-U.), offre de meilleurs habitats pour l'alevinage et la migration des jeunes Saumons Quinnat (*Onchorhynchus tshawytscha*) que les bras adjacents de la rivière. En 1998 et 1999, la taille des saumons a augmenté plus rapidement dans la plaine d'inondation agricole, sujette aux débordements saisonniers de crue, que dans la rivière, ce qui laisse croire à de meilleurs taux de croissance. De plus, des jeunes saumons marqués à l'aide de fils de métal codés et relâchés dans la plaine d'inondation étaient plus gros au moment de leur recapture et avaient des taux de croissance apparente plus élevés que des poissons relâchés dans la rivière en même temps. L'amélioration des taux de croissance dans la plaine de débordement résultait en partie d'une consommation significativement plus importante de proies, le reflet d'une plus grande disponibilité des invertébrés de la dérive. Un modèle bioénergétique laisse croire que le succès de l'alimentation a été meilleur dans la plaine d'inondation que dans la rivière, en dépit du coût métabolique d'alevinage significativement plus grand dans les eaux plus chaudes de la plaine d'inondation. Les indices de survie des poissons marqués et relâchés dans la plaine d'inondation étaient quelque peu plus élevés que ceux des poissons de la rivière, mais les différences n'étaient pas statistiquement significatives. La croissance, la survie, le succès de l'alimentation et la disponibilité des proies étaient tous supérieurs en 1998 par comparaison avec 1999, une année à débit plus modéré, ce qui indique que l'hydrologie affecte la qualité des habitats d'alevinage dans la plaine d'inondation. Nos résultats appuient les prédictions du concept de pulsion de crue (flood pulse concept) et mettent en lumière l'importance de la plaine d'inondation pour le saumon.

[Traduit par la Rédaction]

Introduction

Although the trophic structure of large rivers is frequently dominated by upstream processes (Vannote et al. 1980), there is increasing recognition that floodplains plays a major role in the productivity and diversity of riverine communities (Bayley 1995). Based largely on observations from relatively undisturbed river–floodplain systems, Junk et al. (1989) proposed the flood pulse concept, which predicts that annual inundation is the principal force determining productivity and biotic interactions in river–floodplain systems. Floodplains can provide higher biotic diversity (Junk et al. 1989) and increased production of fish (Bayley 1991; Halyk and Balon 1983) and invertebrates (Gladden and Smock 1990). Potential mechanisms for floodplain effects include increased habitat diversity and area (Junk et al. 1989), large inputs of

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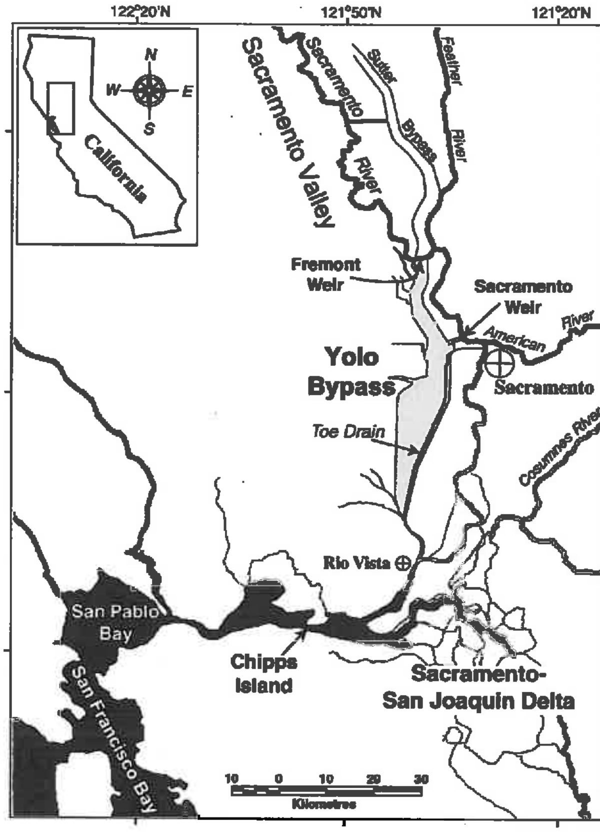
terrestrial material into the aquatic food web (Winemiller and Jepsen 1998), and decreased predation or competition due to intermediate levels of disturbance (Corti et al. 1997). Nonetheless, the degree to which floodplains support riverine ecosystems remains poorly understood, particularly in regulated and temperate rivers. Uncertainties about river–floodplain relationships are due, in large part, to the difficulty in separating the relative contribution of floodplain versus channel processes and sampling problems in seasonal habitats, which are frequently subject to extreme environmental variation.

In the this study, we examined the relative importance of floodplain and riverine habitat to juvenile chinook salmon (*Oncorhynchus tshawytscha*) in the Sacramento River (California, U.S.A.), a large regulated river (Fig. 1). The system is particularly well suited to a comparative study, because young salmon migrating down the lower Sacramento River to the San Francisco Estuary in wet years have two alternative paths: they may continue down the heavily channelized main river or they may pass through the Yolo Bypass, an agricultural floodplain bordered by levees. We had two reasons to believe that the floodplain might be important habitat for young salmon. First, years of high flow are known to enhance populations of a variety of species in the San Francisco Estuary (Jassby et al. 1995) and the survival of chinook salmon (Kjelson et al. 1982). However, the specific mechanisms for these benefits have not been established. Possible reasons for the positive effects of flow on fish include increased habitat availability, migration cues, food supply, larval transport, and reduced predation rates (Bennett and Moyle 1996). Floodplain inundation is one of the unique characteristics of wet years, during which the Yolo Bypass is likely to be a significant migration corridor for young chinook salmon in the Sacramento Valley. During high-flow events, the Yolo Bypass can convey >75% of the total flow from the Sacramento River basin, the major producer of salmon among tributaries of the San Francisco Estuary. Second, floodplains are known to be among the most important fish-rearing areas in a variety of river systems, yet in developed regions, the availability of this habitat has been greatly reduced by channelization and levee and dam construction (Rasmussen 1996). A high degree of habitat loss may greatly enhance the biological significance of remnant floodplains in heavily modified systems, such as the San Francisco Estuary and its tributaries.

This study tests the hypothesis that the agricultural floodplain provides better habitat quality than the adjacent river channel. For the purpose of this analysis, we focus on salmon growth, feeding success, and survival as indicators of habitat quality. Obviously, there are many other possible measures of habitat quality, such as reproductive output of adults or physiological indicators. However, we believe that the chosen suite of parameters is reasonably representative of habitat quality. For example, Gutreuter et al. (2000) successfully used growth as a factor to test the hypothesis that floodplain inundation had a major effect on fish production.

The San Francisco Estuary is one of the largest estuaries on the Pacific Coast (Fig. 1). The system includes downstream bays (San Pablo and San Francisco) and a delta, a broad network of tidally influenced channels that receive inflow from the Sacramento and San Joaquin rivers. The estuary and its tributaries have been heavily altered by levees, dams, land reclamation activities, and water diversions. The primary floodplain of the Sacramento River portion of the delta is the Yolo Bypass, a 24 000-ha leveed basin that conveys excess flow from the Sacramento Valley, including the Sacramento River, Feather River, American River, Sutter Bypass, and westside streams. The 61 km long floodplain floods seasonally in winter and spring in about 60% of years, and is designed to convey up to 14 000 $m^3 \cdot s^{-1}$. During a typical flooding event, water spills into the Yolo Bypass via the Fremont Weir when Sacramento Basin flows surpass approximately 2000 $m^3 \cdot s^{-1}$. Except during extremely high flow events, the mean depth of the floodplain is generally less than 2 m, creating broad shoal areas. During dry seasons, the Toe Drain channel, a permanent riparian corridor, remains inundated as a result of tidal action. At higher levels of Sacramento Basin flow (e.g., >5000 $m^3 \cdot s^{-1}$), the Sacramento Weir is also frequently operated. Agricultural fields are the dominant habitat type in Yolo Bypass, but approximately one-third of the floodplain area is natural vegetation, including riparian habitat, upland habitat, emergent marsh, and permanent ponds.

Fig. 1. The location of Yolo Bypass in relation to the San Francisco Estuary and its tributaries. The San Francisco Estuary encompasses the region from San Francisco Bay upstream to Sacramento. Feather River Fish Hatchery is located on the Feather River approximately 112 km upstream of Yolo Bypass.



There are four races of chinook salmon in the Sacramento Valley: winter, spring, late fall, and fall run (Yoshiyama et al. 2000). Historical data indicate that all races have decreased in abundance since the 1950s, but the spring, winter, and late-fall runs have shown the most pronounced declines. There are multiple causes for these long-term reductions, including habitat loss, habitat degradation, water diversions, and oceanic conditions. In the present study, we focused on the fall run, the numerically dominant race in the Sacramento Valley. The typical life-history pattern for these salmon is for young to migrate from the tributaries to the bay–delta area at the "fry" stage (Brandes and McLain 2001), when most individuals are approximately 35- to 70-mm fork length (FL). In low flow years, there may be substantial upstream rearing in the Sacramento River. Peak juvenile emigration from the tributaries occurs during winter and spring (Kjelson et al. 1982).

Materials and methods

Physical conditions

During 1998–1999, flow measurements in Yolo Bypass and the adjacent stretch of the Sacramento River were obtained from gauges operated by the U.S. Geological Survey (USGS). Daily water temperatures for each site were calculated as the mean of maximum and minimum daily measurements for single stations in the Sacramento River (USGS) and a temperature recorder (Onset Corp.) installed in the Yolo Bypass Toe Drain channel (Fig. 1). However, from 1 February to 26 March 1998, these data were not available for Yolo Bypass. During this period, before the recorder was installed, discrete measurements were taken at the same location, typically during mid or late morning.

Fish sampling

Salmon FL (mm) was measured during January–April in 1998 and 1999 on samples collected with 15-m beach seines (4.75-mm mesh). Samples were collected weekly at five core locations located around the perimeter of the Yolo Bypass, during periods when the basin was flooded. After the bypass drained, additional samples were collected at random locations around the perimeter of ponds near the core locations. Comparative data on salmon size in the adjacent reach of the Sacramento River were collected by the U.S. Fish and Wildlife Service (USFWS) at five beach-seine sites, using techniques similar to those used when the the bypass was flooded.

FLs of salmon obtained from beach-seine sampling were compared to determine whether there was evidence of major differences in salmon size between the Yolo Bypass and the Sacramento River. However, these data were not considered unambiguous evidence of growth differences, because the two systems were open to immigration and emigration during much of the study, and migrating salmon include multiple races of salmon that cannot be readily separated. We addressed this issue by using paired releases of coded-wire-tagged (CWT) juvenile salmon in Yolo Bypass and the Sacramento River. This approach allowed comparisons of growth among fish of similar origin and provided a relative estimate of migration time and survival. The salmon were produced and tagged at the Feather River Fish Hatchery and released on 2 March 1998 and 11 February 1999. The release sites were in Yolo Bypass below Fremont Weir (52 000 in 1998; 105 000 in 1999) and in the adjacent reach of the Sacramento River (53 000 in 1998; 105 000 in 1999). The fish had a mean FL of 57.5 ± 0.5 mm (SE) in 1998 and of 56.8 ± 0.4 mm (SE) in 1999. A small portion of each group was subsequently collected by trawling at the seaward margin of the delta at Chipps Island, which is located downstream of the confluence of the Yolo Bypass and the Sacramento River (Fig. 1). The USFWS Chipps Island survey samples a single channel location with a midwater trawl towed at the surface (Baker et al. 1995; Brandes and McLain 2001). Ten 20-min tows were made each day, except during March in 1998 and 1999, when sampling was conducted every other day. Data on migration time (days) and FL (mm) were recorded for fish recaptured from each release group. Apparent growth rate was also calculated for each fish, as: (FL of individual at Chipps Island – mean FL of CWT release group) × (migration time)$^{-1}$. Survival indices of the paired CWT releases were calculated by USFWS by dividing the number of fish recovered for each release group at Chipps Island by the number released, corrected for the fraction of time and channel width sampled (Brandes and McLain 2001).

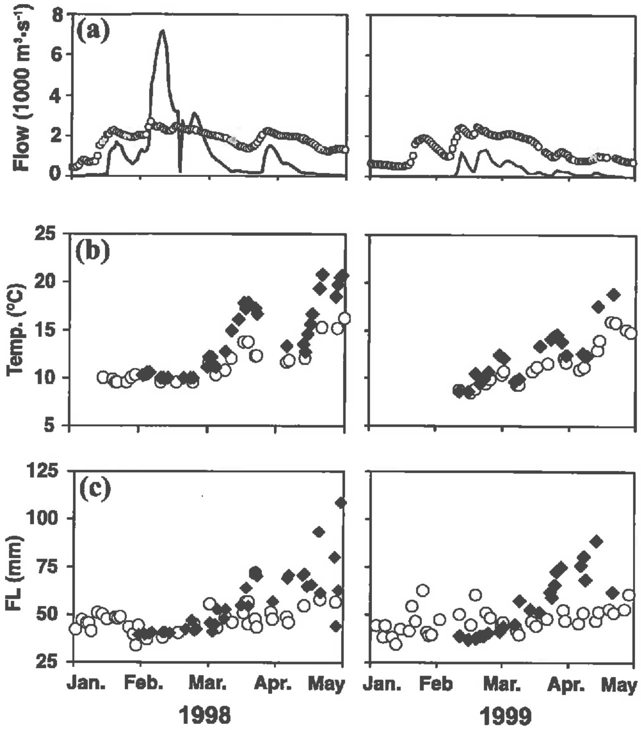
Diet

We performed diet comparisons on fall-run juvenile salmon (33–81 mm) collected in beach-seine samples during February–March of 1998 and 1999 from the Yolo Bypass (103 individuals) and the Sacramento River (109 individuals). Fish samples were tagged and stored individually in a deep freeze. After thawing, stomachs were removed from the fish and the contents were identified (using a dissecting microscope) to order (insects and arachnids), genus (crustaceans), or phylum (rarely eaten taxa such as oligochaetes). To develop average invertebrate length estimates, up to 10 individuals of each prey type encountered were measured. Prey dry weight estimates were calculated from average lengths, using regression equations for delta crustaceans obtained from J. Orsi (California Department of Fish and Game, Stockton, CA 95205, unpublished data) and from literature sources. Diet results were compared as an index of relative importance (IRI) (Shreffler et al. 1992) for each month. The index was calculated as: IRI = (% numeric composition + % weight composition) × % frequency of occurrence.

Prey availability

Invertebrates were sampled in February–March of 1998 and 1999, to examine prey availability in the Yolo Bypass and the Sacramento River. Sampling was not designed as a comprehensive evaluation of spatial and temporal variation of prey. Rather, it was intended to provide information on whether variation in salmon diets between the two locations was consistent with gross differences in prey type or relative abundance. We focused on Diptera (adults, pupae, and larvae) and crustacean zooplankton, which comprised over 90% of the diets of Yolo Bypass and Sacramento River juvenile salmon. Weekly drift samples were collected at fixed stations on the Yolo Bypass and the Sacramento River during periods when the floodplain was inundated. The sampling points were located away from overhanging vegetation and bank eddies, in water velocities of approximately 15–60 cm·s^{-1}, depending on flow. Net (500-μm mesh) dimensions were 0.46 × 0.3 m mouth and 0.91 m length. The nets were fished for approximately 30 min during mid-morning, to coincide with the time period when most fish-stomach samples were taken. Sample volume was calculated using a flowmeter (General Oceanics Model 2030R) and net dimensions. Drift samples were stored in ethanol or formaldehyde, then identified to family or order using a dissecting microscope. In 1998, zooplankton were collected in the Yolo Bypass at two fixed stations with battery-operated rotary-vane pumps with a mean flow rate of 17 L·min^{-1}. Samples were taken via pipes with outlets at multiple locations beneath the water surface. Discharge was directed into a 150 μm mesh net held in a basin on the bank. Flow rate was recorded at the beginning and end of the sample period, which varied from 1 to 6 h. No samples were taken in the Sacramento River during a comparable period in 1998. In 1999, zooplankton samples were taken with a Clarke–Bumpus net (160-μm mesh, diameter 0.13 m, length 0.76 m) placed in surface flow in the Yolo Bypass and Sacramento River. Sample volume was recorded as for the drift net. Zooplankton samples were concentrated and stored in 5%

Fig. 2. Chinook salmon size versus physical conditions in Yolo Bypass and the Sacramento River during winter and spring in 1998 and 1999. (*a*) Mean daily flow ($m^3 \cdot s^{-1}$) in Yolo Bypass (solid line) and the Sacramento River (circles). (*b*) Mean water temperature (°C) in Yolo Bypass (solid symbols) and the Sacramento River (open symbols). (*c*) Mean daily chinook salmon FL for Yolo Bypass (solid symbols) and Sacramento River (open symbols) beach-seine stations. For presentation purposes, only the daily mean FLs are shown; however, individual observations for February–March were used for statistical analyses.



formaldehyde, for later identification to genus using a dissecting microscope.

Bioenergetics

Feeding success was examined in two ways: (1) prey biomass estimated from stomach contents and (2) prey biomass estimated as a function of maximum theoretical consumption. For the first measure, we used the previously described stomach-content data to calculate total-prey biomass for individual fish.

A limitation of using prey biomass as a measure of feeding success between locations is that thermal history affects how consumption alters growth rate (Hewett and Kraft 1993). As will be discussed in further detail, water temperatures were significantly higher in the Yolo Bypass floodplain than in the Sacramento River. To correct for this problem, our second approach used bioenergetic modeling to incorporate the metabolic effects of water temperature. We used methods similar to those of Rand and Stewart (1998) to calculate a wet weight ration index, which uses prey biomass for each sampled individual as a proportion of the theoretical maximum daily consumption. The stomach-content data were used as our estimate of prey biomass for individual fish. The theoretical maximum daily consumption rate (C_{max}) was modeled using Fish Bioenergetics 3.0 (Hanson et al. 1997), using observed body size and water temperature at the time each beach-seine sample was collected. The model input also required fish mass, which we estimated from FL data, using length–weight relationships from Sacramento River juvenile salmon (Petrusso 1998). The caloric value of the prey was taken from weight conversion factors provided by Hanson et al. (1997). Model parameters were derived from those of Stewart and Ibarra (1991) for chinook salmon. The model was run for individual fish collected at each sampling location in 1998 and 1999.

Table 1. Robust regression statistics for Yolo Bypass and Sacramento River salmon FLs for 1998 and 1999.

	1998		1999	
	Parameter ± SEM	*t*	Parameter ± SEM	*t*
Intercept	29.4±0.6	46.8	23.5±0.5	43.7
Location	6.4±0.6	10.2	11.1±0.5	20.6
Day	0.3±0.01	34.5	0.3±0.01	48.5
Location:day	−0.14±0.01	−18.4	−0.21±0.01	−33.6

Note: The t values are all highly significant ($p < 0.0001$).

We emphasize that the second approach provides an *index*, rather than an *absolute* measure of feeding success. The wet weight ration index is conceptually analogous to "*P*" in Hanson et al. (1997), a model parameter that indicates what fraction of C_{max} is obtained over the course of the day. The major difference is that *P* is based on prey consumption over a 24-hour period, whereas our wet weight ration index is based on instantaneous measurements of stomach contents, which may not represent mean trends over the entire day. An additional limitation is that the Stewart and Ibarra (1991) model parameters were developed for adult salmon and we applied the model to juveniles. We did not have sufficient field or laboratory data to develop bioenergetic-model parameters specific to the earliest life stages. Nonetheless, other studies (Rand and Stewart 1998) have demonstrated that similar wet weight ration indices can provide an effective technique for comparing relative salmonid feeding success between seasons and years.

Statistical analysis

Overlapping temperature measurements from continuous recorders and the discrete measurements during 26 March – May 1998 were analyzed with Wilcoxon's matched-pairs test, to determine whether the two methods yielded different results. Mean water temperature for Yolo Bypass and the Sacramento River during the primary period of floodplain inundation (February–March) was analyzed with a generalized linear model with a variance function that increased with the mean squared, since variances were not homogeneous (Venables and Ripley 1997). Salmon FL measurements for Yolo Bypass and the Sacramento River during February–March of 1998 and 1999 were compared with a robust iteratively reweighted least squares regression procedure ("rlm"; Venables and Ripley 1997), because we detected substantial numbers of outliers in preliminary graphical evaluations of the data. Initial analyses revealed a substantial difference in the effects of location between years, so years were analyzed separately. Results from the CWT and bioenergetic studies were analyzed using a factorial-design analysis of variance, to evaluate the effects of location (Yolo Bypass, Sacramento River) and year (1998, 1999). Residuals from each model were examined graphically, to confirm that they met the assumption of normality and homogeneity of variance. Cochran and Levene's tests were also used, to test the assumption of homogeneity of variance. Logarithmic transformation was performed where necessary.

Results

Physical conditions

Yolo Bypass was inundated in 1998 and 1999 but the hydrology was substantially different in the two years (Fig. 2).

Table 2. Results of salmon collections at Chipps Island for 1998 and 1999 coded-wire-tagged groups released concurrently in Yolo Bypass and the Sacramento River.

	1998		1999	
	Yolo Bypass	Sacramento River	Yolo Bypass	Sacramento River
Fork length (mm)	93.7±2.0	85.7±1.4	89.0±2.6	82.1±1.7
Migration time (days)	46.2±2.3	55.4±3.5	58.2±2.8	58.6±4.1
Apparent growth rate ($mm \cdot day^{-1}$)	0.80±0.06	0.52±0.02	0.55±0.06	0.43±0.03
Survival index	0.16	0.09	0.09	0.07
Sample size	9	10	9	8

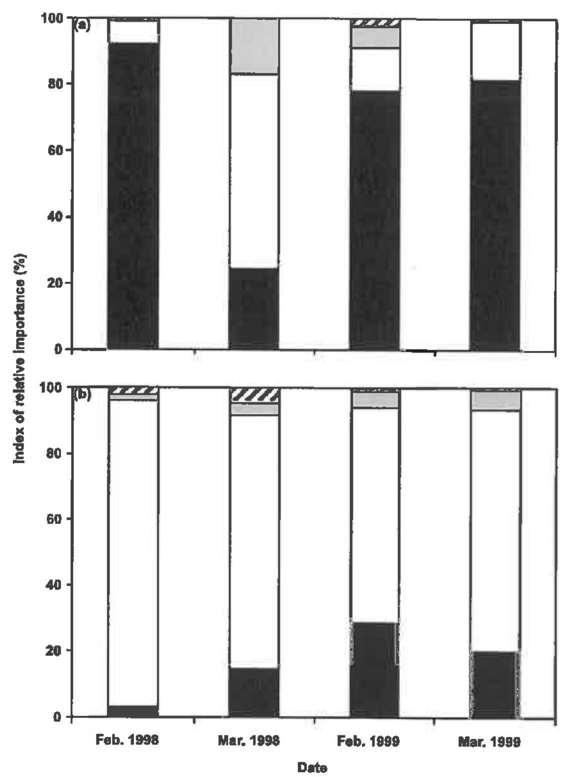
Note: Values for FL, migration time, and apparent growth rate are mean ± standard error (SEM).

The first year was extremely wet, with multiple flow pulses and a peak flow of 7200 $m^3 \cdot s^{-1}$. In 1999, floodplain hydrology was more moderate, with a peak of 1300 $m^3 \cdot s^{-1}$. Flows in the Sacramento River were much less variable than in the floodplain and generally remained at or below 2000 $m^3 \cdot s^{-1}$, a level within the design capacity (3100 $m^3 \cdot s^{-1}$) of the channel. Overlapping sampling between the continuous-temperature recorders and the discrete measurements during March–May 1998 showed a mean difference of 0.9°C between the two approaches, but this disparity was not statistically significant (Wilcoxon's matched-pairs test, $p > 0.25$). In 1998 and 1999, temperatures increased fairly steadily throughout the study period; however, in both years, temperature levels in Yolo Bypass were up to 5°C higher than those in the adjacent Sacramento River during the primary period of inundation, February–March. Temperature in the Yolo Bypass was described in 1998 by $T_y = -7.7 \pm 2.1 + (1.9 \pm 0.2)T_s$ and in 1999 by $T_y = -3.5 \pm 1.2 + (1.5 \pm 0.1)T_s$, where T_y is the temperature of the Yolo Bypass, T_s is the temperature of the Sacramento River, and the range for each value is the 95% confidence limit.

Fish growth, migration time, apparent growth rate. and survival

Salmon increased in size substantially faster in the Yolo Bypass than in the Sacramento River during each of the study years (Fig. 2). Robust regression results showed that the effect of location was highly significant ($p < 0.00001$) in each year (Table 1). This result is consistent with the CWT data (Table 2), which showed that the 1998 and 1999 Yolo Bypass CWT release groups had significantly larger mean length ($F = 14.34$, $p = 0.0006$) and higher apparent growth rates ($F = 20.67$, $p = 0.0007$) than the Sacramento River release groups. There was also a statistically significant effect of year: both release groups had larger mean sizes ($F = 4.42$, $p = 0.04$) and higher apparent growth rates ($F = 16.47$, $p = 0.0002$) in 1998 than in 1999. The 1998 Yolo Bypass CWT group showed the fastest migration time, arriving an average of at least 9 days ahead of any other release group. However, there was no statistically significant ($F = 2.22$, $p = 0.15$) effect of release location on migration time in the analysis of variance (ANOVA). As for fish size and apparent growth rate, mean migration time was slower in 1999 than in 1998 ($F = 5.60$, $p = 0.02$). There was no statistically significant interaction between location and year for salmon size ($F = 0.07$, $p = 0.78$), apparent growth rate ($F = 1.62$, $p = 0.21$), or migration time ($F = 1.8$, $p = 0.18$). The survival indices were somewhat higher for CWT groups released in the Yolo Bypass than for those released in the Sacramento River for both 1998 and 1999. However, the lowest coefficient of variation based on a Poisson distribution of the CWT recaptures is 32%, and the actual (unknown) distribution of counts is likely to have higher variance than a Poisson distribution. Clearly the confidence limits of the paired survival indices would overlap, so the differences are not statistically significant.

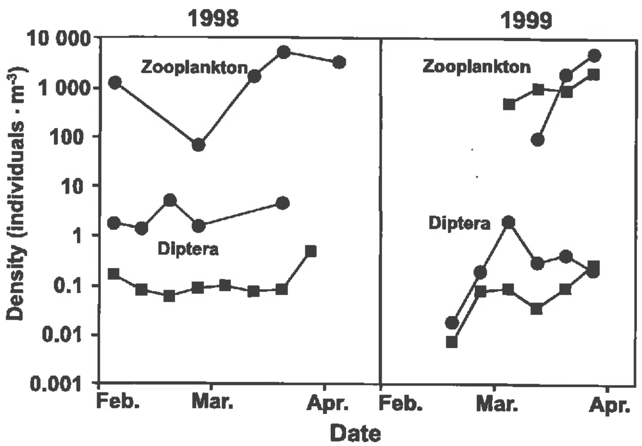
Fig. 3. Chinook salmon diet during February and March of 1998 and 1999 in Yolo Bypass (*a*) and the Sacramento River (*b*). The index of relative importance (*y*-axis) is defined in the text. Diptera (solid bars), zooplankton (open bars), other aquatic prey (shaded bars), and other terrestrial prey (striped bars) are shown for each month.



Diet

The diet of young salmon in the Yolo Bypass was dominated by dipterans, principally chironomid pupae and adults (Fig. 3). The second most common prey item was zooplank-

Fig. 4. Log_{10}-scaled weekly abundance (individuals·m^{-3}) of zooplankton and Diptera in Yolo Bypass (circles) and the Sacramento River (squares) during 1998 and 1999. Note that 1998 zooplankton data were not available for the Sacramento River.



ton, mostly cladocerans and copepods. Except for March 1998, zooplankton comprised less than 15% of the Yolo Bypass diets. Other aquatic (mainly amphipods and collembola) and terrestrial (mainly ants and arachnids) prey were relatively minor diet items. As for the floodplain samples, dipterans and zooplankton comprised over 90% of the diets of Sacramento River salmon; however, zooplankton were the dominant prey item in all months. Other aquatic (mostly amphipods, oligochaetes, and collembola) and terrestrial (mostly ants and other terrestrial insects) prey were consumed infrequently.

Prey availability

The drift samples contained many of the same taxa observed in the salmon diets, with Diptera (principally chironomids) as the major type at both sampling locations. However, the density of Diptera was much higher in the Yolo Bypass than in the Sacramento River (Fig. 4), particularly in 1998, when densities were consistently an order of magnitude higher. In general, dipteran drift densities were higher at each location in 1998 than in 1999. There was little difference in zooplankton density in the Yolo Bypass between 1998 and 1999 or between Yolo Bypass and the Sacramento River in 1999.

Bioenergetics

Young salmon from the Yolo Bypass had higher total-prey weights ($F = 39.2$, df = 1, $p < 0.0001$) than those from the Sacramento River (Fig. 5). The bioenergetic-modeling results showed that Yolo Bypass salmon also had higher wet weight ration indices than those from the Sacramento River ($F = 19.3$, df = 1, $p < 0.0001$). The interaction between location and year was significant for both the wet weight ration indices ($F = 10.0$, df = 1, $p = 0.02$) and the prey weights ($F = 4.7$, df = 1, $p = 0.03$).

Discussion

Chinook salmon that rear in the Yolo Bypass floodplain have higher apparent growth rates than those that remain in the adjacent Sacramento River channels. Mean length increased faster in the Yolo Bypass during each study year, and CWT fish released in the Yolo Bypass were larger and had higher apparent growth rates than those released in the Sacramento River. It is possible that these observations are due to higher mortality rates of smaller individuals in the Yolo Bypass or of larger individuals in the Sacramento River; however we have no data or reasonable mechanism to support this argument.

Apparent growth differences between the two areas are consistent with water temperature and stomach-content results. We found that the Yolo Bypass floodplain had significantly higher water temperatures and that young salmon from the floodplain ate significantly more prey than those from the Sacramento River. The wet weight ration indices calculated from bioenergetic modeling suggest that the increased prey availability in Yolo Bypass was sufficient to offset increased metabolic requirements from higher water temperatures. Higher water temperatures in the Yolo Bypass are expected as a result of the shallow depths on the broad floodplain. Increased feeding success in the Yolo Bypass is consistent with trends in prey availability. While Yolo Bypass and the Sacramento River had similar levels of zooplankton, Yolo Bypass had more dipteran prey in the drift, particularly in 1998. Studies of juvenile chinook salmon diets by Rondorf et al. (1990) showed that zooplankton were the least-favored prey items. Therefore, the dominance of zooplankton in the diets of Sacramento River salmon probably reflects a relatively low availability of other more energetically valuable prey items.

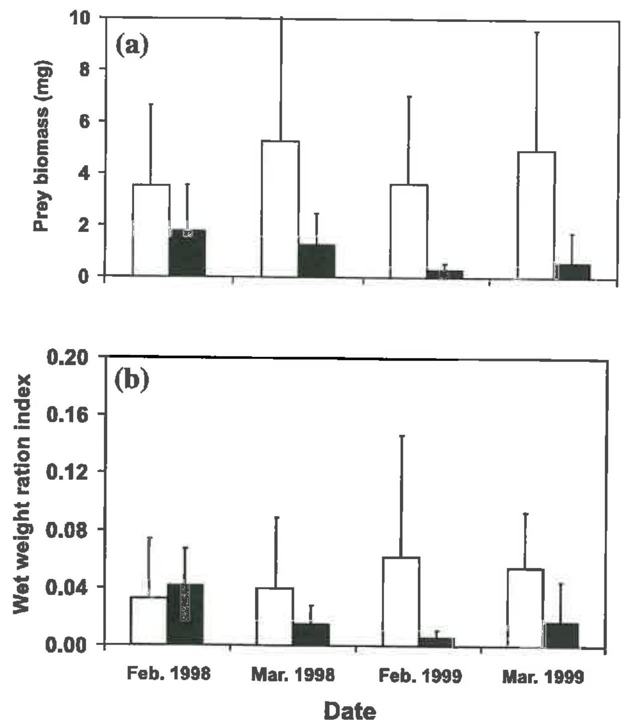
Recoveries of paired releases were too few to determine whether the higher survival indices for the Yolo Bypass release groups represent actual survival differences or random variation. Additional validation is needed from new release studies and from CWT recoveries in the adult ocean fishery and escapement. Nonetheless, the hypothesis that floodplain rearing could improve survival is substantiated by the growth data and bioenergetic modeling. Faster growth rates reflect improved habitat conditions, which would be expected to lead to improved survival, both during migration and later in the ocean. Elevated Yolo Bypass survival rates are also consistent with significantly faster migration rates in 1998, the likely result of which would be reduced exposure time to mortality risks in the delta, including predation and water diversions.

Improved survival is consistent with other habitat differences between the Yolo Bypass floodplain and the Sacramento River channel. We estimate that complete inundation of the Yolo Bypass creates a wetted area approximately 10 times larger than the reach of the Sacramento River we studied. This level of inundation is equivalent to a doubling of the wetted area of the entire delta portion of the San Francisco Estuary. Much of the floodplain habitat consists of broad shoals composed of soil and vegetation that are typical of the low-velocity conditions selected by young salmon (Everest and Chapman 1972). An increase in rearing area should reduce competition for food and space and perhaps reduce the probability of encountering a predator. In contrast, the Sacramento River channel is relatively narrow, with steep rock-reinforced banks and little shallow habitat. Migration through the Yolo Bypass corridor would also prevent fish from entering the channels of the central delta, in which there are various risks, including major water diversions (Brandes and McLain 2001). However, the Yolo Bypass is a less-stable environment, with stranding risks when flood waters recede. The relatively well-drained topography of the Yolo Bypass floodplain may help to reduce the magnitude of this problem. This is not to say, however, that access to floodplain rearing habitat represents the only mechanism to account for possible improvements in juvenile salmon survival in wetter years. Other covariates, such as reduced water temperature (Baker et al. 1995), reduced predation losses from higher turbidity (Gregory and Levings 1998), and reduced water diversion effects (Kjelson et al. 1982), also contribute to improved wet-year survival of salmon that migrate through the San Francisco Estuary.

The results from this study suggest that hydrology may affect salmon feeding success, migration, and survival in both floodplain and river habitat. The CWT results indicate that salmon grew faster, migrated faster, and may have had better survival rates in 1998 than in 1999. One clear difference between the years is that the flow pulses were higher and of longer duration in 1998 than in 1999. Higher flow could directly increase migration rates through higher water velocities and have multiple indirect effects on growth through factors such as food supply or water temperature. The abundance of Diptera in drift samples was substantially higher in 1998 than in 1999 in both locations. The significant interaction between location and year for both prey weights and the wet weight ration index indicates that the combined effects of diet and water temperature under 1998 hydrology should have resulted in higher growth rates. Higher growth rates and faster migration times in 1998 may, in turn, have improved survival by reducing predation risk. Higher-flow conditions in 1998 increased the quantity and duration of floodplain rearing area, perhaps reducing resource competition and predator encounter rates. Increased flow duration and magnitude in 1998 could also have improved survival on the floodplain by reducing stranding risks.

These results provide new insight into the significance of seasonal floodplain habitat for salmon rearing, which has been studied primarily in perennial waterways such as estuaries and rivers (Healey 1991; Kjelson et al. 1982). Indeed, this is the first study we are aware of demonstrating that off-channel floodplain provides major habitat for chinook salmon. We do not believe that the benefits of the floodplain to chinook salmon are unique to Yolo Bypass. Initial results from the Cosumnes River, an undammed watershed in the delta, show similar growth enhancements for juvenile chinook salmon that rear on the floodplain rather than in adjacent river channels (Peter Moyle, University of California, Davis, CA 95616, personal communication). Moreover, the benefits of the floodplain to salmon are consistent with findings for other fish species. Sommer et al. (1997) found that the Yolo Bypass provides major spawning, rearing, and foraging habitat for the native cyprinid Sacramento splittail (*Pogonichthys macrolepidotus*). The spawning and rearing of fish on floodplains has been reported in diverse locations that range from small streams (Halyk and Balon 1983; Ross and Baker 1983) to large rivers (Copp and Penaz 1988) in both temperate (Gehrke 1992; Turner et al. 1994) and tropical (Winemiller and Jepsen 1998) locations. The growth effects of floodplain habitat have been described for several tropical locations (Welcomme 1979); however, the present study and the results of Gutreuter et al. (2000) represent the only examples from temperate rivers of which we are aware.

Fig. 5. Feeding success results for Yolo Bypass (open bars) and Sacramento River (solid bars) juvenile salmon during 1998 and 1999. (*a*) Estimated prey weights in stomach contents. (*b*) Wet weight ration indices. Means and standard errors are shown.



Differences between the invertebrate communities in floodplains versus river channels have been reported by Castella et al. (1991). The exceptional production of drift invertebrates on the Yolo Bypass floodplain is consistent with the results of Gladden and Smock (1990), who found that invertebrate production was one to two orders of magnitude greater on the floodplain than in adjacent streams. Although we did not monitor benthic invertebrates, results from other studies of large rivers indicate that benthic biomass may be up to an order of magnitude higher in the floodplain (Junk et al. 1989). The Yolo Bypass drift invertebrate results contrast with the results for zooplankton, which were not particularly abundant on the floodplain. This finding is comparable with that of Welcomme (1979), who reported that densities of zooplankton in natural floodplains are frequently low, except for low-water periods and localized concentrations near habitat interfaces such as shorelines.

The mechanism for greater abundance of drift invertebrates in the Yolo Bypass remains unclear, but is unlikely to be an artifact of land use on the floodplain. Possible explanations for increased drift abundance include increased food supply (e.g., primary production or detritus), more habitat, and longer hydraulic residence times. For each of these mechanisms, Yolo Bypass probably provides functions similar to more "natural" floodplains. Improved food supply is supported by the work of Jassby and Cloern (2000), whose modeling studies suggest that the Yolo Bypass should have enhanced phytoplankton production as a result of its large surface area and shallow depth. Inputs of fertilizers from agriculture in the Yolo Bypass would not be important contributing factors, as nitrogen and phosphorous are rarely limiting to phytoplankton production in the delta (Ball and Arthur 1979). Like less-disturbed floodplains in other regions (Junk et al. 1989), invertebrate production in the Yolo Bypass may be stimulated by an increased availability of detritus in the food web. Alternatively, the trends in invertebrate abundance we observed may be a consequence of physical differences between floodplain and channel habitat. Inundation of the floodplain may increase the amount of habitat for benthic invertebrates, a major source of drift biomass. Given the larger surface area and lower velocities in Yolo Bypass, the floodplain probably has a much longer hydraulic residence time than the Sacramento River, reducing the rate at which drift invertebrates would be flushed out of the system. Increased habitat area and hydraulic residence time would also have been functional characteristics of the historical floodplain.

In the broader context, the results for salmon and drift invertebrates are consistent with the flood pulse concept, which predicts that floodplains should yield greater fish and invertebrate production than channel habitat (Junk et al. 1989). This finding is significant in that the flood pulse concept was developed primarily on the basis of relatively undisturbed rivers, whereas our study was conducted in a regulated river with a floodplain dominated by agricultural uses. Gutreuter et al. (2000) showed similar enhancements in fish growth from floodplain inundation in the Upper Mississippi River, another large regulated river. These studies suggest that floodplains can maintain important functional characteristics even in heavily modified rivers. In the case of the San Francisco Estuary and its tributaries, we do not claim that floodplain inundation is the primary factor regulating the productivity of the system. The Yolo Bypass floodplain may be seasonally more productive than the Sacramento River for some fish and invertebrates, but we have no data regarding its contribution during dry months or years. Nonetheless, the results of the present study and of Sommer et al. (1997) are sufficient to demonstrate that the floodplain represents one of the most biologically important habitat types in the region. We believe that proposed large-scale restoration activities in the San Francisco Estuary and its tributaries (Yoshiyama et al. 2000) that would increase the area and connectivity of the floodplain offer particular promise for native fish populations such as chinook salmon and Sacramento splittail.

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[Article]

Habitat Use and Stranding Risk of Juvenile Chinook Salmon on a Seasonal Floodplain

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Abstract.—Although juvenile Chinook salmon *Oncorhynchus tshawytscha* are known to use a variety of habitats, their use of seasonal floodplains, a highly variable and potentially risky habitat, has not been studied extensively. Particularly unclear is whether a seasonal floodplain is a net "source" or a net "sink" for salmonid production. To help address this issue, we studied salmon habitat use in the Yolo Bypass, a 24,000-ha floodplain of the Sacramento River, California. Juvenile salmon were present in the Yolo Bypass during winter–spring; fish were collected in all regions and substrates of the floodplain in diverse habitats. Experimental releases of tagged hatchery salmon suggest that the fish reared on the floodplain for extended periods (mean = 33 d in 1998, 56 d in 1999, and 30 d in 2000). Floodplain rearing and associated growth are also supported by the significantly larger size of wild salmon at the floodplain outlet than at the inlet during each of the study years. Several lines of evidence suggest that although the majority of young salmon successfully emigrated from the floodplain, areas with engineered water control structures had comparatively high rates of stranding. Adult ocean recoveries of tagged hatchery fish indicate that seasonal floodplains support survival at least comparable with that of adjacent perennial river channels. These results indicate that floodplains appear to be a viable rearing habitat for Chinook salmon, making floodplain restoration an important tool for enhancing salmon production.

A large downstream movement of fry to provide dispersal to rearing areas is typical of ocean-type Chinook salmon *Oncorhynchus tschawytcha* (Healey 1991). Rearing areas include channel and off-channel habitat in natal and nonnatal streams and their estuaries (Bjornn 1971; Kjelsen et al. 1982; Levy and Northcote 1982; Swales et al. 1986; Swales and Levings 1989; Healey 1991; Shreffler et al. 1992). Recently, Sommer et al. (2001b) observed that juvenile Chinook salmon also live on seasonal floodplains. Large rivers and streams typically have dynamic floodplains varying in size from several to thousands of hectares, unless their channels are heavily confined by topography (e.g., streams at high elevation or confined by canyons or levees). Floodplains are known to be of major importance to aquatic ecosystems in most regions; large rivers typically favor the development of a fauna adapted to colonize this habitat (Welcomme 1979; Junk et al. 1989; Sparks 1995). As a result, it is reasonable to expect dispersing salmonid fry show some ability to use seasonal habitat. In support of this hypothesis, Sommer et al. (2001b) reported that food resources and water temperatures on the seasonal floodplain of a large river were superior to those in an adjacent perennial channel, resulting in enhanced growth rates of young salmon. Despite some evidence that enhanced growth on the floodplain improved fry–smolt survival in the estuary, Sommer et al. (2001b) did not address any effects on adult production.

Intuitively, rearing in seasonal floodplains or intermittent streams seems risky because these habitats are among the most dynamic on earth (Power et al. 1995). It is still unknown whether seasonally dewatered habitats are a net "source" or a "sink" for salmonid production relative to production in permanent stream channels (Brown 2002). In particular, the high degree of seasonal flow fluctuation characteristic of floodplain habitat could cause major stranding events and increase mortality rates of young salmon (Bradford 1997; Brown 2002). For resident taxa in intermittent streams, the benefits of very large flow fluctuations appear to outweigh costs associated with a variable environment (Spranza and Stanley 2000). This issue continues to be a key concern for regulatory agencies that evaluate off-channel restoration projects or proposed flow fluctuations for possible effects on fishes (Brown 2002; Bruce Oppenheim, NOAA Fisheries, personal communication).

Here, we describe spatial and temporal trends in juvenile Chinook salmon habitat use and stranding in a large California river floodplain. Our study was conducted in the Yolo Bypass, the primary floodplain of the Sacramento River, the major pro-

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Exhibit 28

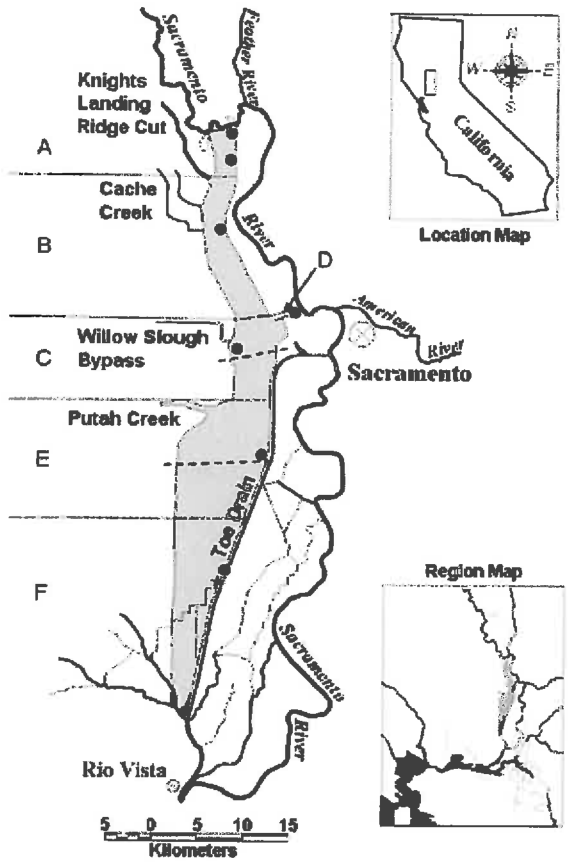

FIGURE 1.—Location of Yolo Bypass in relation to the San Francisco Bay–Delta and its tributaries. Fremont Weir is the upper (northern) edge of the Yolo Bypass. The major regions of the floodplain are delineated from north to south and correspond to the following codes: (A) Fremont Weir; (B) Cache Creek sinks; (C) Yolo Bypass Wildlife Area; (D) Sacramento Bypass; (E) Putah Creek Sinks; and (F) Liberty Island. The sampling locations are identified as follows: beach seine sites (solid circles); screw trap (star); and purse seine transects (dotted lines).

ducer of salmon in the San Francisco estuary (Figure 1). Because the Yolo Bypass can convey 75% or more of the total flow from the Sacramento River basin (Sommer et al. 2001a), this floodplain can be expected to be a migratory pathway for a substantial number of juvenile Chinook salmon. A major objective of our study was to collect basic information about the timing, duration, and habitat use of salmon on floodplains. We hoped that these data would provide insight into whether a floodplain is a net source (i.e., with rearing benefits) or a net sink (i.e., with high mortality because of stranding or predation) for salmon populations. The major hypotheses evaluated were as follows: (1) salmon occur in all major habitat types and geographic regions; (2) floodplains provide rearing habitat for salmon and are not simply a migration corridor; and (3) stranding of juvenile salmon does not have a major population-level effect on survival of the fish that use floodplain habitat. We addressed these hypotheses by sampling wild fish throughout the floodplain, experimentally releasing tagged fish, and using hydrologic modeling and measurements of physical conditions to describe how habitat varied over the study period.

Study Area

The San Francisco Estuary and its two component regions, Sacramento–San Joaquin Delta and downstream bays (Figure 1), make up one of the largest estuaries on the Pacific coast of North America. Major changes to the system have included diking and isolation of about 95% of the wetlands, introduction of exotic species, channelization, sediment inputs from hydraulic mining, and discharge of agricultural and urban chemicals (Nichols et al. 1986; Kimmerer 2002). The Estuary receives most freshwater via the Delta, which drains approximately 100,000 km^2. Most precipitation occurs upstream of the Delta during winter and spring, resulting in a greater than 10-fold seasonal range of daily freshwater flow into the estuary. However, the hydrograph is substantially altered by dams on each of the major rivers. Peak flow pulses typically occur during winter, but dam operations can reduce the magnitude of the pulses, particularly in dry years, when much of the inflow is captured behind reservoirs (Mount 1995; Kimmerer 2002). The historically prominent spring flow pulse from snowmelt is at present muted except during heavy, late-season storms. For the past several decades, much of the spring snowmelt has been stored in reservoirs and released during summer and autumn, periods of historically lower flow. As much as 65% of the net Delta flow during summer and autumn is diverted from the channels by two large water diversions (the State Water Project and the Central Valley Project); additional water is diverted by 2,200 pumps and siphons for irrigation (Kimmerer 2002).

The 24,000-ha Yolo Bypass is the primary floodplain of the Delta (Sommer et al. 2001a). The majority of the floodplain is leveed to protect surrounding cities from floodwaters, but levees confine flow through the bypass only under very high flow events. The Yolo Bypass currently floods an average of every other year, typically under high-flow periods in winter and spring. The Yolo Bypass has a complex hydrology, with inundation possible from several different sources. The floodplain typically has a peak inundation period during January–March but can flood as early as October and as late as June. The primary input to the Yolo Bypass is through Fremont Weir in the north, which conveys floodwaters from the Sacramento and Feather rivers. During major storm events (e.g., >5,000 m^3/s), additional water enters from the east via the Sacramento Weir, adding flow from the American and Sacramento rivers. Flow also enters the Yolo Bypass from several small streams on its western margin, including Knights Landing Ridge Cut, Cache Creek, and Putah Creek. During much of the winter, water-suspended sediment levels in the Yolo Bypass and Sacramento River are high, generally resulting in secchi depths of less than 0.25 m. However, hydraulic residence times are typically longer in the Yolo Bypass than in the Sacramento River (Sommer et al. 2004). Floodwaters recede from the northern and western portions of the bypass along relatively even elevation gradients of 0.09% west–east and 0.01% north–south into a perennial channel on the eastern edge of the Bypass; they then rejoin the Sacramento River near Rio Vista. The majority of the Yolo Bypass is at present managed for wildlife in a mosaic that includes riparian, wetland, upland, and perennial pond habitats; however, a dominant land use during the past two decades, agriculture has decreased in recent years because of habitat restoration activities.

Our data collection focused on the fall-run juvenile Chinook salmon, currently the numerically dominant race in the Sacramento Valley (Yoshiyama et al. 2000). There are four races of Chinook salmon in the Sacramento Valley: winter, spring, late-fall, and fall-run. Like many other native fish, Chinook salmon in the San Francisco estuary and its tributaries have been adversely affected by such factors as habitat loss, water diversions, and species introductions (Bennett and Moyle 1996); as a result, the Sacramento River winter and spring run Chinook salmon are protected under the Federal Endangered Species Act. The typical life history pattern is for young fall-run salmon fry (approximately 35–70 mm fork length) to migrate from the tributaries during winter and spring to the estuary (Brandes and McLain 2001).

Methods

Physical habitat.—Because seasonal hydrologic variability is a key characteristic of floodplain habitat, we reasoned that detailed data on changes in physical habitat would be necessary to evaluate the responses of young salmon. Daily flow data were obtained from gauging stations in the floodplain, and temperature data were collected using continuous temperature recorders (Sommer et al. 2001b). However, the vast area of Yolo Bypass made it impractical to directly measure other parameters, such as depth and surface area. As an alternative, we used a hydrologic model to estimate these parameters (Sommer et al. 2004). To summarize, the model treated Yolo Bypass as a "reservoir" described by (1) basin geometry and (2) flow and stage time series. The Yolo Bypass floodplain geometry was developed from 200 cross-sections with data collected at 300-m intervals by standard rod and level survey techniques. Mean daily stage and flow data were obtained from five gauging stations in the Yolo Bypass. For each date in the time series, we used linear interpolation between the gauging stations to estimate the stage at each cross-section. The estimated stage value was then used to calculate conveyance characteristics of each cross-section: area, width, and wetted perimeter. The daily results for each cross-section were used to estimate total surface area and mean depth. The large scale of the study reach did not allow validation of the depth estimates. As a partial validation of the model, Sommer et al. (2004) estimated total inundated area for the Yolo Bypass by using aerial photographs on days when the floodplain was inundated (February 8 and March 2, 1998) and when the floodplain was draining (April 28, 1998). To provide additional information about areas where fish stranding and consequent losses could occur, we estimated the portion of the area that was isolated ponds versus inundated area that was actively draining to the Delta (i.e., perennial channels and adjacent inundated area) on April 28, 1998.

Fish habitat use.—We used beach seine sampling to examine which regions and substrates of the floodplain were used by young salmon (hypothesis 1). During January through April of each year, a 15-m seine (3.2-mm mesh) was used to sample six regions of the Yolo Bypass (Figure 1). Fixed stations were used in each region during flooded periods. After floodplain drainage, samples were collected randomly within each region. For all periods, the primary substrate type of the habitat (sand, mud, gravel, pavement, or vegetation), fish species and size, and an estimate of the surface area swept by the seine were recorded. Habitat use during flood events was summarized in terms of the percentage of samples that contained salmon for each region and substrate type.

To provide additional information about habitat use, we conducted purse seine sampling along two transects (Figure 1). This sampling, performed in 1998 when the Yolo Bypass flow was relatively high (>850 m^3/s), used purse seines (30.5 m × 4.6 m, 4.75-mm mesh) set from a jet boat. Purse seining was conducted at 1–2 transects up to five times weekly, depending on hydrology. Hauls were made at random points in each of three habitat types (riparian, agricultural fields, and wetlands), the boundaries of which were established from aerial photographs taken before the Bypass was inundated. In the case of riparian habitat, hauls were made in clearings adjacent to trees to avoid snagging. We also recorded transect side (east or west half) for each haul because the western side of the Yolo Bypass was shallower and flow was dominated by inputs from westside streams rather than from Fremont or Sacramento weirs (Sommer et al. 2004). Most of these hauls were performed in areas exposed to at least a modest current. Additional limited paired sampling was conducted to examine possible differences between areas with and without velocity refuges. Low-velocity habitats sampled included downstream edges of levees, islands, and clusters of trees. Water velocities in randomly selected areas were approximately 0–0.05 m/s compared with greater than 0.33 m/s in adjacent exposed areas. Water depths were similar for each sampling pair. Differences in salmon densities for each habitat type were examined by using a Kruskal–Wallace test. A randomization *t*-test with 1,000 iterations (Haddon 2001) was used to compare salmon density on the east and west sides of the floodplain.

Migration trends.—To examine temporal trends in salmon migration through the floodplain (hypotheses 2 and 3), we operated a rotary screw trap (EG Solutions, Corvallis, Oregon) near the base of the Yolo Bypass during each study year. This technique was intended to provide an indication of the timing and duration of migration, rather than an absolute measure of the number of salmon emigrating the floodplain. During much of the sampling period the inundated width of the floodplain was 1–5 km, an area we considered too large for the traditional mark–recapture evaluations required to measure trap efficiency and total emigration (Roper and Scarnecchia 1996). A 1.5-m-diameter trap was used for the first 3 weeks of sampling in February 1998, after which a 2.4-m trap was used for all other sampling. We operated traps as often as 7 days each week, the daily effort varying from 1 to 24 h, depending on debris load and safety considerations. Fish number and size were recorded in all years. In 1998, young salmon were classified as fry (prominent parr marks) or transitional fish/smolts (faded parr marks, silver appearance).

Floodplain residence time and growth.—We used experimental releases of salmon with coded wire tags (CWTs) as our primary method to evaluate fish residence time on the floodplain (hypothesis 2). Fry (mean size = 57 mm fork length) from the Feather River Fish Hatchery (Figure 1) were tagged by using coded-wire half tags (Northwest Marine Technologies) and released in the Yolo Bypass below the Fremont Weir on March 2, 1998 (53,000 fry); February 11, 1999 (105,000 fry); and February 22, 2000 (55,000 fry). We assessed residence time in the Yolo Bypass from recoveries of tagged fish in the screw trap at the base of the floodplain.

We also examined, using the previously described beach seine data, whether there was evidence of long-term rearing of wild salmon in the floodplain. We compared the slopes of weekly fork length measurements for the two northern beach seine regions ("North") to the southernmost region ("South"), using a generalized linear model (GLM) with a Poisson distribution and log link variance function. We reasoned that major significant differences between the sizes of fish in the two areas provided evidence of extended rearing and growth of fish in the floodplain.

Salmon survival and stranding.—We used several independent data sources to examine whether salmon successfully emigrated from the floodplain (hypothesis 3). First, we compared survival of each of the Yolo Bypass CWT hatchery-reared salmon release groups with the survival of parallel CWT groups containing the same number of fish released into the Sacramento River (Sommer et al. 2001b). Recapture rates at the smolt stage of the 1998 and 1999 release groups had previously been analyzed by Sommer et al. (2001b); in the present study, we evaluated adult recoveries in the commercial and recreational ocean fisheries through 2003. Second, we examined stranding by using beach seine data (described previously) collected within a few weeks after the Sacramento River stopped flowing into the Yolo Bypass. Densities of salmon were compared with a randomization *t*-test (Haddon 2001) for (1) isolated earthen ponds (2) perennial channels, and any sites immediately adjacent to these water sources. The results for all years were pooled because of relatively low sample sizes for individual years. Data for each year

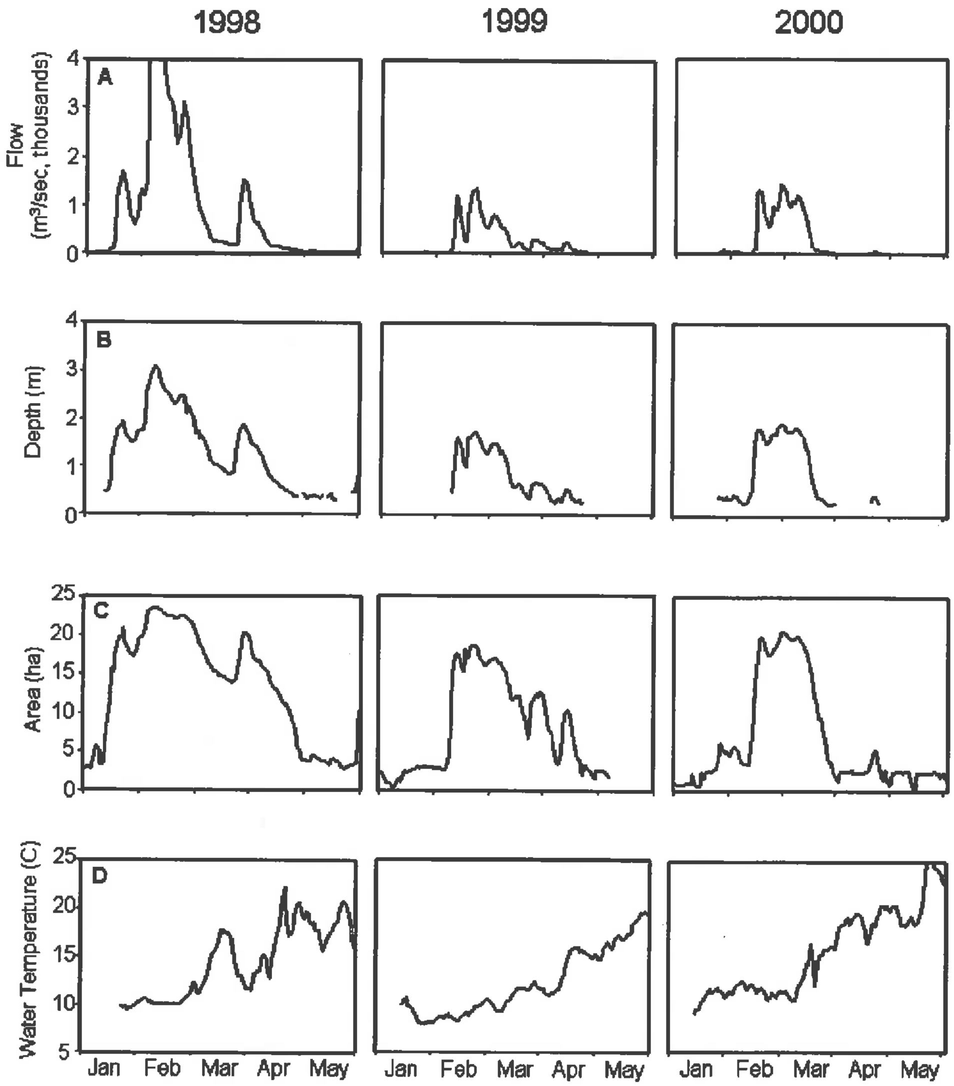

FIGURE 2.—Trends in physical variables for January–June 1998–2000: (A) mean daily flow in the Yolo Bypass; (B) simulated mean daily depth; (C) surface area; and (D) daily mean water temperature. The surface area data for 1998 and 2000 are from Sommer et al. (2004).

were first standardized for possible annual differences in abundance by conversion to z-scores; we then ran the randomization analysis using 1,000 iterations. We hypothesized that abundance of salmon would be equal in isolated ponds and contiguous water sources; that is, they would show no distinct "preferences." Our reasoning was that similar abundance levels would indicate successful emigration, because most of the water drains from the floodplain. To further understand factors that could affect stranding, we also used a randomization t-test to compare densities of fish in two types of isolated ponds: isolated earthen ponds and concrete weir scour ponds at Fremont and Sacramento weirs (Figure 1). Sampling effort was much greater in the isolated earthen ponds, so the randomization t-test was performed after randomly subsampling the earthen pond data from throughout the floodplain to provide equal sample sizes. We predicted that flood control structures would cause higher stranding than "natural" ponds. In addition, we examined trends in the catch of salmon in the screw trap data. We predicted that salmon catch would increase substantially during drainage because fish successfully emigrated the floodplain.

Results

Physical Habitat

The hydrographs varied substantially during the years of study (Figure 2A). In 1998 the hydrology was wet (4.4-year recurrence flood event) and the Yolo Bypass was inundated during mid-January through mid-April and again in early June. The flow was lower in the other 2 years, when inundation occurred between mid-February and mid-March, peak flood events being at the 1.7-year recurrence interval in 1999 and at the 2.4-year recurrence interval in 2000. Surface area in the Yolo Bypass closely followed the flow peaks, the amounts of inundated area being successively smaller in each of the study years (Figure 2C). For the April 28, 1998, photographs, the total surface area of 5,050 ha was slightly lower than the model estimate of 6,700 ha. Based on the aerial photographs, we estimated that only 600 ha of the 5,050 ha comprised isolated ponds, the remainder being water that drained to the Delta. For all but peak flood events, mean water depth remained less than 1 m (Figure 2B). During peak flood events, mean depths did not exceed 2 m except in February 1998. Water temperature showed gradual increases throughout each study year (Figure 2D).

Fish Habitat Use

We captured salmon in all regions of the floodplain and on all substrate types. During 1998–2000 flood events, salmon were captured in a high percentage of samples in each region (Figure 1) of the floodplain: (1) Fremont Weir (100%, n = 13 samples); (2) Cache Creek Sinks (50%, n = 16 samples); (3) Yolo Bypass Wildlife Area (77%, n = 22 samples); (4) Sacramento Bypass (100%, n = 7 samples); (5) Putah Creek Sinks (94%, n = 11 samples); and (6) Liberty Island (100%, n = 7 samples). Similarly, during 1998–2000 flood events we collected salmon on a high percentage of substrate types: (1) mud (70%, n = 47 samples); (2) sand (100%, n = 3 samples); (3) pavement (100%, n = 8 samples); (4) vegetation (97%, n = 32 samples); and 5) gravel (89%, n = 9 samples).

Salmon densities as estimated by purse seine sampling were not significantly different between riparian (mean abundance = 46.9/ha, SE = 10.4, n = 23), agricultural (mean abundance = 20.9/ha, SE = 6.1, n = 35), or natural vegetated habitat types (mean abundance = 27.5/ha, SE = 5.6, n = 31) based on a Kruskal–Wallis test (H = 4.38, df = 2, P = 0.112). There was also no statistically significant difference between the east (mean abundance = 29.5/ha, SE = 6.0, n = 53) and west (mean abundance = 29.9/ha, SE = 6.7, n = 36) sides of the Bypass as shown by a randomization t-test (P = 0.95). Salmon were collected in six hauls in low-velocity habitat (mean abundance = 189/ha, SE = 24/ha), but none were collected in adjacent areas exposed to a current.

Floodplain Migration Trends

Salmon migration as indicated by trends in screw trap catch was highly variable over the course of the study, but there were prominent peaks in Chinook salmon catch coincident with floodplain drainage during late March–April (Figure 3B). Additional smaller peaks in salmon catch also paralleled flow, mostly during February and March. The life history stage of salmon during 1998 was exclusively parr through the end of March, after which the majority showed signs of smoltification.

Floodplain Residence Time

Based on recoveries of tagged fish in the screw trap, the mean residence time of CWT salmon was 33 d (range, 16–46 d; n = 10) in 1998, 56 d (range, 4–76 d; n = 49) in 1999, and 30 d (range, 28–37 d; n = 25) in 2000. The size of fish was significantly larger (P<0.001; GLM) at the outlet of the floodplain than at the top (Figure 3C) during each of the study years.

Salmon Survival and Stranding

The numbers of CWT fish recovered for the Yolo Bypass were higher than in the Sacramento River in 1998, similar in 1999, and lower in 2000 (Table 1). Densities of wild Chinook salmon were highly variable during floodplain drainage events, with no statistically significant difference between densities in isolated earthen ponds and contiguous water sources (Table 2). However, densities of salmon were significantly higher (P < 0.0001; randomization t-test) in concrete weir scour ponds than in isolated earthen ponds (Table 3).

Discussion

Research on migratory fishes reveals that these species frequently have alternative life histories that may be influenced by habitat use at early life stages (Clark 1968; Secor 1999). Under Clark's (1968) "contingent hypothesis," migratory taxa have divergent migration pathways that could help the species deal with environmental variability and heterogeneity. This theory is consistent with our understanding of Chinook salmon, which are adapted to the extreme hydrologic variability in western North America and show a range of life histories (Healey 1991; Bottom et al. 2005). In this context, the use of multiple habitats—including natal and nonnatal streams (Bjornn 1971; Scriv-

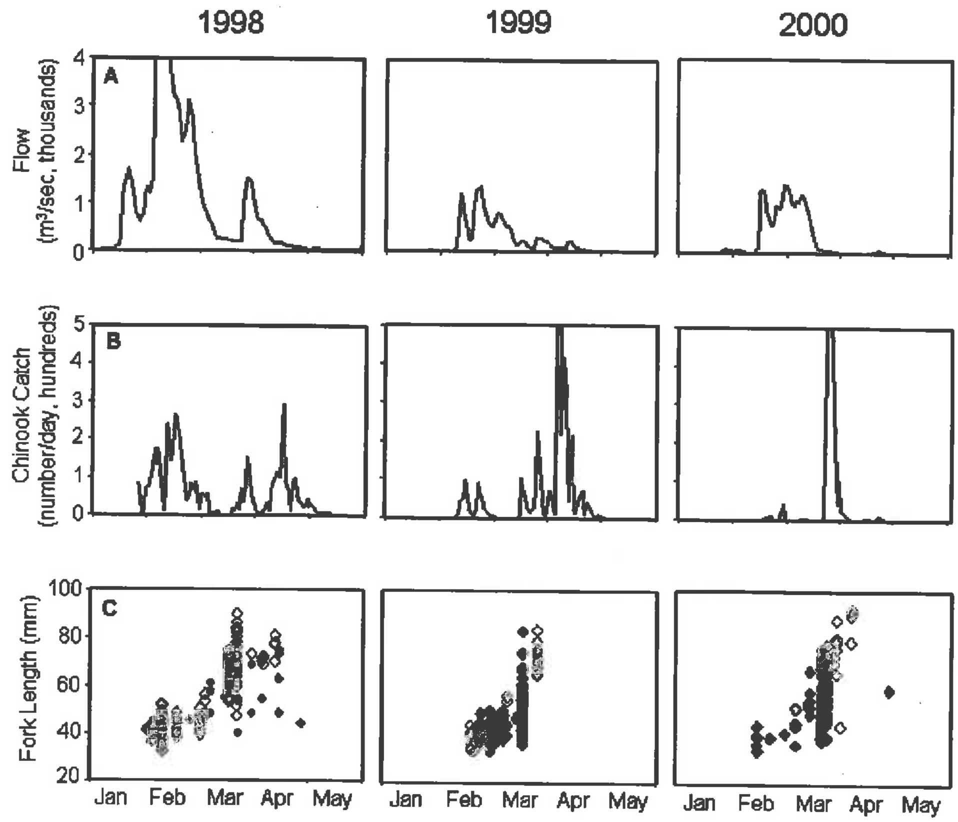

FIGURE 3.—Chinook salmon results during winter and spring 1998–2000: (A) mean daily flow; (B) salmon catch rates in screw trap sampling; and (C) salmon size for beach seine samples near the Yolo Bypass intake (solid symbols) and outlet (clear symbols).

ener et al. 1994), side channels and off-channel ponds (Swales et al. 1986; Swales and Levings 1989), low-elevation rivers (Kjelsen et al. 1982; Brown 2002), and estuaries (Healey 1991; Shreffler et al. 1992)—can be considered as part of an overall "bet-hedging" strategy that spreads risk across a variable environment. Despite the fact that seasonal floodplain represents perhaps the single most variable habitat available to salmon, our study suggests that floodplains are a viable rearing location for young fish.

TABLE 1.—Number of coded wire tags recovered in the ocean and commercial fisheries for Chinook salmon released in the Yolo Bypass and Sacramento River. The total number of tagged fish released in each location for each year is shown in parentheses. The survival ratio is calculated as the number of Yolo Bypass recoveries divided by the number of Sacramento River recoveries.

Release group	1998 (53,000)	1999 (105,000)	2000 (55,000)
Yolo Bypass	75	136	27
Sacramento River	35	138	47
Survival ratio	2.14	0.99	0.57

At the beginning of our study, our conceptual model for floodplain habitat use was that young salmon move into the floodplain during high-flow events and spread throughout the broad expanse of seasonally inundated habitat. Among the wide variety of suitable substrates and habitat types for rearing, young salmon appear to seek out low-velocity areas. Moreover, floodplain habitat apparently is not simply a migration corridor; many young salmon actively rear on the highly productive floodplain habitat for extended periods of time, resulting in high growth rates. Our findings suggest that salmon emigrate from the seasonally inundated habitat both during flood events and during drainage. Juvenile Chinook salmon do not appear to be especially prone to stranding mortality; indeed, survival may actually be enhanced by floodplain rearing in some years. Our conceptual model was supported by our results and has a variety of management implications.

Salmon were present in a broad range of habitat and substrate types and were collected in all regions and sides of the Yolo Bypass floodplain. The

TABLE 2.—Densities of Chinook salmon (number/ha ± SE, with sample size in parentheses) collected in beach seine sampling during drainage events in 1998–2000. The sample locations are divided into isolated earthen ponds and contiguous water sources. Density differences were not statistically significant between the two pond types based on a randomization t-test of the pooled data for all years ($P = 0.79$; $n = 43$ for isolated ponds; $n = 59$ for contiguous water sources).

Location type	1998	1999	2000
Isolated ponds	206 ± 112 (30)	890 ± 491 (8)	126 ± 65 (5)
Contiguous water sources	167 ± 79 (33)	310 ± 104 (13)	463 ± 123 (13)

fact that they were present on the western half of the Bypass, where flows are dominated by Knights Landing Ridge Cut and Cache and Putah creeks, suggests that salmon spread throughout the floodplain after entering the basin by way of Fremont and Sacramento weirs. A few of these fish may have originated from a modest spawning population in Putah Creek (Marchetti and Moyle 2001). The fact that salmon were present in a wide range of habitat and substrate types and in different regions of the Yolo Bypass indicates that many areas of habitat were suitable, although this does not mean that there were no habitat preferences. Like many young fishes, much of the distribution of juvenile Chinook salmon can be explained by their association with shallow depths and low velocities (Everest and Chapman 1972; Roper et al. 1994; Bradford and Higgins 2001). The physical modeling indicated that mean depths were generally 1 m or less during all but peak flood periods, so much of the thousands of hectares of inundated habitat was probably within the shallow range typically preferred by young Chinook salmon (Everest and Chapman 1972). Our limited purse seine sampling suggested that young salmon were most abundant in low-velocity areas, which is consistent with previous studies in river and stream habitat (Everest and Chapman 1972; Roper et al. 1994; Bradford and Higgins 2001). We did not directly simulate water velocity in the present study; however, the relatively shallow water depth during flood events reflects the broad area of low-velocity rearing habitat created during flood events. We expect that this increase in rearing habitat in the Yolo Bypass provides foraging opportunities (Sommer et al. 2001b), reduced energy expenditure, and perhaps reduced probability of encounter with a predator (Ward and Stanford 1995).

Our results also suggest that fish rear in the system for extended periods rather than simply using it as a migration corridor. The mean residence time of 30–56 d for the 44-km reach between the floodplain release location and the screw trap is substantially longer than one would expect, given that (1) fingerlings are capable of migrating at rates of at least 6–24 km/d in low-elevation reaches of other large rivers (Healey 1991) and (2) one of our 1999 CWT fish was recovered just 4 days after being released, having traveled an estimated rate of 11 km/d. The fish were significantly larger at the base of the Yolo Bypass, suggesting that their period of residence in the floodplain was long enough to support substantial growth. Similarly, Sommer et al. (2001b) found that salmon showed higher growth rates in the Yolo Bypass than in the adjacent Sacramento River, primarily because of higher levels of invertebrate prey in the floodplain. A long period of rearing is also supported by the screw trap data, which showed that the densities of salmon were greatest during drainage of the floodplain. We believe that these peaks are a result of rearing salmon being forced off of the floodplain by receding flows. Temperature and salmon life history stage do not provide good alternative explanations for the emigration trends. In 1998, for example, water temperatures were relatively high by late March and salmon began smoltification shortly thereafter; yet the screw trap data indicate

TABLE 3.—Densities of Chinook salmon (number/ha ± SE, with sample size in parentheses) collected in beach seine sampling for earthen ponds and adjacent concrete weir ponds. Density differences were statistically significant between the two pond types based on a randomization t-test of the pooled data for all years ($P < 0.0001$; $n = 26$ for each pond type). Note that we used a randomly sampled subset of the earthen pond data to provide equal sample sizes for the comparison.

Location type	1998	1999	2000
Earthen ponds	186 ± 67 (63)	531 ± 200 (21)	369 ± 97 (18)
Concrete weir ponds	2,717 ± 1,115 (14)	14,208 ± 3,898 (12)	4,181 ± 1,275 (3)

that emigration did not peak until the end of April, when the floodplain drained. Perhaps the emigration trends are partially confounded by seasonal variation in salmon abundance. In the absence of trap efficiency data, we cannot estimate the proportion of the population that emigrated in winter versus spring events.

Several lines of evidence suggest that the majority of fish successfully emigrated from the floodplain. One important observation was that the area of isolated ponds was small relative to the overall area of the floodplain during both peak flood and drainage periods. As an example, in 1998, the wettest year we studied, the peak area of inundation was 24,000 ha, but the total inundated area dropped to 5,000 ha by late April. Of the 5,000 ha remaining at this point, our estimates from aerial photographs showed that isolated ponds took up only 600 ha. Put another way, isolated ponds represented just 12% of the wetted area in April and only 2.5% of the peak inundated area in winter. The same trend is evident in the area simulations for 1999 and 2000, when the peak area was 20,000 ha, but dropped to about 2,000 ha within a month. These results demonstrate that the Yolo Bypass drains fairly efficiently, leaving little isolated area where stranding can occur. This finding was somewhat unexpected, because many parts of the Yolo Bypass have natural topographic features or agricultural levees that could potentially impede drainage and fish emigration. Even if the area of isolated ponds is low, stranding could still be a substantial source of mortality if densities of fish in the remaining ponds were very high. However, we found no evidence that densities of fish stranded in isolated ponds were significantly higher than those in contiguous water sources that were draining to the Delta. The key point here is that most of the water drains from the floodplain and apparently the majority of the fish are leaving with the receding floodwaters. To help illustrate this issue, if we assume that mean densities of fish observed in Table 2 were representative of the entire wetted area of floodplain in April 1998, then the total number of fish in the 600 ha of isolated ponds would have been 123,600 salmon, lower than an estimate of 835,000 fish in the 5,000 ha of contiguous water sources. This conservative estimate also does not include the large numbers of fish that emigrated from the floodplain before April.

In addition to the beach seine and surface area data, we believe that trends in screw trap data support the hypothesis that stranding is not consistently a major problem on the floodplain. The screw trap data are somewhat ambiguous, because the large area of the floodplain makes it unreasonable to measure the efficiency of the trap. Therefore, we cannot accurately estimate the absolute number of salmon emigrating from the floodplain. However, we can at least examine the patterns of trap catch to evaluate likely mechanisms. Some of the possible patterns that we would expect to see for different factors are summarized in Figure 4. First, under the "trap efficiency" model, we would have expected dual peaks in the earliest and latest portions of flood events, when the screw trap would be sampling the highest portion of total flow (Figure 4A). If young salmon follow the "go with the flow" model, catch and flow peaks should be well-correlated (Figure 4B). Alternatively, if floodplains represent an important rearing habitat, we would expect catch trends to follow the "loitering" model, in which catch does not increase until drainage, when fish are forced from their rearing habitat by receding floodwaters (Figure 4C). Finally, if stranding were a major factor controlling catch trends, we would expect an early increase in catch as fish moved through the floodplain during inundation, but then catch should drop earlier than flow as young salmon became isolated from draining floodwaters (Figure 4D; "bathtub" model). Of these patterns, our data for the Yolo Bypass provide the strongest support for both the "go with the flow" and "loitering" models. In each year we saw obvious screw trap catch peaks associated with flow events, and additional prominent peaks associated with drainage. To summarize, apparently some of the fish move

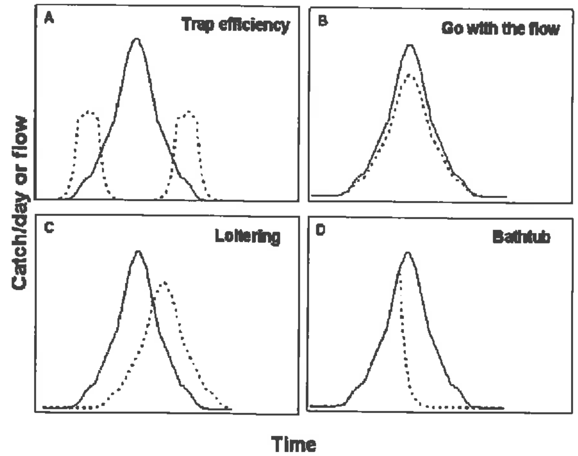

FIGURE 4.—Four conceptual models of expected screw trap catch (dotted line) relative to flow (solid line). See the Discussion for further details about each model.

through the floodplain in direct association with flow, whereas others remain as long as possible to rear on the floodplain. The screw trap trends show no evidence that stranding had a major influence on patterns of emigration.

Relatively low stranding rates on the Yolo Bypass floodplain are supported by observations from other seasonal floodplain habitat in the San Francisco estuary (Peter Moyle, University of California–Davis, personal communication) and other studies. Higgins and Bradford (1996) and Bradford (1997) report that juvenile salmonids are relatively mobile and that most avoid being stranded during moderate rates of stage change. Higgins and Bradford (1996) state that maximum recommended stage reduction levels for gravel bars of regulated rivers are typically 2.5–5 cm/h, much more than the 1 cm/h or less rates of change in mean water depth we observed during drainage in the present study. In his review of the ecology of fishes in floodplain rivers, Welcomme (1979) noted that the majority of fish emigrate from floodplain habitat during drainage.

Even if stranding is not a major source of mortality, this does not necessarily mean that floodplains are not sinks for salmon production. Of the possible sources of mortality, birds and piscivorous fishes may have benefited from stranded salmon (Brown 2002). As noted by Sommer et al. (2001a), major avian predation is unlikely because densities of wading birds are low relative to the thousands of hectares of rearing habitat available during flood events. We did not measure densities of fish predators, but believe that the creation of large areas of rearing habitat should create more refuges for young fish and decrease the probability of encounter with a predator.

Ultimately, it is survival data that allow us to differentiate source from sink habitat. The size and complexity of the San Francisco estuary made it very difficult to directly measure survival rates with statistical rigor (Newman and Rice 2002); however, our CWT release studies at least provide an indication of whether survival rates in the Yolo Bypass were substantially different from those in the Sacramento River, the adjacent migration corridor. The limited results suggest that fry–adult survival rates were at least comparable in the Yolo Bypass and the Sacramento River. Moreover, the 1998 results suggest that in some years, survival may actually be substantially higher for salmon that migrate through the floodplain. Although none of these CWT releases were replicated, the fact that Sommer et al. (2001b) reported similar results for fry-to-smolt survival for the same releases in 1998 and 1999 increases our confidence that the survival data are not spurious.

Our data indicate that floodplains are a viable rearing habitat for juvenile Chinook salmon. Hence, the most important management implication of our study is that seasonal habitat should be considered as part of restoration plans for this species. Despite frequent concerns that off-channel habitat could increase stranding mortality (Brown 2002; Bruce Oppenheim, NOAA Fisheries, personal communication), our results for a hydrologically variable seasonal floodplain suggest that one should be able to design restoration projects that do not create a population sink because of excessive mortality. This is not to say, however, that stranding mortality is never an issue on floodplain habitat. For example, in the Yolo Bypass we saw significantly higher stranding rates in the concrete weir scour ponds of Fremont and Sacramento weirs than in earthen ponds. This finding suggests that artificial water control structures can create unusual hydraulics that promote stranding. However, the total area of these concrete weir ponds was only 3 ha, much smaller than our estimate of 600 ha for total isolated pond area for April 1998 and insignificant compared with the peak inundated area of 24,000 ha area. Fixing the poor hydraulics at these water-control structures may, nonetheless, be an attractive option, particularly if the cost of the solution is relatively low or if it helps to address other fisheries issues such as adult fish passage. In the Yolo Bypass, the concrete weirs not only create stranding problems for juveniles but also frequently block upstream passage of adult salmon, sturgeon, and steelhead trout (Sommer et al. 2001a), thus creating an incentive to resolve both issues simultaneously.

Finally, we wish to acknowledge that even natural floodplain or well-designed restored floodplain habitat could at least occasionally be a population sink because of stranding or predation losses. Our study was conducted over 3 years for a single, large floodplain; we cannot rule out the possibility that floodplains may not have net benefits in other years or locations. As an example, fish densities in the Yolo Bypass were relatively low compared with those reported in some other studies (Levy and Northcote 1982; Swales et al. 1986; Swales and Levings 1989); perhaps young salmon behavior could be different at higher densities. However, the potential for such losses can still be consistent with effective management of salmon populations. Diverse life history strategies provide bet-hedging for salmon populations in the highly variable environment of coastal tributaries (Secor 1999; Bottom et al. 2005). We therefore expect that young salmon will not thrive in all habitats in every year. In the case of highly variable seasonal environments such as floodplains, stranding losses might cause excessive mortality in some years, but the risks may be offset by increased rearing habitat and food resources in other years (Sommer et al. 2001b; Brown 2002).

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Insights into the Problems, Progress, and Potential Solutions for Sacramento River Basin Native Anadromous Fish Restoration

Spring-Run Chinook Salmon in Mill Creek, California (Photo by Dave Vogel)

April 2011

Prepared for:

Northern California Water Association
and
Sacramento Valley Water Users

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Exhibit 29-1

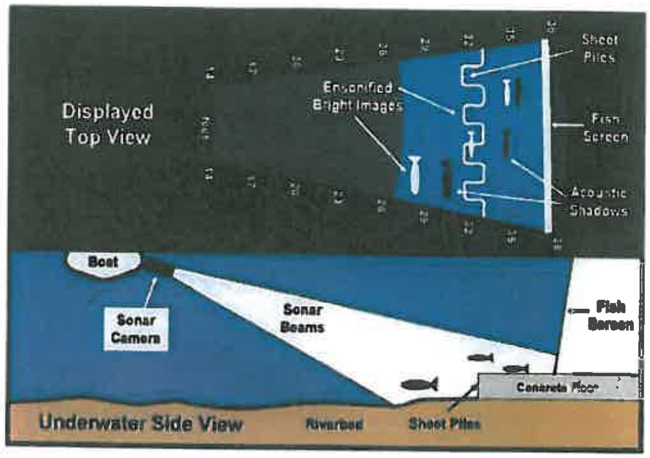


Figure 60. Schematics of DIDSON™ imaging at the base of a flat-plate fish screen. Bottom diagram shows orientation of sonar beams from the acoustic camera off the side of a boat and submerged objects at the fish screens. Top diagram shows the resultant corresponding sonar imaging of objects ensonified with acoustic shadows from the objects. (from Vogel 2008b)

From 1996 through 2010, Natural Resource Scientists, Inc. conducted 22 separate research projects on juvenile salmon (including four studies of predatory fish) in the Delta using acoustic or radio telemetry as a means to gain an improved understanding of fish movements and mortality (Vogel 2010a). The reason juvenile salmon telemetry studies were initiated in the Delta was to acquire detailed data on fish behavior, fish route selection through complex channels, and estimate fish survival in discrete reaches. Past efforts using traditional coded-wire tagging could not answer those critically important questions. Research findings from the telemetry investigations indicate that smolt survival assumptions and models must incorporate these new conclusions to avoid misinterpretation of data and improve quantitative estimates of fish survival and movements (Vogel 2010a).

The first successful use of telemetry on juvenile salmon in the Central Valley was conducted by Natural Resource Scientists, Inc. on behalf of EBMUD in 1996 and 1997. At that time, the specific behavior of juvenile salmon in the Delta was largely unknown. The initial studies quickly determined that the fish did not move as a school, but instead, dispersed, exhibiting a wide range in migratory behaviors in the complex Delta environment. Salmon moved many miles back and forth each day with the ebb and flood tides and the side channels (where flow was minimal) were largely unused. Site-specific hydrodynamic conditions present at flow splits when the fish arrived had a major affect in initial route selection. Importantly, some of the salmon were believed to have been preyed upon based on very unusual behavior patterns (Vogel 2010a).

Subsequent, additional juvenile salmon telemetry studies were conducted by Natural Resource Scientists Inc. on behalf of the USFWS and CALFED in the north Delta (Vogel 2001, Vogel 2004). Triangulating radio-tagged fish locations in real time (Figure 61) clearly demonstrated how juvenile salmon move long distances with the tides and were advected into regions with very large tidal prisms, such as upstream into Cache Slough and into the flooded Prospect and Liberty Islands (Figure 62). During the studies, it was determined that some radio-tagged salmon were eaten by predatory fish in northern Cache Slough, near the levee breaches into flooded islands (discussed below). Also, monitoring telemetered fish revealed that higher predation occurred in Georgiana Slough as compared to the lower Sacramento River (Figure 63). As discussed previously, past coded-wire tagging studies found that salmon released into northern Georgiana Slough were found to have a higher mortality rate than fish released downstream of the slough in the Sacramento River (Brandes and McLain 2001).

Figure 61. Left picture, mobile telemetry conducted in the north Delta. Photo by Dave Vogel.
Figure 62. Right picture, telemetered locations of approximately 100 radio-tagged salmon smolts released in the lower Sacramento River near Ryde (data from Vogel 2001 and Vogel 2004).

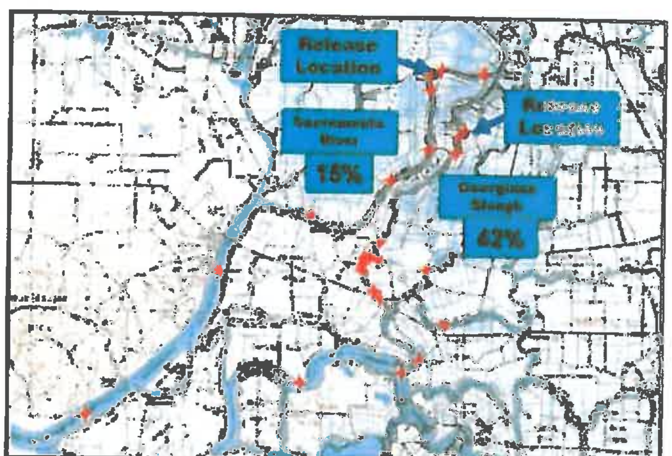
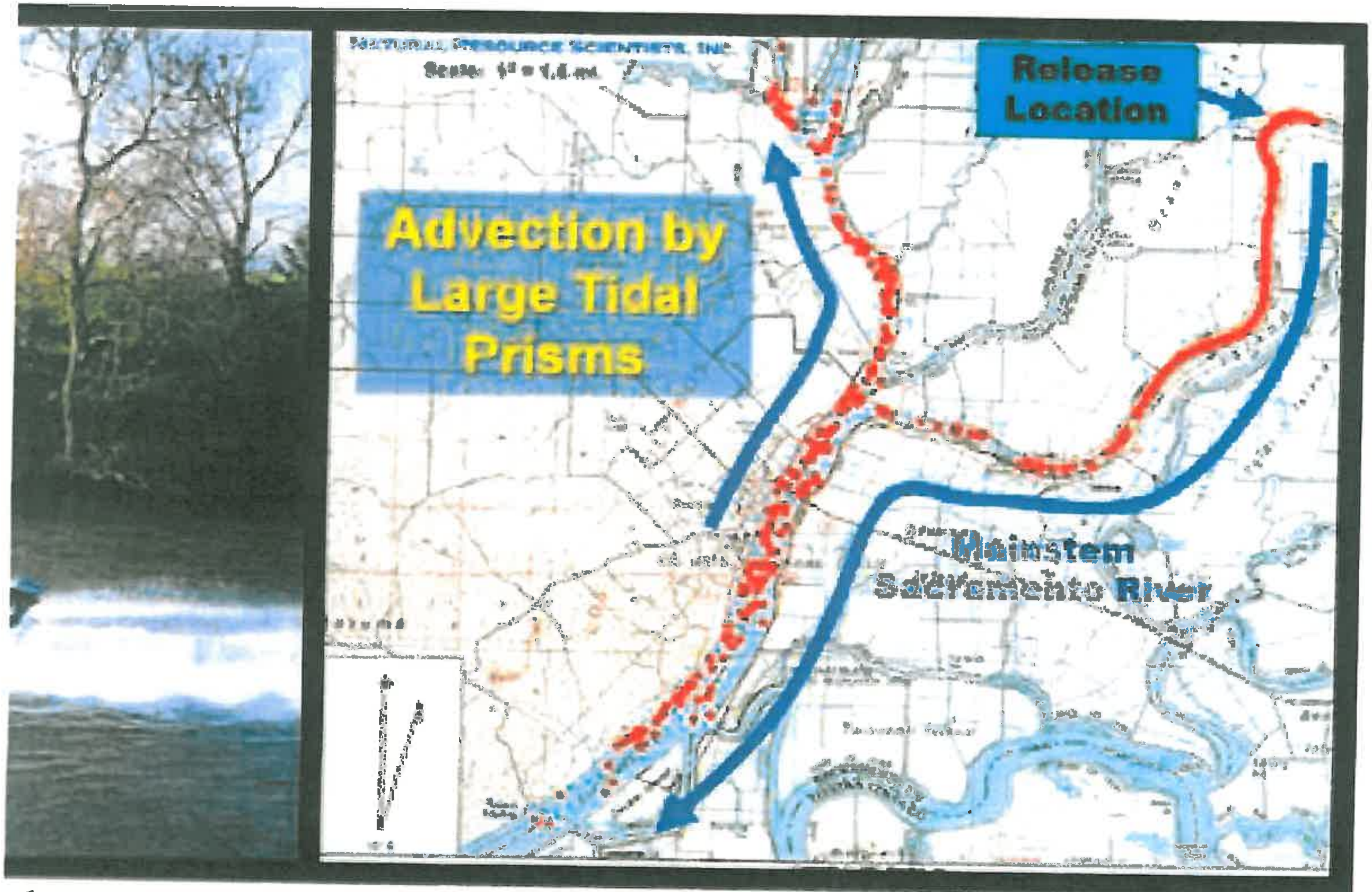


Figure 63. Estimated mortality rate for groups of radio-tagged salmon released at two locations in the north Delta and locations where radio-tagged salmon smolts were detected to have been preyed upon (Vogel 2001, Vogel 2004).

More recently, a 2007 study conducted by releasing acoustic-tagged juvenile salmon in the San Joaquin River found 116 motionless juvenile salmon transmitters in the lower San Joaquin River near the Stockton Waste Water Treatment Plant and a nearby bridge (Figure 64) (Vogel 2007b). This was an all-time record for the largest number of dead radio- or acoustic-telemetered juvenile



.ducted in the north Delta. Photo by Dave Vogel.

ıs of approximately 100 radio-tagged salmon smolts released in the vegetation at some sites in the Delta and water clarity. Increased water clarity for sight predators such as black bass and striped bass would presumably favor predatory fish over prey (*e.g.*, juvenile salmon). Fewer native fish species are found in *Egeria* stands compared to introduced fish species (Grimaldo and Hymanson 1999). Additionally, it has been hypothesized that high densities of *Egeria* in portions of the Delta may restrict juvenile salmon access to preferred habitats, forcing salmon to inhabit deep water or channel areas where predation risks may be higher (Grimaldo *et al.* 2000).

During recent years, there has been an emphasis to reclaim or create shallow, tidal wetlands to assist in re-recreating the form and function of ecosystem processes in the Delta with the intent of benefitting native fish species (Simenstad *et al.* 1999). Among a variety of measures to create such wetlands, Delta island levees either have been breached purposefully or have remained unrepaired so the islands became flooded. A recent example is the flooding of Prospect Island which was implemented under the auspices of creating shallow water habitat to benefit native fish species such as anadromous fish (Christophel *et al.* 1999). Initial fish sampling of the habitat created in Prospect Island suggested the expected benefits may not have been realized due to an apparent dominance of non-native fish (Christophel *et al.* 1999). Importantly, a marked reduction of sediment load to the Delta in the past century (Shvidchenko *et al.* 2004) has implications in the long-term viability of natural conversion of deep water habitats on flooded Delta islands into shallow, tidal wetlands. The very low rates of sediment accretion on flooded Delta islands indicate it would take many years to convert the present-day habitats to intertidal elevations which has potentially serious implications for fish restoration (Nobriga and Chotkowski (2000) due to likely favorable conditions for non-salmonid fish species that can prey on juvenile salmon. Studies of the shallow water habitats at flooded Delta islands showed that striped bass and largemouth bass represented 88 percent of the individuals among 20 fish species sampled (Nobriga *et al.* 2003).

There have likely been significant adverse, unintended consequences of breaching levees in the Delta. There is a high probability that site-specific conditions at the breaches have resulted in hazards for juvenile anadromous fish through the creation of favorable predator habitats. The breaches have changed the tidal prisms in the Delta and can change the degree in which juvenile fish are advected back and forth with the tides (Figure 61; previously discussed). Additionally, many of the breaches were narrow which have created deep scour holes favoring predatory fish. Sport anglers are often seen fishing at these sites during flood or ebb tides. Breaching the levees at Liberty Island is an example (Figure 72 and 73). Recent acoustic-tagging of striped bass in this vicinity confirmed a high presence of striped bass (Figure 74, D. Vogel, unpub. data).

Figure 72. Liberty Island in the north Delta before and after flooding.

Figure 73. Liberty Island in the north Delta before and after flooding showing locations of narrow breaches in the levee.

Figure 74. Locations (squares) where predatory striped bass were acoustic-tagged with transmitters during the winter of 2008 – 2009 in the north Delta near Liberty Island (D. Vogel, unpublished data).

TABLE A-5
1976-77 Estimated Crop Et Values
Delta Service Area
(in inches)

Land Use Category	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Total Oct.76-Sep.77	Oct.77	Total Nov.77-Oct.77
Sacramento-San Joaquin Delta															
Irrigated Pasture	3.2	1.5	1.0	0.7	1.5	3.6	5.4	4.8	6.9	7.7	6.4	4.7	47.4	3.4	47.6
Alfalfa	3.2	1.5	1.0	0.7	1.5	3.2	4.9	4.4	6.5	7.5	6.5	4.9	45.8	3.4	46.0
Deciduous Orchard (Fruits & Nuts)	2.6	1.5	1.0	0.7	1.5	2.7	3.8	4.0	6.1	7.4	6.1	4.3	41.7	2.6	41.7
Tomatoes	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.6	4.0	8.2	6.0	2.3	34.3	1.9	33.8
Sugar Beets	2.4	1.5	1.0	0.7	1.5	1.9	2.2	3.7	7.6	8.3	6.4	4.4	41.6	2.4	41.6
Grain Sorghum (Milo)	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.0	5.9	7.3	4.3	2.5	33.2	1.9	32.7
Field Corn	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.3	5.7	6.9	5.1	2.6	33.8	1.9	33.3
Dry Beans	2.4	1.5	1.0	0.7	1.5	1.9	2.2	1.7	5.7	6.2	2.7	2.5	30.0	1.9	29.5
Safflower	2.4	1.5	1.0	0.7	1.5	1.9	2.5	4.8	8.7	7.7	4.4	2.5	39.6	1.9	39.1
Asparagus	2.4	1.5	1.0	0.7	1.5	1.9	2.2	1.0	3.5	7.7	6.4	4.7	34.5	2.4	34.5
Potatoes	2.4	1.5	1.0	0.7	1.5	1.9	2.2	1.7	4.3	7.4	5.5	2.8	32.9	1.9	32.4
Irrigated Grain	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	1.0	1.0	1.6	26.1	1.6	24.7
Vineyard	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.8	5.3	6.5	5.3	3.4	34.5	2.4	34.5
Rice	3.2	1.5	1.0	0.7	1.5	1.9	2.8	5.6	8.8	9.8	8.1	5.5	50.4	3.4	50.6
Sudan	2.4	1.5	1.0	0.7	2.0	4.3	5.7	4.8	6.9	7.7	4.9	4.7	46.6	2.4	46.6
Misc. Truck	2.4	1.5	1.0	0.7	1.5	1.9	3.2	4.6	6.7	7.4	5.2	3.7	39.8	1.9	39.3
Misc. Field	2.4	1.5	1.0	0.7	1.5	1.9	2.2	2.4	6.1	7.4	5.0	1.9	34.0	1.9	33.5
Double Cropped with Grain															
Sugar Beets	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	4.2	5.2	5.8	37.7	3.4	38.7
Field Corn	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	4.3	6.3	6.1	39.2	2.7	39.5
Grain Sorghum (Milo)	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	1.8	2.7	6.1	5.2	36.5	1.9	36.0
Sudan	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	3.6	7.7	4.9	4.7	41.6	1.9	41.1
Dry Beans	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	3.1	7.6	3.5	1.5	36.4	1.9	35.9
Tomatoes	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	2.3	6.6	6.0	5.2	40.8	1.9	40.3
Lettuce	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	4.1	7.4	5.3	4.9	42.4	2.4	42.4
Misc. Truck	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	2.3	6.6	6.0	5.2	40.8	2.4	40.8
Misc. Field	2.4	1.5	1.0	0.7	2.0	4.3	5.7	3.1	4.1	7.4	5.3	4.9	42.4	3.4	43.4
Fallow Lands 1/	2.4	1.5	1.0	0.7	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	14.0	1.0	12.6
Native Vegetation 2/	2.4	1.5	1.0	0.7	1.4	3.7	3.8	2.1	2.3	2.6	2.3	2.0	25.8	1.6	25.0
Riparian Veg. & Water Surface	4.6	2.4	1.4	0.8	1.9	4.5	7.4	6.6	9.7	11.8	9.7	7.0	67.8	4.3	67.5
Urban	1.6	0.8	0.6	0.7	1.0	1.0	1.9	2.4	2.4	2.5	2.4	1.9	19.2	1.6	19.2

1/ Applies also to nonirrigated grain.
2/ Applies also to nonirrigated orchards and vineyards

Metric conversion: inches times 25.4 equals millimetres.

Exhibit 29-2

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

PUBLICATIONS OF THE
DIVISION OF WATER RESOURCES
EDWARD HYATT, State Engineer

S A C R A M E N T O - S A N J O A Q U I N

W A T E R S U P E R V I S O R ' S

R E P O R T

FOR YEAR

1 9 3 1

By
HARLOWE M. STAFFORD
Water Supervisor

Under the supervision of
HAROLD CONKLING
Deputy State Engineer

August, 1932

Exhibit 29-3

TABLE 69

UNIT CONSUMPTIVE USE OF WATER IN SACRAMENTO-SAN JOAQUIN DELTA**
Acre-feet per Acre

Crop or Classification	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total Seasonal Use	Total Annual Use
Alfalfa	(.06)	(.08)	.10	.30	.40	.50	.65	.55	.50	.20	(.10)	(.07)	3.20	3.51
Asparagus	.05	.05	.05	.05	.08	.14	.40	.68	.55	.42	.12	.10	2.69	2.69
Beans	(.06)	(.08)	(.08)	(.16)	(.20)	.14	.24	.58	.37	(.09)	(.07)	(.05)	1.33	2.12
Beets	(.06)	(.08)	(.08)	.13	.32	.51	.61*	.53*	.20*	(.13)	(.10)	(.07)	2.30	2.82
Celery	(.04)	(.04)	(.04)	(.08)	(.10)	.10	.10	.20	.25	.30	.20	.05	1.20	1.50
Corn	(.04)	(.04)	(.04)	(.08)	(.10)	.24	.85	.84*	.40*	.10	(.10)	(.07)	2.43	2.90
Fruit	(.04)	(.04)	(.04)	.18	.32	.50	.57	.40	.23	.07	(.07)	(.05)	2.27	2.51
Grain and Hay	(.04)	(.04)	.07	.60	.83	.20	(.14)	(.23)	(.21)	(.14)	(.07)	(.05)	1.70	2.62
Onions	(.04)	(.04)	.08	.13	.27	.49	.43	.20	(.16)	(.13)	(.10)	(.07)	1.60	2.14
Pasture	.08	.10	.20	.25	.25	.25	.25	.25	.20	.15	.10	.08	2.16	2.16
Potatoes	(.06)	(.08)	(.08)	(.16)	.15	.38	.52	.30	.15	(.09)	(.07)	(.05)	1.50	2.09
Seed	(.06)	(.08)	(.08)	.10	.25	.50	.50	.50	.35	.10	(.10)	(.07)	2.30	2.69
Truck	(.06)	(.08)	.10	.10	.25	.50	.45	.45	.30	.15	.10	(.07)	2.40	2.61
Tules	.16	.09	.30	.74	1.10	1.28	1.53	1.32	1.18	.98	.59	.36	9.63	9.63
Willows	.05	.03	.09	.22	.33	.38	.46	.40	.35	.29	.18	.10	2.88	2.88
Bare Land	.04	.04	.04	.08	.10	.13	.14	.13	.11	.09	.07	.05	1.02	1.02
Idle Land with Weeds***	.06	.08	.08	.16	.20	.26	.28	.24	.16	.13	.10	.07	1.82	1.82
Open Water Surfaces	.08	.13	.23	.34	.60	.76	.84	.78	.60	.33	.14	.08	4.91	4.91

NOTE: Figures shown in brackets ( ) represent estimated consumptive use on cropped areas before planting and after harvest. (Evaporation from bare land, use by weeds, etc.).

* Includes estimated additional use by weeds during these months.

** These are the data as determined for and published in Bulletin No. 27 - "Variation and Control of Salinity in Sacramento-San Joaquin Delta and Upper San Francisco Bay" - Table 1.

*** Average for land below elevation 5.0 U.S.G.S. datum. Use on unirrigated lands above elevation 5.0 is considered zero.

TABLE 74

USE OF WATER BY CAT-TAILS GROWN IN TANKS, NEAR CLARKSBURG,
RECLAMATION DISTRICT 999, 1931

TANK NO.	USE OF WATER – ACRE-FEET PER ACRE												
	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
2	0.22	0.22	0.58	1.08	2.28	2.28	2.96	2.51	1.66	0.91	0.43	0.23	15.36
3	0.21	0.20	0.49	1.12	1.94	2.11	2.51	1.92	1.36	0.83	0.51	0.22	13.42
4	0.20	0.21	0.52	1.30	2.51	2.78	3.34	2.78	1.90	1.04	0.54	0.29	17.41
5	0.23	0.25	0.50	1.15	1.98	1.83	2.04	1.82	1.28	0.76	0.37	0.13	12.34
6	0.22	0.24	0.60	1.44	2.80	2.77	3.51	—UNDER TEST FOR LEAKAGE→					
MEANS	0.22	0.22	0.54	1.22	2.30	2.35	2.87	*2.26	*1.55	*0.94	*0.46	*0.22	*14.63

*MEAN OF FOUR TANKS

TABLE 75

USE OF WATER BY TULES GROWN IN TANKS, NEAR CLARKSBURG,
RECLAMATION DISTRICT 999, 1931

TANK NO.	USE OF WATER – ACRE-FEET PER ACRE												
	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
7	0.21	0.23	0.54	1.32	3.02	2.88	4.35	—UNDER TEST FOR LEAKAGE—					
8	0.20	0.24	0.48	1.18	2.45	2.39	3.02	2.59	1.78	1.01	0.51	0.20	16.05
9	0.20	0.26	0.48	1.12	2.14	2.20	2.76	1.98	1.37	0.82	0.41	0.20	13.94
10	0.19	0.24	0.51	1.08	2.07	2.26	2.88	1.71	1.23	0.66	0.43	0.23	13.49
11	0.21	0.19	0.40	0.90	1.84	1.65	1.63	1.32	1.16	0.72	0.39	0.19	10.60
12	0.20	0.20	0.25	0.84	1.75	1.26	2.75	2.36	1.72	1.09	0.61	0.27	13.30
MEANS	0.20	0.23	0.44	1.07	2.21	2.11	2.90	*1.99	*1.45	*0.86	*0.47	*0.22	*13.48

*MEAN OF FIVE TANKS

TABLE 77

USE OF WATER BY CAT-TAILS AND TULES GROWN IN TANKS AT CAMP 3, KING ISLAND
1931

TANK NUMBER	PLANT	WATER SURFACE ABOVE GROUND SURFACE FEET	USE OF WATER – ACRE-FEET PER ACRE													COMPARA-TIVE PLANT SIZE (2)
			JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC. (3)	YEAR (4)	
1	CAT-TAILS	0.0	0.14	0.13	0.25	0.52	0.52	0.31	0.33	0.18	0.13	0.15	0.07		2.8	UNDERSIZE
2	CAT-TAILS	1.0	–	NO	USABLE	RECORD –	(1)0.72	0.82	0.92	0.82	0.67	0.53	0.26		6.2	UNDERSIZE
3	TULES	1.0	–	NO	USABLE	RECORD –	(1)1.33	1.13	1.32	1.16	0.80	0.51	0.19		8.0	NORMAL
4	TULES	0.0	0.17	0.15	0.45	0.58	1.00	0.88	0.88	0.71	0.53	0.15	0.07		5.7	UNDERSIZE

(1) INCLUDES APRIL 29TH AND 30TH.
(2) THE COMPARISON FOR SIZE IS WITH SURROUNDING PATCH PLANTS OF THE SAME KIND. PLANTS IN TANKS NUMBERS 1 AND 2 WERE UNDERSIZE ALL SEASON. PLANTS IN TANK NUMBER 4 WERE NORMAL SIZE AT BEGINNING OF SEASON.
(3) HEAVY RAINS DERANGED CONDITIONS SO THAT NO RELIABLE RECORD FOR DECEMBER WAS OBTAINED.
(4) ESTIMATED. CLOSELY FOR TANKS NUMBERS 1 AND 4. ROUGHLY FOR TANKS NUMBERS 2 AND 3.

– – 0 – –

TABLE 78

USE OF WATER BY TULES GROWN IN TANKS AT SIMMONS ISLAND, NEAR BAY POINT, 1931

TANK NO.	WATER SURFACE ABOVE GROUND SURFACE FEET	USE OF WATER – ACRE-FEET PER ACRE													NUMBER OF STALKS IN JULY*
		JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.*	DEC.	YEAR (APPROX)	
1	1.0	0.11	0.15	0.23	0.28	0.38	0.48	0.61	0.48	0.43	0.21	0.11	(0.11)	3.58	11
2	0.0	(0.11)	(0.11)	(0.12)	0.14	0.94	0.80	0.69	0.52	0.36	0.22	0.11	(0.11)	4.23	19
3	1.0	(0.11)	(0.15)	(0.28)	0.34	1.01	0.87	0.84	0.67	0.60	0.46	0.29	(0.11)	5.73	35
4	0.0	(0.11)	(0.15)	(0.24)	0.29	0.96	0.89	0.78	0.59	0.54	(0.30)	0.14	(0.11)	5.10	30
MEANS		(0.11)	(0.14)	(0.22)	0.26	0.82	0.76	0.73	0.57	0.48	(0.30)	0.16	(0.11)	4.66	

NOTE: FIGURES IN PARENTHESES ARE ESTIMATED.
* THERE WERE SOME NEW SPROUTS IN ALL TANKS IN JULY.

Technical Memorandum:

Delta Risk Management Strategy (DRMS) Phase 1

Topical Area:

Impact to Infrastructure

Final

Prepared by:
URS Corporation/Jack R. Benjamin & Associates, Inc.

Prepared for:
California Department of Water Resources (DWR)

June 15, 2007

Exhibit 30

7.2 Summary

The total estimated replacement costs for infrastructure assets within the Delta are summarized in Table 7-8 for the current (2005) and 2050 conditions, for MHHW and 100 year inundation levels. This table accounts for infrastructure assets that could be damaged as a result of levee breaching and island flooding (see Section 1.2). The costs are based on the results presented in Tables 7-1, 7-2, 7-4 and 7-5.

Table 7-8 Comparison of Total Replacement Costs of Delta Infrastructure - Current and 2050[a]

Inundation Level	Current (2005)[c]	2050	Cost Ratio: 2050/Current
Within Mean Higher High Water (MHHW) Limits [b]	\$6.7 billion	\$8.5 billion [e]	1.3
Within 100-year Flood Limits [b,c]	\$56.3 billion	\$67.1 billion [e]	1.2

[a] Costs in this table are for infrastructure assets and their contents that could be damaged as a result of levee breaching and island flooding.
[b] See Section 4.1.2 and Figure 4-1 for limits of inundation.
[c] Flood plain limits were developed from FEMA Flood Insurance Rate Maps.
[d] Costs are in 2005 dollars.
[e] Costs are in 2005 dollars; not escalated to 2050.

As indicated in Table 7-8, the total replacement cost of assets within the 100-year flood limits significantly exceeds (about 8 times) these costs for assets within the MHHW limits. The reason for this large difference is explained by referring to Figure 4-1. This figure shows that the 100-year flood event has the potential to inundate major urban areas such as Sacramento and Stockton that have a large inventory of infrastructure assets. However, the MHHW limits do not extend to these large urban areas. Smaller towns and rural/agricultural areas mainly fall within the MHHW limits. The largest differences between damages for the 100-year flood event and other events would be for infrastructure that is located near the edge of the floodplain in urban areas (areas with topographic relief).

Table 7-8 also indicates that over the next 50 years, the total replacement cost of assets could increase by about 20 to 30 percent within the MHHW limits and the 100-year flood plain limits. Likewise, the overall damage repair costs of assets as a result of levee failure are also expected to increase over the next 50 years due to the (1) increase in the amount of infrastructure assets as a result of population growth, (2) Delta water level rise due to climate change, and corresponding increase in MHHW and 100-year flood levels, and (3) decrease in island elevation levels due to subsidence. The increase in water levels, coupled with the decreasing island elevations, would increase the amount of inundation of Delta assets in the future. The damage would therefore increase, resulting in greater future repair costs and repair times.

The repair costs for infrastructure assets will be based on the number of island failures and resulting inundation, and the repair costs will vary from island to island. For both current and 2050 conditions, the overall results of the repair and replacement costs presented in the asset tables indicate that the repair costs due to inundation could be on the order of 30 percent (for MHHW) and 50 percent (for the 100-year food) of the asset replacement costs, considering all Delta islands and tracts.

7.3 Limitations

As stated in Section 1.2, we consider damage to infrastructure assets that could result from levee breaching and island flooding. Infrastructure assets that would not be damaged by levee failure (e.g., pumping plants and power plants) are beyond the scope of the TM.

As stated in Section 3, because some asset types lack attribute information, it was not always possible to estimate asset costs from the GIS data. In these cases, there is insufficient definition of quantitative attributes to evaluate reliable replacement and repair costs and assumptions had to be made so that damage loss could be estimated. Also, some assets were not available in the GIS database. Further characterization of the Delta infrastructure assets would reduce the uncertainty in the damage estimates.

Because of the lack of information on repair times (due to the absence of historic experience), especially for multi-island failures, judgment was used to estimate repair times.

8. References

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STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
CENTRAL VALLEY FLOOD PROTECTION BOARD
RESOLUTION NO. 2018-06 FOR
ACCEPTABLE OPERATION AND MAINTENANCE OF THE
STATE PLAN OF FLOOD CONTROL

BACKGROUND:

A. **WHEREAS**, in 1911 the Legislature created the Reclamation Board. The Reclamation Board was given regulatory authority over the Sacramento Valley's levee system and levee maintaining agencies with the objectives of (1) assuring a logical, integrated system for controlling flooding along the Sacramento and San Joaquin Rivers and their tributaries in cooperation with the United States Army Corps of Engineers (USACE), (2) cooperating with various agencies in planning, constructing, operating, and maintaining flood control works, and (3) maintaining the integrity of the flood control system and designated floodways. In 1913 the Reclamation Board was given regulatory authority over the San Joaquin Valley's levee system and levee maintaining agencies. In 2007 the Legislature restructured the Reclamation Board and renamed it as the "Central Valley Flood Protection Board"; and

B. **WHEREAS**, as the non-federal sponsor of the State-federal flood control system in California's Central Valley, the Central Valley Flood Protection Board (Board) has provided the federal government with assurances that the flood control system would be operated and maintained as prescribed by regulations of the Secretary of the Army that require compliance with the USACE Standard Operation and Maintenance (O&M) manuals for the Sacramento River Flood Control Project (1955) and for the Lower San Joaquin River Levees – Lower San Joaquin River and Tributaries Project (1959) pursuant to the authority in California Water Code Section 8617; and

C. **WHEREAS**, pursuant to Section 3 of the Flood Control Act of 1936 and Section 103 of the Water Resources Development Act of 1986 (WRDA 86), non-Federal interests are required to pay 100 percent of the costs of operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of structural flood damage reduction projects. In addition, the USACE has issued a policy guidance memorandum dated August 16, 2005 which states that a project is only eligible for reconstruction assistance from the USACE if a non-federal sponsor has performed adequate maintenance; and

D. **WHEREAS**, the USACE has issued Engineering Regulation (ER) 1110-2-401, dated September 30, 1994 which defines "repair, replacement, and rehabilitation" for projects managed by non-federal sponsors. "Repair" is considered to entail those activities of a routine nature that maintain the project in a well-kept condition. "Replacement" covers those activities taken when a worn-out element or portion thereof is replaced. "Rehabilitation" refers to a set of activities as necessary to bring a deteriorated project back to its original condition; and

E. **WHEREAS**, the legislature granted the Board jurisdiction and authority over the State Plan of Flood Control (SPFC) as denoted in California Water Code, including Section 8534, which requires the Board to enforce on behalf of the State the erection, maintenance and protection of the SPFC which in its judgment will best serve the interests of the State and Section 8608 which requires the Board to establish and enforce standards for the operations and maintenance of the SPFC; and

F. **WHEREAS**, California Water Code Section 12642 states "In all cases where the Federal Government does not maintain and operate projects, it is the responsibility and duty of the county, city, state agency, or public district affected to maintain and operate flood control and other works, constructed pursuant to Chapters 1 and 2 of this part, after their completion and hold and save the State and the United States free from damages."; and

G. **WHEREAS**, California Water Code Section 12828 states "Except where the co-operation required by the United States in addition to the costs of all lands, easements, and rights-of-way, has been authorized to be assumed by the State prior to March 12, 1946, the department shall not reallocate the funds allocated to it, nor shall the Reclamation Board expend any funds appropriated directly to it, for acquisition of property rights or contributions to the United States, for any project for which the Reclamation Board is directed to give assurances to the United States unless and until a public agency other than the Reclamation Board has either assumed the obligations of maintenance and holding the United States harmless from damages due to the construction of works, directly with the United States, or has by binding agreement with the Reclamation Board agreed to assume such obligations and to hold the State and the Reclamation Board harmless from any claims therefor..."; and

H. **WHEREAS**, many local maintaining partners provided assurances to the Board and signed agreements with the Board for continued operation and maintenance prescribed by regulations of the Secretary of the Army for the flood control system in the Central Valley; and

I. **WHEREAS**, in 2005, Hurricane Katrina caused portions of the federal levee system to fail in New Orleans, resulting in significant loss of life and property and subsequently, the USACE embarked upon a nationwide scrutiny of the federal levee system; and

J. **WHEREAS**, after Hurricane Katrina, the people of California recognized the Sacramento-San Joaquin Valley as an area significantly at risk for similar devastation suffered by New Orleans and passed Proposition 1E, which provided $4 billion for flood protection for the Central Valley, which has been utilized over the past 11 years to significantly improve the SPFC facilities in the Central Valley; and

K. **WHEREAS**, the Central Valley Flood Protection Act of 2008 (2008 Act) directed that the Department of Water Resources (DWR) prepare a Central Valley Flood Protection Plan (CVFPP) to be adopted by the Board by July 1, 2012 (CWC § 9612(b)); and

L. **WHEREAS**, DWR prepared a 2017 update to the CVFPP pursuant to the requirements of the 2008 Act. The 2017 update was adopted by the Board through Resolution of Adoption 2017-10 on August 25, 2017; and

M. WHEREAS, through Resolution of Adoption 2017-10, the Board stated the following:

i. That in order to successfully implement the 2017 CVFPP Update, essential and adequate funding is necessary to continue to operate and maintain the flood system, that additional funding is required to correct identified deferred maintenance issues, and that further funding is essential to continue to make vital improvements to California's aging flood system.

ii. That since the adoption of the 2012 CVFPP, the levee inspection reports provided by the USACE indicate severe levee maintenance deficiencies in over 90% of State Plan of Flood Control levee systems.

iii. That it is committed to working with the local maintaining agencies to correct these operation and maintenance deficiencies in order to obtain or regain eligibility for the Public Law 84-99 Rehabilitation Program.

iv. That it acknowledges the importance of all eight key policy issues identified in the 2017 CVFPP Update and will facilitate resolution of these interrelated policy issues with the understanding that the Board has identified funding and operation and maintenance of the flood system as the highest priorities to advance prior to the 2022 CVFPP Update.

N. WHEREAS, through multiple successful Coordinating Committee meetings, the Board has facilitated a discussion regarding the definitions of OMRR&R, including valuable participation by the USACE, maintaining agencies, and stakeholders.

NOW, THEREFORE THE BOARD FINDS:

1. That the above recitals are true and correct.

2. That this Resolution 2018-06 is being adopted by the Board as confirmation of the State's standards for OMRR&R for SPFC facilities. It is also intended to notify all interested parties that the Board will enforce its standards as necessary to fulfill its mandates pursuant to California Water Code and its federal assurances.

3. That the USACE requires that all SPFC facilities be operated and maintained in accordance with the Code of Federal Regulations, Title 33, Section 208.10 (33 CFR 208.10), with federal O&M manuals, in accord with ER 1110-2-401 and that all levee systems pass periodic inspections with acceptable ratings to be eligible for the federal Public Law 84-99 Rehabilitation Program.

4. That except as noted below, the State's priority and long-term goal is for maintaining agencies to substantially improve operation and maintenance practices to reach compliance with all requirements of applicable federal regulations and O&M manuals ensuring eligibility for the federal Public Law 84-99 Rehabilitation Program under current federal interim guidelines. The State does not believe that compliance with the USACE vegetation standards is appropriate or practical within the SPFC in light of

competing interests under the Endangered Species Act and therefore has promoted alternative levee vegetation objectives that require maintaining agencies to instead comply with the State's current levee vegetation management strategy.

5. That the obligation to perform routine operation and maintenance did not change with the addition of 33 U.S.C. 2213 from WRDA1986.

6. That the required operations and maintenance as identified in existing O&M manuals includes "repair, replacement, and rehabilitation" as described in ER 1110-2-401, but does not include reconstruction of a project or project segment that has reached the end of its design service life or is deficient due to a design or construction defect.

7. That many local maintaining agencies have advised the State that lack of sustainable funding is a major hurdle to adequately operate and maintain SPFC facilities.

8. That identifying and securing a sustainable funding source for operation and maintenance of the SPFC is a State priority.

9. That the State is committed to working with the maintaining agencies to correct operation and maintenance deficiencies that will reduce risk to the people and property of the Central Valley, and obtain, regain, and maintain eligibility for the federal Public Law 84-99 Rehabilitation Program.

10. That the State acknowledges the value of maintaining agencies and applauds those agencies which received acceptable ratings. The State appreciates those maintaining agencies that have developed and submitted System Wide Improvement Framework (SWIF) plans.

11. That the State encourages all other maintaining agencies currently not meeting federal Public Law 84-99 Rehabilitation Program eligibility criteria to develop, submit, and adhere to SWIFs as an initial phase to regain eligibility for the federal Public Law 84-99 Rehabilitation Program. As an interim phase of compliance with the requirements of 33 CFR 208.10 and federal O&M manuals, the maintaining agencies may address the unacceptable items identified in the USACE inspection reports that fall within the list of items used to determine Public Law 84-99 eligibility, currently described in the USACE memorandum dated March 21, 2014 with subject line "Interim Policy for Determining Eligibility Status of Flood Risk Management Projects for the Rehabilitation Program Pursuant to Public Law (P.L.) 84-99".

12. The Board will seek to update or execute assurance agreements with local maintaining agencies to standardize such agreements in a manner that explicitly recognizes operation and maintenance requirements include repair, rehabilitation, and replacement as defined in ER 1110-2-~~104~~.
401

NOW, THEREFORE, BE IT RESOLVED, THAT THE BOARD ESTABLISHES THE FOLLOWING POLICIES:

I. Maintaining agencies who have not received acceptable ratings from recent Department inspections, shall make every effort to receive "acceptable" ratings from annual Department inspections.

II. Maintaining agencies shall make every effort to obtain or regain, and maintain, eligibility for the federal Public Law 84-99 Rehabilitation Program, including participating in the federal SWIF program as an initial phase while working toward an interim phase of compliance by addressing the unacceptable items within the USACE's list described in the USACE's interim policy.

III. Maintaining agencies shall make every effort to comply with the State's long-term requirement of full compliance with 33 CFR 208.10 and federal O&M manuals consistent with the State's current levee vegetation management strategy.

IV. Maintaining agencies that are unable to meet OMRR&R requirements shall seek necessary funding to comply with OMRR&R requirements or participate in the federal SWIF program.

V. The State is committed to improving operation and maintenance of SPFC facilities in all areas. Where the State is required to perform OMRR&R, the State shall continue to obtain, regain, and maintain eligibility in the Public Law 84-99 Rehabilitation Program. The State shall also make every effort to address non-compliant encroachments systemwide.

VI. The State will investigate all remedies available to it as authorized by California Water Code, in areas where local maintaining agencies are unable or unwilling to fund proper operation and maintenance practices in compliance with 33 CFR 208.10 and federal O&M manuals.

This resolution shall constitute the written decision of the Board in the matter of acceptable operation and maintenance of the State Plan of Flood Control.

PASSED AND ADOPTED by vote of the Board on Month XX, 2018

William H Edgar

William H. Edgar, President

Jane Dolan, Secretary

State of California

FLOOD HAZARD MITIGATION PLAN

FOR THE

SACRAMENTO–SAN JOAQUIN DELTA

Covering portions of Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties

---

Disaster Declarations

FEMA-633-DR, FEMA-651-DR, FEMA-689-DR,

FEMA-677-DR

Prepared by
Department of Water Resources
for
Office of Emergency Services

September 15, 1983

Exhibit 32

State of California

FLOOD HAZARD MITIGATION PLAN

FOR THE

SACRAMENTO-SAN JOAQUIN DELTA

Covering Portions of Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties

Disaster Declarations

FEMA-633-DR, FEMA-651-DR, FEMA-669-DR

FEMA-677-DR

Prepared by

Department of Water Resources
for
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September 15, 1983

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State of California
GEORGE DEUKMEJIAN, GOVERNOR

The Resources Agency
GORDON K. VAN VLECK, Secretary for Resources

Department of Water Resources
DAVID N. KENNEDY, Director

Alex R. Cunningham, Deputy Director
Arthur C. Gooch, Acting Deputy Director
Howard H. Eastin, Acting Deputy Director

CENTRAL DISTRICT

Robert G. Potter . . . . District Chief

This report was prepared under the direction of

Lee W. Carter . . . . Chief, Data and Operations Branch

Special thanks are extended to the following people
for their cooperation and expertise given
during the preparation of this report

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Jim Dixon . . . . Sacramento County
Peggy Keranen . . . . San Joaquin County

PART I. SUMMARY AND RECOMMENDATIONS

A summary of the State Hazard Mitigation Plan for the Sacramento-San Joaquin Delta is as follows:

A. Short-Term Mitigation Plan

1. By February 1, 1984, the State will give the U. S. Army Corps of Engineers a Letter of Intent to sponsor a federal-state flood control project.

2. The Department of Water Resources will request an increase in funding for the Delta Levee Maintenance Subventions Program from Tidelands Oil revenue beginning in 1984-85 and continuing until a major federal levee rehabilitation project can be implemented.

3. The Department of Water Resources, in cooperation with local districts, will use appropriate construction and maintenance standards for nonproject levees to upgrade these levees to the standards described in the "Short-Term Rehabilitation Plan".

4. The local districts will implement a levee inspection program and file a report by June 1 of each year with the Director of the Department of Water Resources for 1983-84 and 1984-85. The Department of Water Resources will develop a state levee inspection program and request funding for the program beginning in 1984-85.

5. The local districts should complete their annual levee maintenance by November 1.

6. The Department of Water Resources will develop a program to reevaluate land subsidence rates in the Delta and request funding to begin the study in the 1984-85 fiscal year.

7. The local districts should develop and file with the Office of Emergency Services (copy to the Department of Water Resources) an emergency response and evacuation plan by June 1, 1984.

8. The State of California should continue to request emergency declarations for federal assistance for serious levee failures and severe storm damage that occur prior to implementation of a federal-state-local flood control project.

B. Long-Term Mitigation Plan

The State intends to develop a comprehensive federal-state-local flood control project that would consider all islands in the Delta and to seek legislation to finance the nonfederal share.

PART II. INTRODUCTION

A. Background

On February 9, 1983, President Reagan determined that damage resulting from severe storms, flooding, high tides, and wave action in certain areas of California warranted a major disaster declaration under provisions of the Federal Disaster Relief Act of 1974 (Public Law 93-288). This declaration included damage resulting from storms and flooding that took place from November 27, 1982, through March 30, 1983. In a letter dated February 16, 1983, the Federal Emergency Management Agency (FEMA) outlined the terms of the FEMA-State Disaster Assistance Agreement for the major disaster designated FEMA-677-DR. This agreement was executed by the FEMA Regional Director and the Governor. By letter dated March 17, 1983, Amendment No. 1 was added to the agreement to include that portion of the Sacramento-San Joaquin Delta (see Figure 1) located within the counties of Contra Costa, Sacramento, and San Joaquin.

B. Requirement for a Plan

Section 406 of Public Law 93-288 requires, as a condition to receiving federal disaster aid, that repairs be done in accordance with applicable codes, specifications, and standards. It also requires the state or local government recipient of federal aid to evaluate the natural hazards of the area in which the aid is to be used and, if appropriate, take mitigating action.

C. Interagency Flood Hazard Mitigation Report

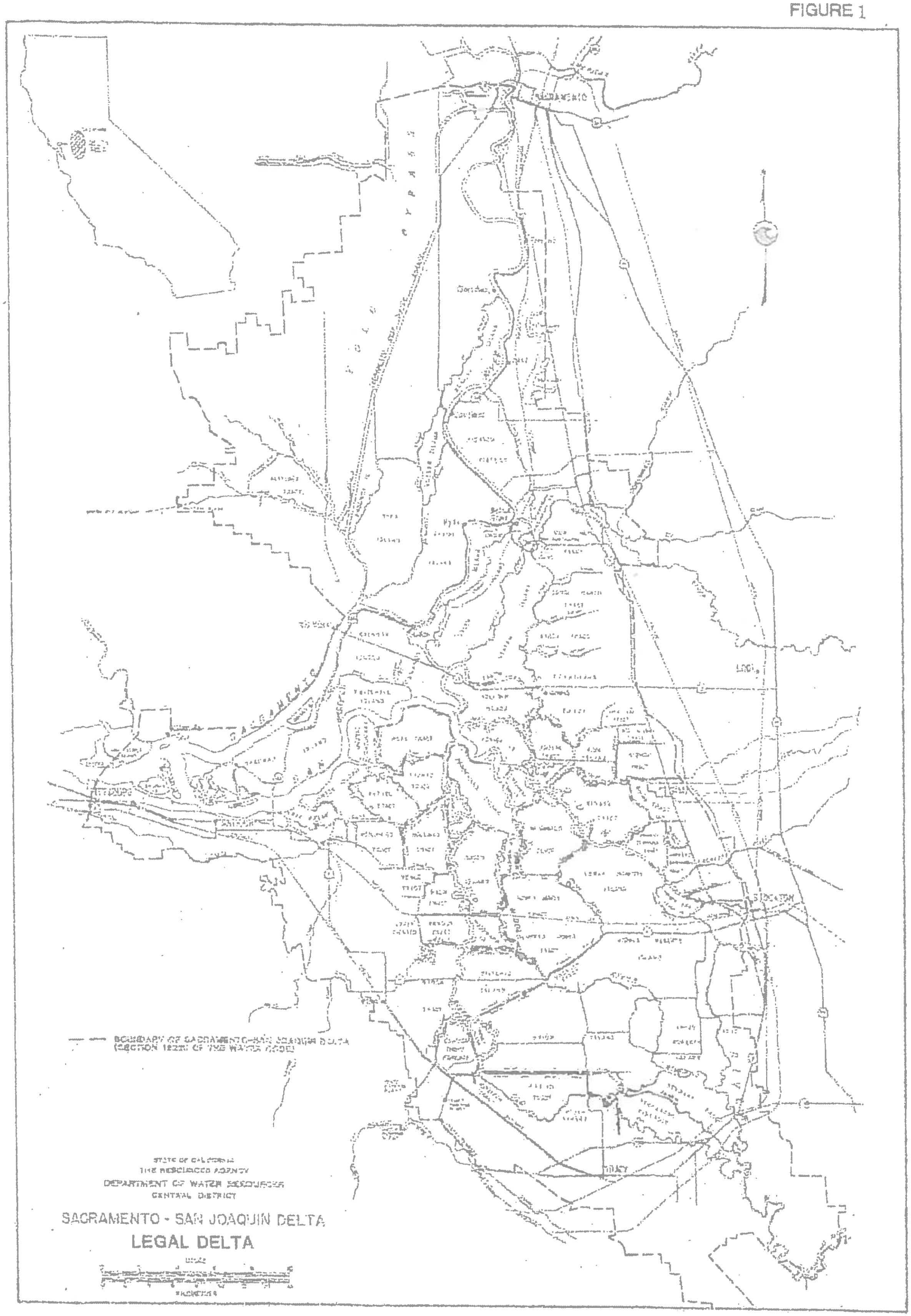
A Federal Interagency Flood Hazard Mitigation Report is prepared by the (federal) Region IX Interagency Flood Hazard Mitigation Team within 15 to 30 days following each presidentially declared major flood disaster. A report covering the recent major disaster, FEMA-677-DR, was dated March 11, 1983. Supplement No. 1 to this report, dated March 24, 1983, made specific recommendations and provided a framework for a State Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta.

D. Objective of This Plan

The objectives of this plan are to:

1. Follow up, in detail, recommendations of the Interagency Flood Hazard Mitigation Report.

FIGURE 1


SACRAMENTO
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
CENTRAL DISTRICT
SACRAMENTO - SAN JOAQUIN DELTA
LEGAL DELTA
STOCKTON
LODI
TRACY

2. Recommend hazard mitigation alternatives for local, state, and federal agencies.

3. Establish immediate and long-term planning frameworks for implementation of hazard mitigation efforts.

E. Purpose of This Plan

The purpose of this plan is to implement the requirements of Section 406 and the requirements of Amendment No. 1 to the FEMA-State Agreement. Amendment No. 1, Paragraph 10(b), states in part:

> "The State ... will prepare and submit, not later than August 1, 1983, to the Regional Director for concurrence, a comprehensive hazard mitigation plan for the entire Sacramento-San Joaquin Delta area. This plan shall address state, local, private and federal activities and interests as they currently exist, are currently being developed, or are planned. This plan shall also identify major hazard mitigation measures to be taken for each district (applicant), by whom, sources of funding, and schedules for accomplishment. Such measures shall include: (1) establishment of applicable codes, specifications and standards for new construction, repair, and maintenance; (2) upgrading of levees and other related facilities to applicable codes, specifications, and standards; (3) periodic inspections, reports, and follow-up of all levee and related facilities; and (4) correction of maintenance deficiencies."

Amendment No. 1, Paragraph 10(b), further states:

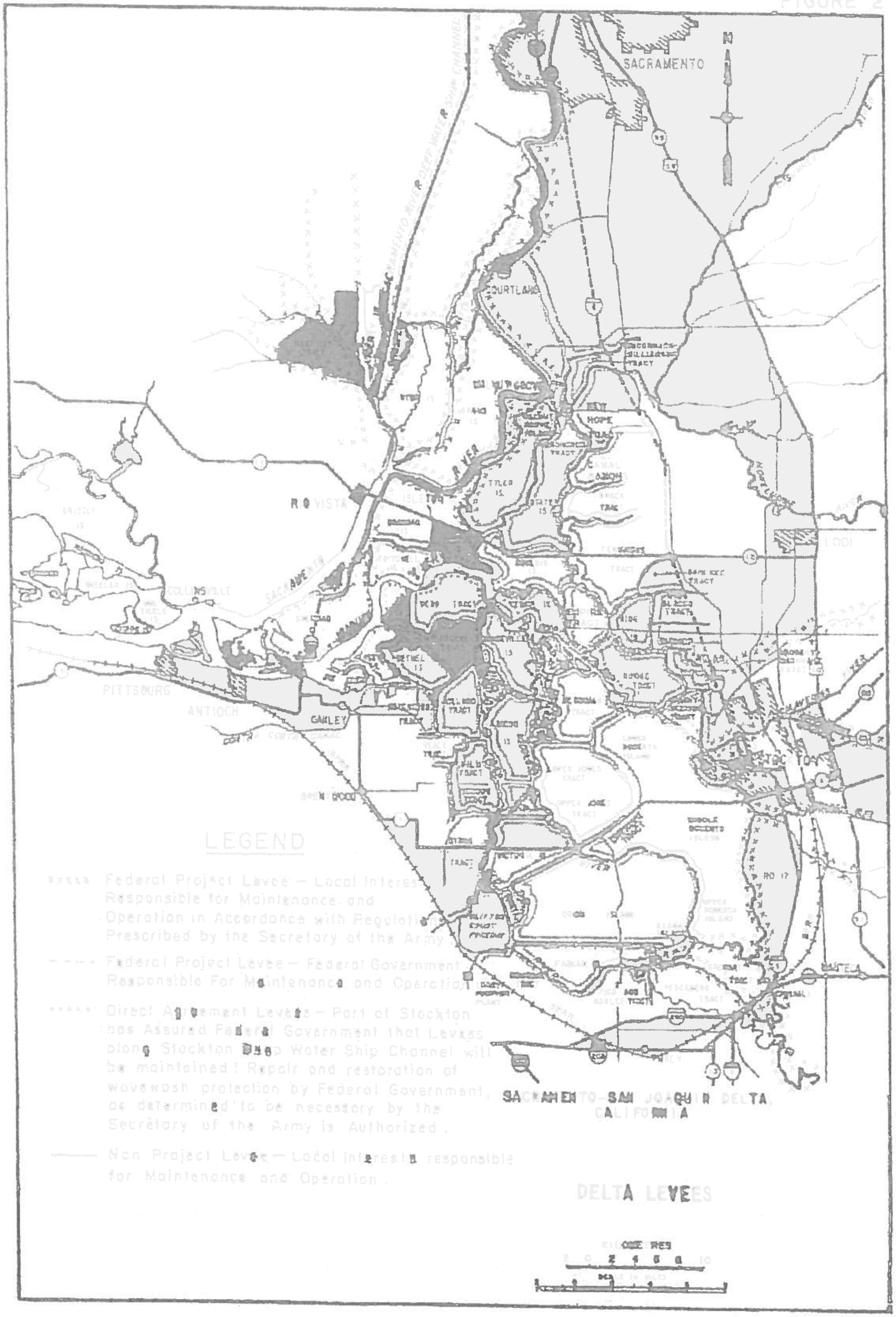
> "It is understood that one plan will be submitted which will incorporate the requirements of Section 406 of the Act and which will also satisfy the requirements for major disaster declarations FEMA-633-DR, FEMA-651-DR, FEMA-669-DR, and FEMA-677-DR."

This mitigation plan fulfills these requirements for both nonproject and direct agreement levees in the Delta (see Figure 2).

F. Flood Hazard Mitigation

Flood hazard mitigation is a management strategy in which current actions and expenditures to reduce the occurrence or severity of potential flood disasters are balanced with potential losses from future floods. Flood hazard mitigation can reduce the severity of the effects of flood emergencies on people and property by reducing the cause or occurrence of the hazard, reducing exposure to the hazard, or reducing the effects through preparedness, response, and recovery measures.

FIGURE 2


SACRAMENTO
COURTLAND
RIO VISTA
COLLINSVILLE
PITTSBURG
ANTIOCH
OAKLEY
BRENTWOOD
LODI
STOCKTON
SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
HOPE
LEGEND
Federal Project Levee — Local Interest Responsible for Maintenance and Operation in Accordance with Regulations Prescribed by the Secretary of the Army.
Federal Project Levee — Federal Government Responsible For Maintenance and Operation
Direct Agreement Levees — Port of Stockton has Assured Federal Government that Levees along Stockton Deep Water Ship Channel will be maintained; Repair and restoration of wavewash protection by Federal Government, as determined to be necessary by the Secretary of the Army is Authorized.
Non Project Levee — Local Interests responsible for Maintenance and Operation.
SACRAMENTO-SAN JOAQUIN DELTA
CALIFORNIA
DELTA LEVEES
KILOMETRES
SCALE IN MILES

Flood hazard mitigation includes such actions as:

° Minimizing probability of flood occurrence (e.g., restoration of damaged dams and levees, dam safety measures).

° Improving structures and facilities at risk (e.g., floodproofing, restoring damaged public facilities to meet applicable codes and specifications).

° Identifying hazard-prone areas and standards for prohibited or restricted use (e.g., flood plain regulations, structural and nonstructural floodproofing, hazard mitigation plans).

° Providing loss recovery and relief (e.g., insurance, disaster grants and housing, low interest loans).

° Providing hazard warning and population protection (e.g., procedures for warning, emergency public information, direction and control, protective measures, shelter, relocation, training).

° Considering opportunities for sharing the cost of levee improvements in connection with water transfer plans (see Appendix A).

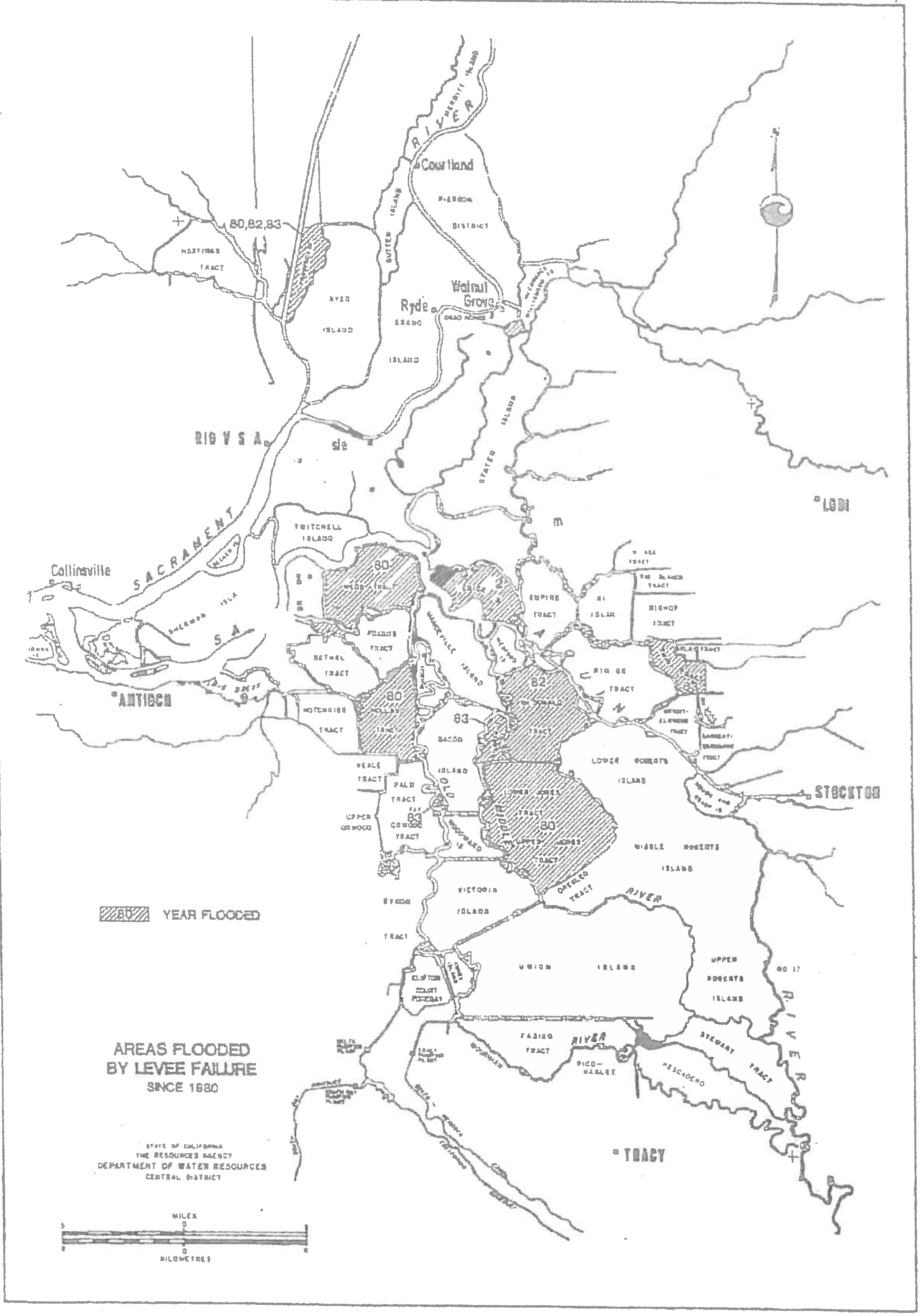
G. Hazards

Since 1980, levee failures have occurred on 12 of about 60 Delta islands (see Figure 3). Factors that contribute to levee failures include: instability of the levee section and foundation materials; subsidence; rodent burrows; erosion from wind waves and boat wakes; inadequate height (freeboard); seismic activity; and seepage.

Specific locations of levee instability and foundation weakness are difficult to identify because weak areas are not readily apparent from visual inspections. Beaver dens often are not apparent until a portion of the levee collapses. Erosion is more readily apparent and can be corrected if identified. Increased moisture from seepage through and under levees, which reduces the shear strength of the soils and thereby contributes to instability of the levees, may or may not be apparent. It is suspected that, in some areas, dredging soil from the channels as a source of material for bolstering levees has contributed to increased instability, subsidence, and seepage.

Flooding of islands can have several adverse impacts, including temporary detriments to water quality due to ocean water intrusion, increased loss of water by evaporation, increased seepage on islands adjacent to the flooded areas, loss of agricultural land, damage to urban and recreational developments, and fish and wildlife losses.

FIGURE 3



AREAS FLOODED
BY LEVEE FAILURE
SINCE 1980
80 YEAR FLOODED
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
CENTRAL DISTRICT
MILES
KILOMETRES
Courtland
Ryde
Walnut Grove
Collinsville
ANTIOCH
LODI
STOCKTON
TRACY
80,82,83
SACRAMENTO
RIVER
HASTINGS TRACT
TWITCHELL ISLAND
BETHEL TRACT
HOTCHKISS TRACT
EMPIRE TRACT
BISHOP TRACT
LOWER ROBERTS ISLAND
VICTORIA ISLAND
UNION ISLAND
UPPER ROBERTS ISLAND
STEWART TRACT

PART III. GOVERNMENTAL AND REGULATORY STRUCTURES

A. General

The existing governmental structure could provide necessary assurances to implement a Delta levees mitigation plan, both on a short-term and long-term basis. However, development of a Delta-wide reclamation district with authority to collect revenues, set maintenance standards, provide assurances, set priorities, and carry out maintenance would facilitate completion of a comprehensive Delta levees rehabilitation plan.

B. Local Districts

Essentially all of the islands and tracts in the Delta have an organized district to administer levee maintenance and restoration. Reclamation and levee districts currently have authority to raise funds from three major sources:

1. The districts are empowered under specific Water Code sections to create and update assessment rolls of the lands within their boundaries on which the governing boards can periodically levy assessments.

2. Water Code sections also allow the governing boards of reclamation districts to establish a schedule of charges and fees for services and benefits provided by the districts.

3. Those districts that use county assessment rolls to levy special taxes for levee maintenance continue to receive an allocation under the post-Proposition 13 tax collection by the county, which includes not only property revenues but also state subventions.

Until 1980, funds made available for levee maintenance and restoration from these sources had been relatively small -- less than $1 million per year. Because of the many levee failures since 1980, the local districts have been assessed up to their capability to pay. In fact, because many districts are in debt for money borrowed to repair and restore their levees, their funding capabilities may not be sufficient to accomplish the flood hazard mitigation obligations requested by FEMA.

C. Counties and Cities

The Delta area includes land in five counties: Contra Costa, Sacramento, San Joaquin, Solano and Yolo. These counties are members of a Delta Advisory Planning Council (DAPC); the objective is to provide a unified county position with regard to Delta matters. All five counties are participating in the National Flood Insurance Program.

Counties have the necessary authority to control land use. This authority has been exercised to control urban development in the Delta. Under this plan, counties would continue to exercise land use control as part of their general plan.

A number of cities are located on the periphery of the Delta, including Sacramento, Tracy, Rio Vista, Pittsburg, and Antioch. Their involvement with the nonproject levees in the Delta is minimal. Isleton and the western portion of Stockton are within the Delta and are protected by nonproject levees. The cities, like the counties, have authority to control land use, and all are participating in the National Flood Insurance Program.

D. State of California

Many state agencies have regulatory powers covering the Delta area. The two principal agencies involved in flood control activities are The Reclamation Board and the Department of Water Resources. Other state agencies with vested interests in the Delta include, but are not limited to: Department of Boating and Waterways; Department of Fish and Game; Department of Parks and Recreation; State Lands Commission; and the State Water Resources Control Board, including the Central Valley and San Francisco Bay Regional Water Quality Control Boards.

The Office of Emergency Services administers funds made available under the Natural Disaster Assistance Act, which have been used for flood damage repair in the Delta.

E. Federal Government

Many federal agencies are involved and have some regulatory powers concerning the 700 miles of navigable waterways in the Delta. The principal federal interests in the Delta are with the following agencies: U. S. Army Corps of Engineers; U. S. Bureau of Reclamation; U. S. Department of Commerce, including the National Marine Fisheries Service, U. S. Fish and Wildlife Service, and the U. S. Coast Guard.

The Federal Emergency Management Agency (FEMA) administers disaster relief funds, made available under Public Law 93-288, which have been used for repair of flood damage in the Delta.

PART IV. SHORT-TERM MITIGATION PLAN

A. Policy

Water Code Section 12981 declares State policy to preserve the Delta in essentially its current configuration. Many bills (summarized in Appendix B) have been introduced during the current legislative session to reaffirm or modify this policy. Action on these bills will give legislative direction concerning activities in the Delta.

Rehabilitation of levees around individual islands is still the approach desired by most Delta interests. When practical, this course of action should be pursued.

A two-prong program is needed to reduce levee failures: rehabilitation of levees by adding materials; and improved maintenance of existing levees.

B. Maintenance

1. Responsibilities

The local districts are responsible for the expense and the work involved in correcting maintenance deficiencies. Each district should:

a. Prepare a plan of annual levee maintenance by June 1 of each year describing planned maintenance work and a schedule for its accomplishment.

b. Make a profile of the levee crown not less than every fifth year, or more often if determined necessary by the Board of Trustees of the district (i.e. following severe storms).

c. Adopt an emergency response and evacuation plan to be put into effect when flooding is imminent.

d. Complete annual levee maintenance by November 1 of each year.

2. Mitigation Actions

In general, district maintenance includes, but is not limited to:

a. Controlling encroachments on the levee that might endanger the levee or hinder levee construction and maintenance.

b. Exterminating burrowing rodents and filling their burrows with compacted material.

c. Shaping the levee crown for proper drainage.

d. Repairing minor slipouts, erosion, and subsidence of the levee section.

e. Cleaning drain and toe ditches adjacent to the landside levee toe that intercept seepage.

f. Minor repairing of revetment work or riprap that has been displaced, washed out, or removed.

g. Repairing and shaping patrol and access roads.

h. Controlling the weight and speed of vehicles using roads on levee crowns so as to not exceed the strength of the structural section.

i. Cutting, removing or trimming vegetation such as weeds, brush, and trees to the extent necessary to maintain a safe levee.

j. Removing debris and litter from the levee and berm where it interferes with levee maintenance.

k. Inventorying and inspecting pipes and conduits through the levee (and gates on such facilities) to ensure that they are in working condition.

l. Repairing and maintaining gates necessary to control vehicular traffic on the levees.

C. Rehabilitation

1. Policy

Short-term responsibility for levee rehabilitation remains with the local districts. The cost, however, will be shared by the state and federal agencies and possibly by other beneficiaries of the Delta. Until increased funding is available, the local districts will continue to use funds from their own revenues, the Delta Levee Maintenance Subventions Program, and federal and state disaster assistance programs to rehabilitate the Delta levees.

Dredging material for levee repair or restoration will not be permitted within 135 feet of the centerline of any levee below a depth of minus 35 feet mean sea level. (Ship channels will be considered separately.)

Materials used to repair or restore the levees must allow enough consolidation to minimize erosion during wave and tidal action and rain runoff. Districts will take and record soundings before dredging to be sure depths are adequate for the materials required.

2. Short-Term Levee Rehabilitation Plan

a. Local Districts

Local districts should:

(1) Rehabilitate levees as rapidly as possible, considering engineering, fiscal, and environmental restraints, to the following minimum standards:

(a) Levees shall have 1 foot of freeboard above the flood expected once in 100 years. (It is important to recognize that 1 foot of freeboard at a 100-year flood does not mean 100-year flood protection. Common levee design practice calls for 3 feet of freeboard at project design flood. Also, the uncertainties of Delta levee foundations and unpredictability of Delta tide levels suggest that even with 3 feet of freeboard, the degree of protection would be far less than the design flood frequency.)

(b) The minimum crown width shall be at least 16 feet.

(c) Waterside slopes shall be at least 1.5 horizontal to 1 vertical, with revetment in areas where erosion has been a problem. The size of the revetment material shall be appropriate for the slope.

(d) Landside slopes shall be at least 2 horizontal to 1 vertical, with flatter slopes in the lower portion of the levee in areas where soil stability and seepage have been problems.

(e) The levees shall have all-weather access roads.

(2) Prepare a plan for annual rehabilitation work by June 1 of each year describing rehabilitation work and a schedule for its accomplishment.

b. State of California

(1) By February 1, 1984, the State will give the U. S. Army Corps of Engineers a Letter of Intent to sponsor a federal-state flood control project.

(2) The Department of Water Resources will recommend to the State Legislature increased funding of the Delta Levee Maintenance Subventions Program to $10 million per year from Tidelands Oil revenues, to begin in the 1984-85 fiscal year and continue until a federal-state flood control project is implemented. The Department will also recommend to the State Legislature that the cost sharing formula be changed so that the State would pay 75 percent and the local districts 25 percent of the cost of levee rehabilitation work done under the program.

(3) The Department of Water Resources will request funding for an annual Delta levee inspection program to begin in the 1984-85 fiscal year. Until funds are made available for a state inspection program, the local district's engineer should make a joint inspection with district representatives and submit a summary of work to be completed for the year, present condition of the levees, mitigation measures to be performed the following year, and a reevaluation of natural hazards affecting the district. This summary report should be submitted to the Director of the Department of Water Resources by June 1 of each year.

(4) By April 1984, the Department of Water Resources, working with representatives of local districts, will develop criteria for using soils from the channels as a source of material for bolstering levees. These criteria will reduce the hazard to levees due to this practice.

(5) The Department of Water Resources will request funds in the 1984-85 fiscal year to initiate a program to reevaluate the rate of subsidence in the Delta.

PART V. LONG-TERM MITIGATION PLAN

A. Policy

The long-term mitigation plan is to implement a major levee rehabilitation project within 20 years. The State supports the concept of a System Plan as described in the Corps' Draft Feasibility Report, dated October 1982, and in the Department's Bulletin 192-82, Delta Levees Investigation, dated December 1982, with the understanding that the local districts may complete construction necessary to comply with federal flood control standards on some islands before a federal flood control project is implemented. All islands should be included in the System Plan for stage construction, as recommended in the Corps' plan.

B. Long-Term Levee Rehabilitation Plan

Based on current information, the following islands and tracts are considered to have the most urgent need of levee rehabilitation:

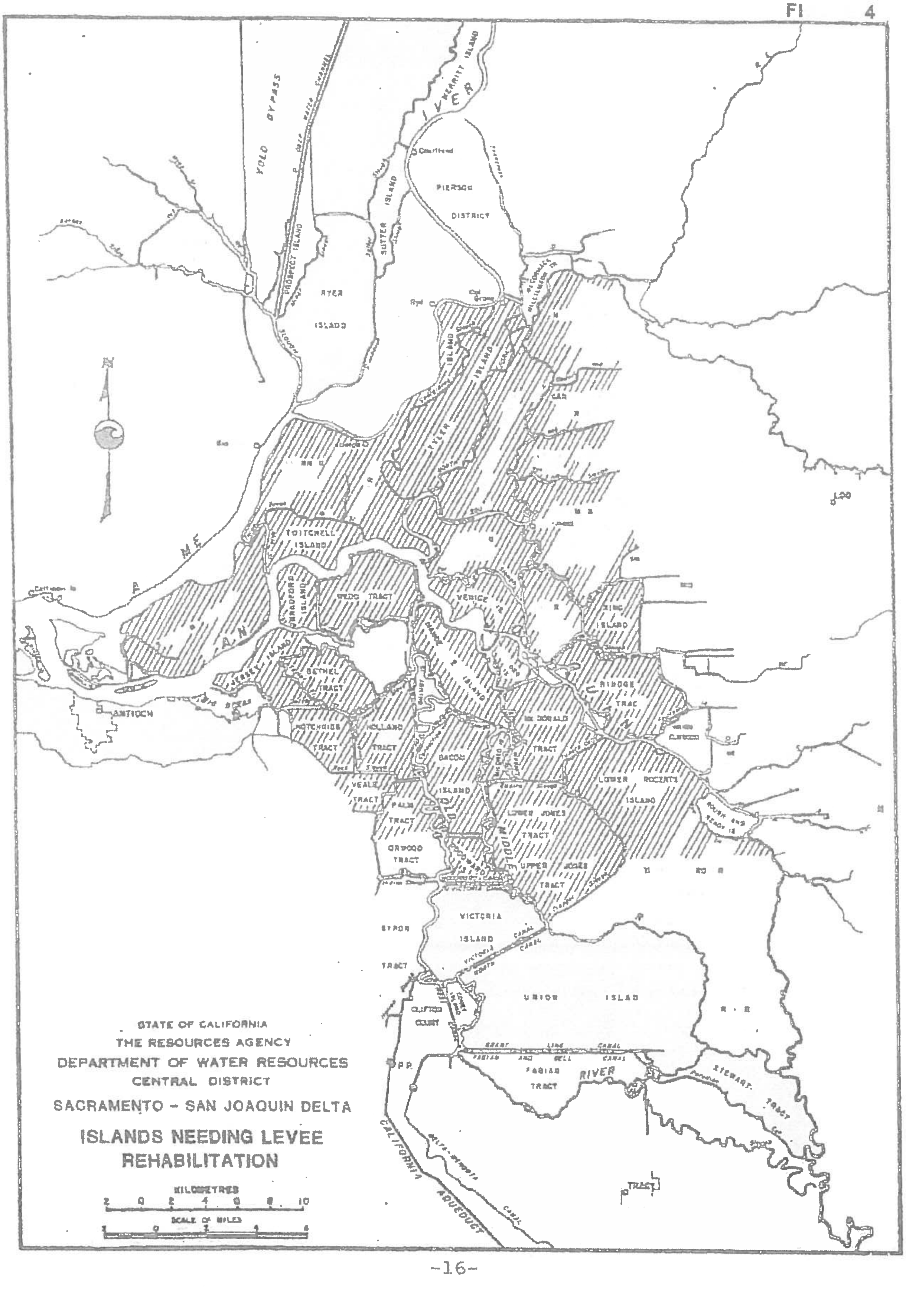
Andrus-Brannan	Hotchkiss	Rindge
Bacon	Jersey	Roberts, Lower
Bethel	Jones, Lower/Upper	Sherman
Bouldin	King	Staten
Brack	Mandeville	Terminous
Bradford	McDonald	Twitchell
Canal Ranch	Medford	Tyler
Dead Horse	Mildred	Venice
Empire	New Hope	Webb
Holland	Palm	Woodward

This list will probably change during the advanced planning stages of the project. (These tracts are shown in Figure 4.)

A joint state-federal levee rehabilitation project requires state legislative and congressional authorizations, funding for detailed planning, and funding for construction. Completion of these actions is expected to take from six to ten years. It is assumed that the funding would be at least 65 percent federal and that the nonfederal funding requirements would be shared 50 percent state and 50 percent local.

In some instances, individual districts have an insufficient economic base to provide even 15 to 20 percent of the cost of modernizing and protecting the island system. In these situations, consideration will be given to a greater State share of such costs, to be reimbursed from subsequent sale or transfer of property rights or value to the State. As an example, public acquisition of land for use in a wildlife management or

FI 4


STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
CENTRAL DISTRICT
SACRAMENTO - SAN JOAQUIN DELTA
ISLANDS NEEDING LEVEE REHABILITATION
KILOMETRES
2 0 2 4 6 8 10
SCALE OF MILES
YOLO BYPASS
SUTTER ISLAND
PIERSON DISTRICT
RYER ISLAND
TYLER ISLAND
TWITCHELL ISLAND
BRADFORD ISLAND
WEBB TRACT
VENICE IS
KING ISLAND
JERSEY ISLAND
BETHEL TRACT
RINDGE TRACT
HOTCHKISS TRACT
HOLLAND TRACT
BACON ISLAND
MC DONALD TRACT
ELMWOOD
ANTIOCH
VEALE TRACT
PALM TRACT
LOWER ROBERTS ISLAND
ROUGH AND READY IS
LOWER JONES TRACT
ORWOOD TRACT
UPPER JONES TRACT
MIDDLE
VICTORIA ISLAND
BYRON TRACT
UNION ISLAND
CLIFTON COURT
GRANT LINE CANAL
FABIAN AND BELL CANAL
FABIAN TRACT
RIVER
STEWART TRACT
P.P.
CALIFORNIA AQUEDUCT
CANAL
TRACT

recreational program or acquisition of a flooded area for use as a reservoir as part of the State Water Project and Central Valley Project.

Cost sharing and funding must be resolved by the Congress and the State Legislature. The local share would be assigned to the individual districts in proportion to the cost to provide flood control to the island represented by the particular district.

PART VI. FUNDING SOURCES

A. General

All plans to preserve the Delta will require large increases in funding for levee rehabilitation.

B. Short-Term Levee Rehabilitation Plan

1. Local Districts

For the 1983-84 fiscal year, the local districts will continue to use their own revenues, supplemented by State contributions under the Delta Levee Maintenance Subventions Program (presently budgeted at $1.5 million per year), and funds made available under the federal and state disaster assistance programs.

2. State of California

A number of legislative bills under consideration include proposals for increases in funding for the Delta Levee Maintenance Subventions Program. Pending action on these bills, the Department of Water Resources will recommend to the Legislature:

a. An increase in funding for this program, beginning with the 1984-85 fiscal year, to a level of $10 million per year from Tidelands Oil revenues; and

b. A change in the formula for State participation to allow 75 percent State funds with 25 percent local matching funds to upgrade existing Delta levees.

3. Department of Water Resources

The Department of Water Resources will also request special language in a federal-state flood control project authorization that would allow credit to the State and to local districts for work done toward upgrading levees to federal standards before implementation of a federal-state-local flood control project.

C. Long-Term Levee Rehabilitation Plan

A U. S. Army Corps of Engineers report, "Draft Feasibility Report and Draft Environmental Impact Statement, Sacramento-San Joaquin Delta, California", October 1982, indicates federal interest in a Delta flood control project. Although the percentage of federal participation must be determined by the

Congress, the long-term mitigation plan for the Delta contemplates a federal-state-local sharing of costs for levee rehabilitation.

California has traditionally shared in the costs of federal flood control projects. The State is now contributing 75 percent and local flood control agencies are required to contribute 25 percent of the land, easement, and right-of-way costs of federal projects.

The federal government has traditionally paid 100 percent of the construction costs for flood control. Local agencies have been responsible for 100 percent of the cost of operating and maintaining flood control facilities. The Corps of Engineers' Draft Feasibility Report assumes the traditional federal-nonfederal cost sharing relationships.

Chapter 5 of the Emergency Delta Task Force report, dated January 12, 1983, also recommends a cost sharing plan that follows the traditional relationships, but it suggests that boating and commercial shipping should share in the nonfederal flood control costs. The report found that local districts are capable of raising from 15 to 20 percent of the necessary funds for levee rehabilitation projects. It is planned that the State and the local districts will equally share the nonfederal cost of a federal flood control project.

D. Nonfederal Funding

Without federal participation in a Delta levees flood control project, the state would be the logical level of government to implement a levee rehabilitation program. Special bond issues might be necessary to supplement the available Tidelands Oil and other State revenues to finance a long-term Delta levees rehabilitation project.

APPENDIX A

RELATIONSHIP OF DELTA LEVEES PLAN TO A WATER TRANSFER PLAN

The Delta is a point of diversion for both the Federal Central Valley Project and the State Water Project for exporting water to areas in California south and west of the Delta. The State's proposal for a Peripheral Canal to move water in an isolated channel across the Delta was rejected by the voters in June 1982. The State must now develop alternative methods for transferring water across the Delta. Some alternative Delta water transfer plans would require channel enlargements and levee setbacks in the South Fork Mokelumne River and channel enlargements near Clifton Court Forebay. To the extent that these enlargements and levee setbacks coincide with plans for levee rehabilitation, there would be an opportunity for cost sharing between the two projects.

In some areas, levee failures could be detrimental to water transfer operations. In these situations, cost sharing among various beneficiaries should be considered, up to an equitable amount of the benefits derived from the levee improvements.

APPENDIX B

LEGISLATIVE BILLS

Bill and Author	Subject
AB484 - Isenberg	Approve plan set forth in Bulletin 192-82
AB758 - Costa	Include New Hope Cross Channel in State Water Project Facilities
AB857 - Bradley	Immune State from liability in repairing Delta levees
AB1300 - Isenberg	Require exporters of water to enter into contracts with public agencies in Delta
AB1325 - Bradley	Prohibit expenditure for levee repair until cross-Delta water facilities are authorized
AB1607 - Waters	Approve Corps' System Flood Control Plan and authorize DWR to undertake work in advance of federal authorization
AB1612 - Waters	Require DWR to be project sponsor of federal flood control plan; request adoption of Modified System Plan
AB1712 - Johnson	Require plans compatible with Emergency Delta Task Force plan; appropriate $10 million from ERF funds to DWR for program
AB1731 - Costa	Nonsubstantive change in Central Valley Project Act
AB2112 - Isenberg	Require DWR to develop and submit to Reclamation Board recommended levee reconstruction standards and establish a yearly levee inspection program
AB2124 - Campbell	Create Delta Levee Maintenance Fund and deposit a percentage of fishing and hunting license fees, vessel registration fees, and motor vehicle fuel license taxes attributable to vessels
SB15 - Ayala	Authorize additional State Water Project facilities; create a Delta Levee Maintenance Fund; allocate $25 million from Long Beach Oil and Dry Gas revenues to the fund
SB834 - Nielson	Convey title to swamp and overflow lands to purchaser of land including berms and borrow pits

From:	Thomas Pate
To:	Delta Council Ecosystem Amendment
Subject:	Delta Amendment NOP
Date:	Friday, July 10, 2020 5:17:54 PM
Attachments:	N-204.DSC-NOPLetter.07102020.TP.pdf

Please find attached comment on the NOP… Thank you

Thomas L. Pate, PE
Water Policy Analyst/District Engineer

Solano County Water Agency
810 Vaca Valley Parkway, Suite 203
Vacaville, CA 95688
707.455.1104

Solano County Water Agency

July 10, 2020

Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Subject: Delta Plan Ecosystem Amendment NOP

Dear Ms. Ross:

The Solano County Water Agency (SCWA) appreciates the opportunity to provide comments on the Notice of Preparation (NOP) for Programmatic Environmental Impact Report (EIR) for the proposed Delta Plan Ecosystem Amendment. The Proposed Project is an amendment to Chapter 4 of the Delta Plan (Ecosystem Restoration) to address a fundamental shift in how conservation is being planned and implemented in the Delta.

SCWA provides wholesale water supplies to most Cities in Solano County through the North Bay Aqueduct (NBA), a State Water Project (SWP) facility, from Barker Slough in the Cache Slough Complex (CSC) Priority Restoration Area that ultimately provides municipal drinking water to approximately 500,000 people of Solano and Napa Counties (Region). While the NBA is owned and operated by the CA Department of Water Resources (DWR), SCWA has a longstanding interest in the Delta, particularly the CSC, to ensure the NBA and other water supplies can continue to provide reliable and high-quality water to the agricultural and municipal water users in Solano County. Within the CSC, the City of Vallejo also has a viable municipal water supply intake, Reclamation District 2068 agriculture intake, and numerous existing small agricultural intakes.

While SCWA is firmly committed to supporting co-equal goals in the Delta, and acknowledges the unique potential role that a "restored" CSC landscape could contribute to the health of native species, SCWA is concerned with infringement of access to local water rights and cumulative impacts to the continued operation of existing water infrastructure in the CSC.

The EcoRestore initiative shifted the State's approach to develop a landscape-scale restoration program and reserve system from broad-based ecosystem protection and restoration strategies under the BDCP to a more focused set of mitigation projects required under the National Marine Fisheries Service and U.S. Fish and Wildlife Service Biological Opinions for operation of the State Water Project (SWP) and Central Valley Project (CVP). The current traditional process by Ecosystem Restoration project proponents for planning and implementing projects in the CSC is project by project.

This traditional process is inadequate with respect to acknowledging and owning potential significant cumulative effects on long-term (operational) impacts to Regional legacy uses of the CSC related to the conversion of designated farmland to ecosystem enhancement benefits. This planning regime has stoked Regional opposition over "barrier" issues associated with implementation of Ecosystem Restoration projects in the CSC, leading to costly delays to project proponents.

A shift in the planning paradigm to a programmatic and more inclusive view could incite Regional cooperation and support for State's agenda. Regional interests formed a coalition through the Corridor Management Framework (CMF)[1] which led to the formation of the Yolo Bypass-Cache Slough Partnership MOU[2] between Federal, State, and Regional interests with the intent to develop a forum for to discuss and resolve regional barrier issues with respect to the State's need to implement water supply mitigation projects in the CSC. Unfortunately, this forum has not really been embraced and effectively utilized by ecosystem project proponents.

The Delta is the focus area for multiple[3] ecosystem restoration initiatives. A common thread throughout those plans is the importance of CSC as the preferential location to create significant[4] amounts of new "functional" tidal wetland habitat. The vast majority of tidal wetland habitat restoration is being implemented within the CSC, within or in close proximity to Solano County and the NBA. During the development of the Bay-Delta Conservation Plan (BDCP-CWF), 60,000 acres of new tidal wetland habitat was envisioned, 30,000 of which designated for CSC. The analysis of the BDCP-CWF revealed significant and unavoidable impacts on municipal water quality at the NBA. The conclusion[5] was that the cumulative effects of new tidal wetlands in the CSC was the principal driver.

The intent of tidal wetland restoration projects in the CSC is to generate better food resources to improve the health of endangered species populations utilizing the Delta and provide rearing and refuge

[1] Six public agencies make up the Lower Sacramento River/Delta North Regional Flood Management Program (RFMP). The RFMP agencies include Solano County, Yolo County, the Sacramento Area Flood Control Agency, the West Sacramento Area Flood Control Agency, the Solano County Water Agency, and Reclamation District 2068. These six agencies came together in 2014 to work on implementing a collective vision of integrated flood, habitat and agriculture within the Yolo Bypass/Cache Slough Complex and the surrounding region.

[2] Fifteen branches of federal, state, and local government have agreed to work together on planning and projects in the Yolo Bypass and Cache Slough region in order to restore wildlife habitat, better manage floods, preserve farmland, improve water supply and quality, and provide economic development and recreation. MOU executed 2016.

[3] "Currently 14 recovery plans, conservation strategies, and specific resiliency plans provide specific guidance on the level of ecosystem restoration needed." DPA, 4-23.

[4] "It is currently estimated that it will take approximately 60,000-80,000 acres of net functional, diverse, and interconnected habitat to achieve the fully restored Delta landscape envisioned in the Delta Reform Act." DPA, 4-23

[5] "The primary driver of the adverse cumulative condition was the assumed amount and location of tidal habitat restoration to be implemented as part of the alternative. The amount of tidal habitat restoration assumed for Alternatives 4A, 2D, and 5A is substantially less than assumed for Alternative 4, such that it is not expected to significantly affect Delta hydrodynamics and source water fractions. However, a substantial amount of tidal habitat restoration is still anticipated to occur in the future as part of separate actions (e.g., the California Water Action Plan/EcoRestore), which could result in a greater portion of higher-bromide concentration water in the restored areas, thus contributing to elevated long-term average and drought period bromide concentrations in those areas. Thus, the cumulative condition for bromide is still considered adverse." Section 5.2.2.4 (Cumulative Impacts, Water Quality), CWF-RDEIR, Impact WQ-3 page 5-77.

habitat for them. The potential cumulative impacts on Regional water supply resilience from the "success"[6] of tidal restoration projects in the CSC are threefold:

- Investing to construct habitat with the desire to breed, rear, and support Delta and Longfin smelt around existing water infrastructure inherently creates conflict between the continued viable operation of those facilities and protection of the species uplift. **Increased presence of endangered species in the vicinity of known water diversion activities increases the likelihood of take of those species and the threat of further regulatory restriction of those legitimate activities.** *"If you build it they will come…"*:
- The NBA has the poorest source water quality in the SWP[7] due to high background elevation of dissolved organic carbon (DOC), turbidity and, coliform. DOC causes water treatment challenges due to the potential formation of disinfection byproducts, such as trihalomethanes (THMs) and halocetic acids (HAA's), which present human health risks with consumption of the treated water. The basis of the aquatic food web is organic carbon, tidal wetlands generate organic carbon. Increased tidal wetlands in the CSC inherently increases the DOC in the source water to the NBA drinking water treatment plants raising public health and safety concerns. Their individual project planning documents do not adequately analyze or address regional concerns with respect to water quality, endangered species, and the corresponding cumulative impacts. **The 'MUNI' beneficial use of CSC is largely ignored by restoration project proponents.**
- Tidal Wetland restoration projects in the Delta are currently being developed individually in a serial fashion. Each project that comes online has the potential to alter the hydrodynamic gradient and tidal flux in the CSC. The incremental changes in these parameters from each project can take away benefits from previous projects due to unpredictable consequences from not using a wholistic planning approach. **A master plan to site habitat restoration projects in the CSC is lacking.**

The corresponding cumulative impacts are meeting co-equal goals for South Delta, Central Valley Project (CVP) and State Water Project (SWP) Operations, but at the sole expense and detriment of co-equal goals in Solano and Napa Counties. The state public investments in tidal wetland restoration in the CSC present potential detriment to the regional public investment in a reliable and resilient Regional water supply portfolio that includes the viability of the NBA. SCWA has made these concerns known in countless forums over the past several years but a constructive resolution to alleviate these concerns has yet to materialize.

Generally, the PEIR should provide an evaluation of the potential impacts, addressing potential adverse effects at both the local and regional levels including the evaluation of the cumulative effects of the Proposed Ecosystem Amendment. The PEIR should identify program-level assurances and mitigation measures, including performance-based approaches or policies to address Regional barrier issues in the

[6] "Proposed Project would assume that the Proposed Ecosystem Amendment and the rest of the currently adopted Delta Plan are implemented and achieve their desired outcomes."- NOP, pg. 12.
[7] SWP Watershed Sanitary Survey Update

CSC with future mitigation programs described to reduce significant impacts or potentially significant impacts to a less-than-significant level. For covered actions constructed or otherwise implemented in response to the proposed amendments, other public agencies would be required to implement all applicable Delta Plan mitigation measures or equally effective measures, if feasible, as required by the Delta Plan. Specifically, the PEIR must proficiently assess the Proposed Ecosystem Amendment's water quality impacts on municipal beneficial uses in CSC in the analysis "Hydrology and Water Quality" PEIR section.

Based on the assumption that the ecosystem amendment will encourage ecosystem projects, the Draft PEIR should address what assurances can be put into place to ensure that existing water rights holders, and state contractors utilizing the CSC are not harmed by ecosystem projects implemented in response to the ecosystem amendment. The Draft PEIR also needs to evaluate the cumulative effects these habitat restoration initiatives can have when combined with the ecosystem amendment on the operation and maintenance of existing agricultural and municipal water diversions, particularly in the CSC such as the North Bay Aqueduct, due to the increased attraction and presence of listed species and the potential for increased exposure to water intakes that could lead to new restrictions on beneficial water supply uses and the degradation of municipal water quality. In addition, storm water drainage within this watershed may be adversely affected and subject to increased regulation. The Draft EIR should evaluate these cumulative impacts in the appropriate sections of the document.

We appreciate this opportunity to provide input on the content of the Draft EIR and would appreciate the opportunity to continue to remain engaged in the CEQA process as the Delta Stewardship Council prepares the Draft EIR. SCWA can provide a wealth of knowledge regarding Delta land uses and the issues of concern for our constituents who live and work in the Delta. While we understand the critical need to improve ecosystem function within the Delta, we believe there is ample opportunity to work collaboratively with the Delta Stewardship Council and Department of Water Resources (DWR), and/or other agencies to meet co-equal goals throughout the entire Delta. We are available and willing to continue to engage with Delta Stewardship Council staff and the EIR consultant team during preparation of the Draft EIR and look forward to opportunities to do so.

Thank you for the opportunity to submit comments. Should you have any questions or concerns, please don't hesitate to contact me at (707) 455-1104 or by e-mail at tpate@scwa2.com.

Sincerely,

Thomas L. Pate
District Engineer/Water Policy Analyst

CC: Phillip Miller, Napa County Flood Control & Water Conservation District=

From:	Brandon Dawson
To:	Delta Council Ecosystem Amendment
Subject:	Delta Plan Ecosystem Amendment NOP - Sierra Club CA
Date:	Friday, July 10, 2020 8:44:04 AM
Attachments:	Sierra Club Comments - DSC Ecosystem Plan Amendment NOP.pdf

Hello,

Please find attached below Sierra Club CA's comments on the Delta Plan Ecosystem Amendment NOP. If you have any questions, please contact me at this email address or the number below.

Thank you,

Brandon Dawson

--

Policy Advocate
Sierra Club California
916-557-1100 x 1090

SIERRA CLUB
CALIFORNIA

July 10, 2020

Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Re: Comments on Delta Plan Ecosystem Amendment Notice of Preparation

Dear Ms. Ross:

On behalf of Sierra Club California, I submit these scoping comments regarding the Delta Stewardship Council's ("Council") Notice of Preparation ("NOP") of a Draft Program Environmental Impact Report ("DPEIR") for the Proposed Delta Plan Ecosystem Amendment.

For more than 34 years, Sierra Club California has led legislative and regulatory advocacy in California for the Sierra Club, a national conservation organization founded in 1892. Our members, supporters, and staff are well-versed in California's efforts to develop and implement smart, equitable water and ecosystem policies that support our communities and economy while also protecting the state's precious environment and natural resources. And with this knowledge and experience, we routinely participate in the necessary public processes and forums that can yield resilient and sustainable water and ecosystem management policies for all Californians.

The comments below reflect our belief that the DPEIR must fully take into account external factors with which the proposed amendment will be operating. It is not enough to consider the proposed amendment in a vacuum; rather, the proposed amendment must adequately address how it will be implemented in conjunction with other Delta Plan chapters and existing/proposed infrastructure in the Delta. Moreover, the DPEIR must assess climate change impacts outside of solely greenhouse gas emissions and air quality. A sufficient analysis around climate change hydrological impacts is necessary to meet the proposed amendment's objectives of protecting, restoring, and enhancing the ecosystem of the Delta.

1. **The DPEIR must include an analysis of the effects of the proposed project in conjunction with other Delta Plan chapters and SWP/CVP operations.**

CEQA requires that the DPEIR analyze the effects of the whole project on the environment. CEQA Guidelines § 15378 (definition of "project" means "the whole of an action"). Here, the proposed project is a chapter amendment that will be used to determine whether certain projects and actions are consistent with, and accomplish the goals of, the Delta Plan. But how the proposed amendment will affect the environment is partly the result of how other chapters of the Delta Plan are implemented, as well as how the State Water Project ("SWP") and Central Valley

Project ("CVP") are operated. Thus, the DPEIR must have a broad scope that analyzes how this plan amendment will engage those factors.

Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009 (Delta Reform Act), the Council created the Delta Plan, a comprehensive, long-term management plan for the Delta that furthered the coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. Wat. Code. § 85054, 85059. The Delta Plan consists of multiple chapters that guide state agencies and project applicants in their pursuit of projects and activities in the Delta. While it is important that the Delta Plan provide consistency among all chapters, the proposed amendment implicates two chapters in particular. Chapter 3 details how the Delta Plan furthers the coequal goal of providing a more reliable water supply for California and gives overview of California's water supply and conveyance infrastructure in the Delta. Chapter 6 examines actions and efforts that are necessary to protect and improve both drinking water quality and environmental water quality in the Delta.

The NOP makes no mention of how the proposed amendment will affect chapters 3 and 6, nor how chapters 3 and 6 have informed the development of the proposed amendment. Amending the ecosystem components of the Delta Plan has a direct effect on determining how to manage water conveyance systems as well as maintaining strong water quality in the Delta. All of these are direct effects on the environment that must be analyzed in the DPEIR. To sufficiently provide protection, restoration, and enhancement of the Delta ecosystem, the DPEIR must adequately analyze how the proposed amendment interacts with these chapters.

Moreover, because of the current operations and proposed projects, ensuring enough Delta inflow and outflow for the ecosystem, as the proposed amendment seeks to do, currently conflicts with the large-scale pumping operations of freshwater from the Delta for the SWP and CVP. Those pumping operations, both independently and together, deplete the Delta ecosystem of much-needed freshwater.

It is well known that to restore and protect the Delta ecosystem, there must be an increase in freshwater flows in and out of the Delta. In 2016, then-Interior Secretary Sally Jewell wrote a memo to the President explaining that the reinitiation of consultation on the 2008 and 2009 biological opinions likely would lead to new or amended biological opinions increasing protections for listed species, and that these new protections would likely reduce water supply from the Delta. In 2017, the State Water Resources Control Board released a peer-reviewed report on the scientific basis for new water quality standards, which concluded that the best available science demonstrated that significantly increased Delta outflow is needed to protect and restore the health of the estuary as a whole.

The water necessary to increase Delta outflow is siphoned off either before it reaches the Delta or in the Delta, via the SWP and CVP. These two massive water delivery systems export an average 5 million acre feet of water per year that otherwise would have flowed through and supported the Delta ecosystem. Other infrastructure projects are in the mix as well, most importantly the proposed single tunnel Delta Conveyance Project. The project will have the capacity to divert an additional 6,000 cubic feet per second of water, and its construction is expected to last nearly 20 years.

There is no language in the NOP suggesting the DPEIR will consider how the SWP and CVP or the proposed Delta Conveyance Project will affect the proposed amendment's performance measures and goals, particularly the doubling salmon objectives in performance measure 4.6 and E.R.P1. Nor is there any language discussing how the proposed amendment will affect the operation of those projects. Without this analysis, projects deemed consistent with the proposed amendment - such as the proposed Delta Conveyance Project - will not adequately protect, restore, or enhance the Delta ecosystem. To fully ascertain how the proposed amendment will impact the environment, the DPEIR must include a full assessment of how the proposed amendment interacts with Chapters 3 and 6 of the Delta Plan, the SWP, and the CVP, and the proposed Delta Conveyance Project. It may be pertinent to examine the last of which as an alternative.

2. **The DPEIR must sufficiently analyze climate change impacts on the Delta ecosystem.**

The best available science shows that climate change will have major impacts on the Delta, including increased air and water temperatures, more frequency of extreme weather events, and sea level rise causing increased salinity levels in inland waters. These factors will impact Delta inflow, upstream operations of infrastructure, and exports, all of which are key factors that can cause fluctuations in the water levels necessary for a healthy Delta ecosystem.

Thus, it is imperative that the DPEIR holistically analyze these climate change impacts on the Delta ecosystem. While an appendix in the proposed amendment provides a synthesis of climate change in the Delta, the NOP only passively mentions climate change once. And even then, the appendix does not address the proposed amendment's effects on the environment as it relates to climate change impacts.

A rigorous analysis of the impacts of increased air temperatures is necessary to inform steps that need to be taken to protect the Delta ecosystem. The Delta and Suisun Marsh are expected to experience higher air temperatures than those at present, with some estimates expecting the mean annual temperature to increase between 4.7 and 9.2 degrees by 2100. These increased temperatures will affect both the time and volume of precipitation and runoff. Runoff supplies the rivers and tributaries in the Delta watershed that ultimately flow into the Delta and Suisun Marsh. The DPEIR must also include a discussion of these effects as it directly relates to how much water is available and needed to restore and protect habitat and species.

Additionally, impacts around sea level rise need to be examined in the DPEIR. Sea level rise in San Francisco Bay is expected to increase water levels in the Delta nearly 2 meters by 2100. The result of this in the Delta is notable: normally brackish and freshwater areas and habitat will be inundated with saline water. These impacts are significant to the species that depend on freshwater, brackish, and even saline habitat.

Moreover, increased salinity will affect tidal marshes in the Delta and Suisun Marsh. These areas provide valuable ecosystem services -- ranging from flood protection for homes and businesses, the filtration of stormwater runoff, habitat for birds and waterfowl, and nurseries for fish and shellfish that are food for other fish species and wildlife. Tidal marshes also act as a key component in carbon sequestration helping to counter the climate crisis. Much of the sediment necessary to build up these tidal marshes enters the Delta via runoff and Delta inflow from the mountain ranges. But with climate change altering precipitation patterns resulting in less runoff and Delta inflow, less sediment will flow into the Delta and Suisun Marsh to build up and support tidal marshes which can decompose in high saline waters. While there are many projects to restore the Delta ecosystem that propose restoring tidal marshes, it is unclear how sea level rise will affect such restoration efforts. The DPEIR must examine how sea level rise will impact both existing tidal marshes and tidal marsh restoration projects.

3. **Conclusion**

We strongly encourage the Delta Stewardship Council to consider the comments above. A DPEIR that is both an analysis of the proposed project's impacts on current/proposed water conveyance infrastructure and a comprehensive study of climate change impacts in the Delta will provide the best information to protect, enhance, and restore the ecosystem of the Delta. We would be happy to discuss these comments further at your convenience.

Thank you.

Sincerely,

Brandon Dawson
Policy Advocate

From: Deirdre Des Jardins
To: Delta Council Ecosystem Amendment
Cc: Bill Jennings; Chris Shutes; Michael Jackson; Carolee Krieger; Barbara Vlamis
Subject: Delta Plan Ecosystem Amendment NOP
Date: Friday, July 10, 2020 3:36:04 PM
Attachments: CSPA et al DP Ecosystem Amendment NOP comments.pdf

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Please accept the attached scoping comments on the Delta Plan Ecosystem Amendment Notice of Preparation, submitted on behalf of California Sportfishing Protection Alliance, California Water Impact Network, Aqualliance, and California Water Research.

Main recipient address corrected to ecosystemamendment@deltacouncil.ca.gov. Please confirm receipt.

Deirdre Des Jardins
California Water Research
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On Fri, Jul 10, 2020 at 3:27 PM Deirdre Des Jardins <ddj@cah2oresearch.com> wrote:

> Please accept the attached scoping comments on the Delta Plan Ecosystem Amendment Notice of Preparation, submitted on behalf of California Sportfishing Protection Alliance, California Water Impact Network, Aqualliance, and California Water Research.
>
> Please confirm receipt.
>
> Deirdre Des Jardins
> California Water Research
> 831 566-6320 cell
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July 10, 2020 Via email to ecosystemamendment@deltacouncil.ca.gov

Harriet Ross
Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Re: Comments on the Notice of Preparation for the Delta Plan Ecosystem Amendment

Dear Ms. Ross:

The California Sportfishing Protection Alliance, the California Water Impact Network, AquAlliance, and California Water Research (collectively, CSPA et al.) respectfully submit comments on the Delta Stewardship Council's Notice of Preparation for the Delta Plan Ecosystem Amendment.

Our comments express seven concerns, which are discussed in further detail below.

1. The PEIR needs to explicitly consider the public trust.
2. The PEIR needs to explicitly consider the 2010 Biological Goals and Objectives produced under the Delta Reform Act.
3. The PEIR needs to explicitly analyze and address the continuing collapse of Delta pelagic fish populations.
4. The PEIR needs to explicitly analyze and address the collapse in primary production in the Delta and Suisun Bay and shifts in phytoplankton composition.
5. The PEIR needs to explicitly consider that the 2006 Bay-Delta Water Quality Control Plan did not address the Pelagic Organism Decline.
6. The PEIR needs to explicitly consider the fiscal impact of the COVID-19 pandemic on habitat restoration projects.

7. The PEIR needs to comprehensively evaluate the full spectrum of economic and social consequences of the proposed Delta Plan amendment.
8. The PEIR must analyze a salmon doubling goal that fully complies with the California Fish and Game Code.

Sincerely,

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1. The PEIR needs to explicitly consider the public trust.

Water Code section 85023 states that, "The longstanding constitutional principle of reasonable use and the public trust doctrine shall be the foundation of state water management policy and are particularly important and applicable to the Delta."

The PEIR needs to explicitly examine how the proposed regulations will establish a state water management policy that complies with Water Code section 85023.

2. The PEIR needs to explicitly consider the 2010 Biological Goals and Objectives produced under the Delta Reform Act.

The Delta Reform Act established that it is the policy of the State of California to "[r]estore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem. (§ 85020(c).) " CWC, Division 35 (Sacramento-San Joaquin Delta Reform Act of 2009, Part 2, (Early Actions), Section 85084.5 required:

> The Department of Fish and Game, in consultation with the United States Fish and Wildlife Service and the National Marine Fisheries Service and based on the best available science, shall develop and recommend to the board Delta flow criteria and quantifiable biological objectives for aquatic and terrestrial species of concern dependent on the Delta.

Following an extensive public proceeding including a peer-review process, CDFW issued a report titled *Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta*.[1] The report found that "recent Delta flows are insufficient to support native Delta fishes in habitats that now exist in the Delta" and recommended numerous biological and goals and objectives and specific recommendations for instream flow necessary to protect public trust fisheries. It also included the specific flow recommendations by the expert panel, fishery agencies and NGOs in the SWRCB's 2010 flow hearing.[2] The DEIR needs to explicitly consider the findings and recommendations in the legislatively-directed CDFW report.

3. The PEIR needs to explicitly analyze and address the continuing collapse of Delta pelagic fish populations.

Fall Midwater Trawl indices establish that, between 1967-1971 and 2014-2018, populations of striped bass, Delta smelt, longfin smelt, American shad, splittail and threadfin shad have declined 98.5, 99.4, 99.9, 52.6, 98.6 and 93.3 percent, respectively. Survey results for Delta smelt led U.C. Davis fisheries professor Peter Moyle to warn state

[1] California Department of Fish and Game, *Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta*, Nov. 23, 2010. https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/swr cb_66.pdf

[2] *Id.*, pp. 94, 97-104, 105-107.

officials in 2018 to prepare for the extinction of Delta smelt.[3]

The Delta Reform Act of 2009, Part 2, (Early Actions), section 85086(c)(1) required the SWRCB to,

> pursuant to its public trust obligations, develop new flow criteria for the Delta ecosystem necessary to protect public trust resources. In carrying out this section, the board shall review existing water quality objectives and use the best available scientific information. The flow criteria for the Delta ecosystem shall include the volume, quality, and timing of water necessary for the Delta ecosystem under different conditions.

Pursuant to legislative direction, the SWRCB conducted an extensive public proceeding in 2010 to determine flow criteria for the Delta necessary to public trust resources, using best available scientific information. The SWRCB's proceeding to develop instream flows protective of public trust resources was the most intense and comprehensive effort to determine necessary flows to protect public trust fish and wildlife resources in the 52-year history of the Board. The Board appointed an illustrious group of recognized experts to serve as an expert and reference 325 technical documents. Twenty-four parties to the proceeding provided 84 expert witnesses and 488 exhibits, plus exhibits from previous Bay-Delta hearings.

The resulting SWRCB report, titled *Development of Flow Criteria for the Sacramento- San Joaquin Delta Ecosystem*, found that "[t]he best available science suggests that current flows are insufficient to protect public trust resources" and that "recent Delta flows are insufficient to support native Delta fishes for today's habitats." It recommended flow criteria, crafted as percentages of unimpaired flows, of "75% of unimpaired Delta outflow from January through June, 75% of unimpaired Sacramento River inflow from November through June and 60% of unimpaired San Joaquin River inflow from February through June." The report also included the specific flow recommendations of an expert panel, fishery agencies, and NGO's in the hearing.

The State Water Resources Control Board's 2017 Final Scientific Basis Report[4] stated:

> Recent Delta flows are insufficient to support native Delta fishes for today's habitats. Flow modification is one of the immediate actions available although the links between flows and fish response are often indirect and are not fully resolved. Flow and physical habitat interact in many ways, but they are not interchangeable. (p. 1-8.)

The PEIR needs to acknowledge the findings and recommendations of the State Water Resources Control Board.

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[3] http://www.capradio.org/44478, http://californiawaterblog.com/2015/03/18/prepare-for-extinction-of-delta-smelt/, http://news.nationalgeographic.com/2015/04/150403-smelt-california-bay-delta-extinction-endangered-species-drought-fish/.

[4] SWRCB, Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows, 2017. Available at https://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/scientific_basis_phase_ii/201710_bdphaseII_sciencereport.pdf.

4. The PEIR needs to explicitly analyze and address the collapse in primary production in the Delta and Suisun Bay and shifts in phytoplankton composition.

A 2019 paper by Hammock et. al. found a 97% decline in production of chlorophyll in the estuary a due to invasion by *Potambcorbula amurensis* and the effects of Delta exports.[5] As discussed by fisheries expert Tom Cannon:[6]

> The [2019 Hammock et al.] paper concludes there is "a growing consensus that the decline in pelagic fish abundance in the SFE [San Francisco Estuary] is at least partially due to a trophic cascade, triggered by declining phytoplankton (Feyrer et al. 2003; Sommer et al. 2007; Hammock et al. 2017; Hamilton and Murphy 2018)".
>
> The authors noted that "the suppression of phytoplankton abundance due to exports cannot be reversed with equivalent releases from upstream reservoirs. Releasing water in late summer/fall increases flow, which decreases residence time, and therefore suppresses phytoplankton abundance (Table 2, Fig. 6)." This finding is extremely important because the primary form of mitigation for Delta exports has been maintaining outflow by increasing inflow with reservoir releases.
>
> The study's analyses strongly indicate that the decline in estuary productivity is associated with the clam invasion and increasing exports over the past five decades. The effects are most pronounced in non-wet years when fish production is most negatively affected.

The decline of primary production in the Delta has been a long-standing issue. The 1983 Interagency Ecological Program Annual Report documents that there was an "apparent lack of a spring algal bloom in the lower San Joaquin River near Antioch since 1976."[7] The PEIR needs to explicitly analyze and address the collapse in primary production in the Delta, especially given that habitat restoration projects may be delayed due to the financial impact of the coronavirus pandemic.

The PEIR also needs to explicitly analyze and address the shifts in phytoplankton composition in the Delta. Studies by Lehman et. al. at the Department of Water Resources has previously found that the phytoplankton composition in the Lower San Joaquin River, Old River, and Franks Tract were almost pure Microcystis.

[5] Hammock, B.G., Moose, S.P., Solis, S.S. et al., "Hydrodynamic Modeling Coupled with Long-term Field Data Provide Evidence for Suppression of Phytoplankton by Invasive Clams and Freshwater Exports" *San Francisco Estuary Environmental Management* (2019) 63: 703. https://doi.org/10.1007/s00267-019-01159-6. Available at https://link.springer.com/article/10.1007/s00267-019-01159-6.

[6] Tom Cannon, The Delta's Trophic Collapse Explained, blog post, April 17, 2019. Available at http://calsport.org/fisheriesblog/?p=2570.

[7] Interagency Ecological Program, 1983 Annual Report, p. 32. Electronic copies taken offline by the California Department of Water Resources and the US Bureau of Reclamation.

5. The PEIR needs to explicitly consider that the 2006 Bay-Delta Water Quality Control Plan did not address the Pelagic Organism Decline.

The current Delta Plan relies implicitly on compliance with the 2006 Bay-Delta Water Quality Control Plan for adaptive management of Delta flows. But the 2006 Bay-Delta Water Quality Control Plan was issued before the reports of the Pelagic Organism Decline Management Team were available, and did not address the POD.

The State Water Resource's Control Board's 2006 Bay-Delta Water Quality Control Plan Amendment Report, Appendix 1 to the 2006 Bay-Delta Water Quality Control Plan[8] states:

> The reasons for the POD are still unknown, and water project operations are included in the conceptual model for many of the POD studies as a possible factor/cause for the decline. The study results are expected in 2007, and may have an impact on the Delta Outflow objective and its implementation. The study results could help staff assess when the current Delta outflow objective must be met to protect the beneficial uses and whether the objective can be relaxed without causing an additional negative impact to sensitive species. In light of this, the State Water Board did not change this objective in the 2006 Plan. The State Water Board will not consider changing the Delta Outflow objective until the POD studies are completed or the Board receives other reliable technical information, warranting a change.[9]

The Water Board held two workshops in 2007 and 2008 to receive information on the Pelagic Organism Decline.[10, 11] But the Water Board deferred consideration of the results presented in the two workshops until the Pelagic Organism Decline studies were completed.

The PEIR needs to analyze an alternative that does not implicitly rely on compliance with the 2006 Bay-Delta Water Quality Control Plan, since that plan is not based on the current best available science.

6. The PEIR needs to explicitly consider the fiscal impact of the COVID-19 pandemic on habitat restoration projects.

According to an independent review, "Key elements of a good adaptive management program include clearly articulated goals and plans for learning, enforceable commitments to revise management decisions, and assured funding for the lifetime of the plan."[12]

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[8] The Plan Amendment Report for the 2006 Bay-Delta Water Quality Control Plan Update is available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plans/2006wqcp/docs/2006_app1_final.pdf.

[9] *Id.*, pp. 45-46.

[10] The 2007 Pelagic Organism Decline Workshop Notice is available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/pelagic_organism/docs/pn_pod.pdf.

[11] The January 2008 Pelagic Organism Decline Workshop Notice is available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/pelagic_organism/docs/pod_wkshop_notice.pdf.

[12] Doremus, H. et al. 2011. Making Good Use of Adaptive Management. Center for Progressive Reform. White Paper #1104. April. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1808106.

The proposed Delta Plan ecosystem amendments rely heavily on habitat restoration projects, and were developed prior to the COVID-19 pandemic and associated fiscal impacts. The PEIR must analyze an ecosystem restoration plan that has reasonable assurances of funding, as well as analyzing risks to funding of the current proposed plan amendments.

a. The PEIR should consider the COVID-19 impacts on the state budget. The state budget had a $54 billion deficit this year, and a proposed climate adaptation bond has been put on hold. The near term outlook for state funding for habitat restoration looks highly uncertain at this point.

b. The PEIR should also consider the COVID-19 impacts on the state's cap and trade program. The cap and trade program has had reduced auction sales, which will potentially reduce funds for the Delta Conservancy's carbon trading program.

c. The PEIR should also consider the COVID-19 impacts on water agency revenues. Many water agencies have seen reduced water sales, and have needed to pause rate increases, and reduce expenditures for capital improvement projects. The near term outlook for water agency funding for habitat restoration also looks highly uncertain at this point.

d. The PEIR should also consider the impact of the pandemic on Delta agriculture. California agriculture is projected to have billions of dollars in losses this year due to disruption of markets. For local Reclamation Districts, the mandate in ER P4 for levee projects to "evaluate, and where feasible… incorporate, alternatives, including the use of setback levees, to increase floodplains and riparian habitats" may be difficult to fund.

7. The PEIR needs to comprehensively evaluate the full spectrum of economic and social consequences of the proposed Delta Plan amendment.

The Delta Reform Act of 2009 states:

> The Delta is a distinct and valuable natural resource of vital and enduring interest to all the people and exists as a delicately balanced estuary and wetland ecosystem of hemispheric importance. (§ 85022(c)(1).) The permanent protection of the Delta s natural and scenic resources is the paramount concern to present and future residents of the state and nation. (§ 85022(c)(2).)

The PEIR should explicitly analyze alternatives to the proposed Delta Plan amendment that optimally protect public trust uses of the Delta, including recreational fishing, boating, and wildlife viewing.

State water policy must consider all of the environmental consequences, social effects and costs and benefits of alternatives including both market and non-market effects, use and non-use values, uncertainty and risk and follow rigorous professional standards and methods of analysis. It must analyze benefits and costs of ecosystem services and contingent valuation.

Following the requirements of the APA act, the PEIR must consider the impact of the proposed amendments to the Delta Plan regulations on small businesses in the Delta, including Delta marinas and campgrounds, bait shops, restaurants, wineries, and the emerging heritage tourism industry.

The PEIR must also explicitly analyze potential redirected impacts to Delta watershed ecosystems and communities.

8. The PEIR must analyze a salmon doubling goal that fully complies with the California Fish and Game Code.

Fish and Game Code section 6902 states in part that “[i]t is the policy of the state to significantly increase the natural production of salmon and steelhead trout by the end of this century. [2000]” This goal has not been achieved for most rivers.

The U.S. Fish and Wildlife Service’s (USFWS) Anadromous Fisheries Restoration Program (AFRP) documents that, since the 1967-1991 baseline period, natural production of Sacramento River mainstem winter-run Chinook salmon and spring-run Chinook salmon have declined by 88.8 and 97.96 percent, respectively, and are only at 5.5 and 1.02 percent, respectively, of doubling levels mandated by the California Water Code (CWC), California Fish & Game Code, and the Central Valley Project Improvement Act. Natural production of San Joaquin River System fall-run Chinook salmon has declined since 1967-1991 by 54.5% and is only 22.7% of doubling levels.[8] Natural production since the 2008 USFWS and 2009 NMFS Biological Opinions (BiOps)[9] were issued is significantly below production in the initial 15 years of the doubling period (1992-2007).

The proposed Performance Measure 4.6: Doubling Goal for Central Valley Chinook Salmon Natural Production, mandates that:

> The 15-year rolling annual average of natural production for all Central Valley Chinook salmon runs increases for the period of 2035–2065…

PM 4.6 uses existing conditions as the yardstick by which it measures salmon protection, and fails to require significant increases, as required under state law. It also uses such a long rolling average that adaptive management steps to significantly increase natural production of Central Valley Chinook will not be taken for 15 years. As such, PM 4.6 conflicts with existing statutes.

From:	Obegi, Doug
To:	Delta Council Ecosystem Amendment
Cc:	Conroy, Mike; jon@baykeeper.org; bobker@bay.org; Zwillinger, Rachel (Mail Contact); Poole, Kate
Subject:	Delta Plan Ecosystem Amendment NOP
Date:	Friday, July 10, 2020 3:23:23 PM
Attachments:	NRDC et al NOP comments on Delta Plan amendment 7-10-2020.pdf

Dear Ms. Ross:

Attached are comments on the Notice of Preparation for the Delta Plan Ecosystem Amendment submitted on behalf of NRDC, Defenders of Wildlife, the Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, San Francisco Baykeeper, and The Bay Institute.

Please let us know if you have any questions regarding our comments or if staff or Council Members would like to discuss these comments with us. Thank you for consideration of our views.

Sincerely,
Doug

DOUG OBEGI
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July 10, 2020

Harriet Ross
Assistant Planning Director
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Sent via email to: *ecosystemamendment@deltacouncil.ca.gov*

RE: Delta Plan Ecosystem Amendment NOP

Dear Ms. Ross:

On behalf of the Natural Resources Defense Council, Defenders of Wildlife, San Francisco Baykeeper, The Bay Institute, Pacific Coast Federation of Fishermen's Associations, and Institute for Fisheries Research, we are writing to provide comments on the Delta Stewardship Council's Notice of Preparation for the Delta Plan Ecosystem Amendment. We oppose this draft amendment to the Delta Plan, which would set back efforts to restore the health of the Bay-Delta ecosystem, fails to reflect the best available science, and proposes performance metrics that are inconsistent with existing law and policy. While we recognize that the Council does not have regulatory authority, the policies and metrics in this Ecosystem Amendment run counter to the Council's mission of protecting, restoring, and enhancing the Delta ecosystem and threatens the fishing jobs and communities that depend on a healthy Bay-Delta. We urge the Council to withdraw and reconsider this amendment to the Delta Plan.

First, the draft Ecosystem Amendment would eliminate the timeline in ER P2 for the State Water Resources Control Board's ("Board") update of the Bay-Delta Water Quality Control Plan,[1] while maintaining the use of the wholly inadequate water quality standards in the existing Bay-Delta Water Quality Control Plan as the measure for compliance with the Plan in ER P1. This approach fails to protect and restore the health of the Bay-Delta watershed. The existing water quality standards for the Bay-Delta regarding Sacramento River inflow, Delta outflow, and in-delta protections for fish and wildlife have not been substantively updated since 1995 notwithstanding requirements to review and update

[1] While we appreciate the addition of an administrative performance metric to have the Board update the Bay Delta Water Quality Control Plan within one year of adoption of these amendments to the Delta Plan, this is an inadequate substitute for a policy requiring the update by a time certain.

these standards under state and federal law, and the Board, state agencies, and federal courts have repeatedly found that these existing standards fail to protect the Public Trust, jeopardize species listed under the Endangered Species Act, and/or fail to meet the requirements of the California Endangered Species Act.

Using the existing water quality standards as the benchmark for compliance with the Delta Plan fails to protect the Bay-Delta. Under current conditions, flows often exceed the legally inadequate existing water quality standards as a result of protections required under the state and/or federal Endangered Species Act and as a result of flood releases. *See* SWRCB 2016. Allowing for reductions in Delta inflows and outflows from current levels to the minimums required under existing water quality standards would result in Delta flow conditions that violate state and federal laws and the Public Trust. This amended language in the Draft Plan would result in a finding of consistency for projects that reduce Delta inflows and outflows to minimum water quality standards, even though those standards violate state and federal law and the reduction in Delta inflows and outflows would likely cause significant adverse environmental impacts to numerous species in the Bay-Delta watershed, both upstream (where reduced instream flows reduce the survival of juvenile salmon, *see, e.g*., Zeug et al 2014; Michel et al 2015; Henderson et al 2018; Sturrock et al. 2019; Munsch et al 2020) and in the Delta (where, for instance, reduced Delta outflow significantly reduces the recruitment and abundance of Longfin Smelt, *see, e.g*., Rosenfield 2010; Nobriga and Rosenfield 2016; SWRCB 2016, as well as reducing the recruitment of Delta Smelt, *see, e.g*., Polansky et al 2019).

Second, the revisions to the text of several of the core strategies appears inconsistent with the best available science and undermines protection for the health of the Bay-Delta. For instance, we are unaware of any scientific justification for the Amendment's proposal to eliminate the existing Plan language in the core strategy 1 (create more natural functional flows) that the best available science demonstrates that current flows into and through the Delta are insufficient to protect the Delta ecosystem, that the best available science demonstrates that flow management is essential to restoration of the Delta ecosystem, or that significant ecosystem stressors like entrainment are a function of altered water flows and that more negative reverse flows in Old and Middle River increase entrainment. Similarly, revisions to core strategy 2 substitutes the title of "ecosystem restoration" for what was previously titled "restore habitat," yet the strategy remains focused on habitat restoration. There is a lack of scientific evidence that tidal marsh and/or floodplain habitat restoration will restore the ecosystem without meaningful increases in flows. For instance, scientific studies of floodplain restoration, while showing increased size of salmon reared on the floodplains, have not demonstrated that it would increase abundance and/or survival of salmon reared on the floodplain (although sample sizes are small). *See* Takata et al 2017. There is little to no evidence that tidal marsh restoration will benefit native fish species like Delta Smelt, Longfin Smelt, or Chinook salmon, in light of current population levels and the prevalence of invasive species, and without meaningful increases in flow. *See, e.g.,* Herbold et al 2014. In addition, the draft amendment revises core strategy 3 to eliminate the focus on improving water quality and substitutes "protect land for restoration." The addition of a core strategy of prioritizing unscreened diversions in the Delta is inconsistent with the best available science, which has shown little harm from entrainment in these Delta diversions other than the CVP and SWP, particularly as compared to other stressors like reduced Delta inflows and outflows.

As revised, the core strategies in the Delta Plan places inordinate emphasis on habitat restoration, despite the lack of scientific evidence that habitat restoration by itself will meaningfully improve the health of the estuary for native fish species. Habitat restoration can provide important benefits to a broad range of species, but it is not a substitute for significantly increasing the amount of flow into and through the Delta in most years either for estuary-dependent species or for the estuary ecosystem as a whole. Indeed, recent research (Munsch et al. 2020) demonstrates that existing habitat is underutilized at current flow levels and at current levels of salmon abundance, and also demonstrates that increased flows are necessary for habitat restoration to benefit salmon. The Plan's emphasis on habitat restoration, while well-intentioned, fails to address the primary stressors on numerous fish species.

Third, the performance metrics regarding more natural flows are scientifically inadequate, and the performance metric regarding salmon doubling is inconsistent with existing law. The amendment proposes no changes with respect to the metrics for the core strategy of creating more natural functional flows, despite the wealth of scientific information in recent years demonstrating the importance of increased Delta inflows and Delta outflows. The existing metric regarding the Delta outflow: inflow ratio, while an important regulatory standard with respect to the operations of the CVP and SWP in the Delta, is a misleading and inaccurate metric with respect to the strategy of more natural flows because it fails to account for the dramatic reduction in Delta inflows as a result of storage and diversions upstream of the Delta. As a result, this metric fails to measure the core strategy of creating more natural functional flows.

Finally, the new performance metric for salmon doubling delays achievement of the salmon doubling goal until the year 2065, which is inconsistent with existing law and a gross abdication of the Public Trust. Both state law (Cal. Fish and Game Code §§ 6900 et seq.) and federal law (the Central Valley Project Improvement Act of 1992) have established policies to achieve salmon doubling by the year 2000. The 1995 Bay-Delta Water Quality Control Plan likewise adopted a salmon doubling objective, and the Board has not identified a time schedule for implementation nor has the Board noticed any amendments to this objective that would justify delaying achievement of the salmon doubling objective for another 30 years.[2]

The salmon doubling requirements of state and federal law is an expression of the responsibilities of all state agencies under the Public Trust. State agencies, including the Board and Delta Stewardship Council, must be consistent with the Legislature's determination that the doubling of natural production of salmon by the year 2000 is a statewide policy. Cal. Fish & Game Code § 6902(a). Fishermen, conservationists, and the larger ecosystems of the San Francisco Bay estuary and its watershed have waited decades for achievement of the salmon doubling objective, as state and federal agencies have refused to implement the significant flow increases necessary to achieve these objectives. There is no justification for further delay.

[2] While the timeline for achievement of the salmon doubling objective is contrary to law, the metric states that it is focused on natural production of salmon, consistent with state and federal law and the existing water quality control plan. As a result, the metric must exclude consideration of hatchery salmon, which are not naturally produced. The statement that the metric shall be evaluated by an annual census "for the general population in the Central Valley and select rivers" is contrary to law and the Public Trust to the extent that it considers hatchery fish amongst the general population to be counted in the annual census.

Unfortunately, the Draft Amendment focuses on measures that divert attention from the primary stressors that California must address to restore and maintain the health of the Bay-Delta ecosystem, prevent extinction of native fish species, and achieve salmon doubling: significant increases in flows into and through the Delta and improved water management that significantly reduces water diversions from the watershed. The draft amendments are not only unsupported by the overwhelming weight of the science, but they are deeply contrary to the very purpose for which the Council was created. As explained in the Delta Reform Act of 2009 – the statute creating the Council – the policy of the State of California is to "[r]estore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem," to "protect and enhance the ecosystem of the Delta and prevent its further deterioration and destruction," and to "[p]rotect, maintain, enhance, and, where feasible, restore the overall quality of the Delta environment and its natural and artificial resources." Water Code §§ 85020, 85022. The Council's failure to heed this clearly articulated purpose is unacceptable. We therefore oppose the Draft Amendment and urge the Counsel to withdraw and reconsider this flawed approach.

Thank you for consideration of our views.

Sincerely,

Doug Obegi
Natural Resources Defense Council

Rachel Zwillinger
Defenders of Wildlife

Jon Rosenfield
San Francisco Baykeeper

Gary Bobker
The Bay Institute

Mike Conroy
Pacific Coast Federation of Fishermen's Associations
Institute for Fisheries Resources

From:	Emily Pappalardo
To:	Delta Council Ecosystem Amendment
Cc:	Gilbert Cosio; Michael Moncrief; Tina Anderson; Nate Hershey
Subject:	DSC PEIR Ecosystem Amendments
Date:	Friday, July 10, 2020 5:08:30 PM
Attachments:	DSC Ecosystem Amendments MBK Comment Ltr 2020-07-10.pdf

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Ms. Ross,

Please find MBK Engineers comment letter on the PEIR Ecosystem Amendment attached.

Emily Pappalardo, P.E.
MBK Engineers
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Sacramento, CA 95825

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July 10, 2020

Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Subject: Delta Plan Ecosystem Amendment NOP

Dear Ms. Ross:

Thank you for the opportunity to provide comments on the Delta Plan Ecosystem Amendment. Upon review of the Draft Program Environmental Impact Report for the Delta Plan Chapter 4 Ecosystem Amendment, we have the following comments:

ER Policy "A" Disclose Contributions to Restoring Ecosystem Function and Providing Social Benefits

This policy requires that any covered action must have one or more policy attributes to obtain a certification of consistency within the Delta Plan. This means, any flood control project that is not covered by statutory exemptions, must accommodate for ecosystem restoration functions described in the policy attributes. This puts an undue burden on proposed projects that are necessary to protect public safety. Some projects, such as cut-off walls, do not feasibly allow for ecosystem improvements within their design. This policy should be revised to exclude flood control projects necessary for public safety.

ER P4 Expand Floodplains and Riparian Habitats in Levee Projects

This policy specifies the inclusion of setback levees and habitat alternatives in capital improvement projects. The term "capital improvement" needs to be further defined. There also must be language that specifically exempts levee maintenance and rehabilitation projects. Incorporation of additional floodplains and riparian habitats are difficult to include in levee projects due to a lack of funding and regulatory policies within channels. Many levee projects throughout the Delta, and even priority areas, may not support such elements. Furthermore, the US Army Corps of Engineers will not support additional riparian vegetation on project levees which fall within their jurisdiction. Implementation of this policy must not limit local maintaining agencies' abilities to perform necessary flood control projects and programs.

Conversion of Lands from Agriculture to Habitat

The priority habitat restoration areas in Figures 4-4 and 4-5 in the Delta Plan Draft Chapter 4, show a significant amount of private lands to be converted from agriculture to habitat. A major aspect of levee maintenance is the ability to obtain assessments from land uses within various reclamation districts. In the Delta, agriculture has been able to provide the funding needed to perform the necessary maintenance and rehabilitation of the flood control system. There will be no income generation from habitat areas at the same level as agriculture, if any. Thus, the financial impacts of lands converted away from agriculture will need to be offset in order to continue to maintain the surrounding levee system.

Need for Flood Protection of Proposed Habitat

The ecosystem amendment does not recognize the critical function the Delta's levee system would provide for proposed tidal wetlands and shallow water habitat. Funding will be needed to maintain and rebuild levee systems around proposed habitat areas to protect shallow and tidal habitats from deep flooding as well as protect adjacent lands still in agricultural production from flooding inundation.

We welcome continued coordination on the impacts of the Delta Plan Ecosystem Amendment on existing flood control and associated funding and look forward to providing feedback during the CEQA process to improve the success in achieving the habitat goals listed in this plan.

Sincerely,

MBK Engineers

Emily Pappalardo, PE
pappalardo@mbkengineers.com

EP/mm/gc
U:/2526 DSC ECOSYSTEM AMENDMENT MBK COMMENT LTR 2020-07-10

From:	Elaine Benjamin
To:	Delta Council Ecosystem Amendment
Subject:	SWC Comment Letter re: "Delta Plan Ecosystem Amendment NOP"
Date:	Friday, July 10, 2020 3:03:41 PM
Attachments:	SWC comment letter DeltaPlan Ecosystem Restoration Admendment (Chapter 4) 7-10-20.pdf
Importance:	High

Good afternoon,

Attached are State Water Contractor's comment letter regarding the Delta Plan Ecosystem Amendment NOP.

If you have any questions, please feel free to contract Darcy Austin at daustin@swc.org.

Thank you,
Elaine

Elaine Benjamin | Office Manager/Finance Administrator
State Water Contractors
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July 10, 2020

Delivered via email: ecosystemamendment@deltacouncil.ca.gov

Ms. Jessica R. Pearson, Executive Officer
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Subject: Notice of Preparation for Draft Program Environmental Impact Report for Proposed Ecosystem Amendment

Dear Ms. Pearson:

The State Water Contractors (SWC) appreciates the opportunity to provide comments on the Notice of Preparation (NOP) for a Program Environmental Impact Report (PEIR) for the proposed Delta Plan Ecosystem Amendment (Proposed Project or Proposed Ecosystem Amendment). The Proposed Project is an amendment to Chapter 4 of the Delta Plan (Ecosystem Restoration) to address a fundamental shift in how conservation is being planned and implemented in the Delta.

Thank you for meeting with us over the last couple years to discuss the Delta Stewardship Council's (Council's) approach to amending the Chapter. SWC appreciates the Council's role in bringing together a strategic vision for ecosystem restoration outside of just mitigation actions.

The SWC is an organization representing 27 of the 29 public water entities that hold contracts with the California Department of Water Resources (DWR) for participation in the State Water Project (SWP).[1] Collectively, SWC's members provide a portion of the water supply delivered to approximately 27 million Californians, roughly two- thirds of the State's population, and to over 750,000 acres of irrigated agriculture. Water supply delivered to the Bay Area, San Joaquin Valley, central coast, and southern California from the SWP is diverted from the Sacramento-San Joaquin River Delta. Through charges for participation in the SWP, SWC's members have funded and continue to fund extensive ecosystem restoration required as mitigation in SWP permits. SWC and some of its largest member agencies also have a long history of supporting and funding improved monitoring and scientific research to inform both water management and ecosystem restoration in the Delta. Thus, SWC and its members have a substantial interest and expertise that can inform any Delta activities, regulations, and policies, including those that affect Delta ecosystem restoration.

[1] SWC's members are: Alameda County Flood Control & Water Conservation District, Zone 7; Alameda County Water District; Antelope Valley East Kern Water Agency; Central Coast Water Authority; City of Yuba City; Coachella Valley Water District; County of Kings; Crestline-Lake Arrowhead Water Agency; Desert Water Agency; Dudley Ridge Water District; Empire-West Side Irrigation District; Kern County Water Agency; Littlerock Creek Irrigation District; Metropolitan Water District of Southern California; Mojave Water Agency; Napa County Flood Control & Water Conservation District; Oak Flat Water District; Palmdale Water District; San Bernardino Valley Municipal Water District; San Gabriel Valley Municipal Water District; San Gorgonio Pass Water Agency; San Luis Obispo County Flood Control & Water Conservation District; Valley Water (formerly known as Santa Clara Valley Water District); Santa Clarita Valley Water Agency; Solano County Water Agency; Tulare Lake Basin Water Storage District; and, Ventura County Watershed Protection District.

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We acknowledge the challenges of bringing together diverse stakeholders in a dynamic ecosystem with complex problems created over decades and factoring in changing demands. The SWC appreciates the opportunity to engage with the Council and offer the following comments. In addition, the enclosed table summarizes specific remarks, provides recent citations to relevant scientific research, and individual recommendations provided in an effort to help the Council meet the best available science mandate, and to make the chapter stronger.

We agree that the state needs a long-term, feasible plan to achieve landscape-scale habitat restoration in the Delta and that flows, or ecosystem restoration alone will not work. A combination of ecosystem restoration and functional flows is necessary to activate floodplain, generate turbidity and/or food web production, send signals to migratory species, etc. That strategy is consistent with the Voluntary Agreement approach we have supported for the update to the Bay-Delta Water Quality Control Plan.

As noted in the letter dated January 21, 2020, we support new ER Recommendation "C" subsection (a) advising the Delta Conservancy to develop incentives to implement targeted subsidence reversal actions. However, we continue to **encourage you to delete or modify the subsection (b) recommendation that calls for state investments in ecosystem restoration actions in subsided areas to be directed to areas that have opportunities to both reverse subsidence and restore intertidal marsh.** This could limit beneficial projects such as rice farming, identified as a subsidence reversal action in footnote #3 of Performance Measure 4.3, which has been shown to reduce subsidence. Encouraging rice farming with ecosystem restoration investments would be consistent with the Delta Plan because it would continue to support Delta agriculture, and Delta as an evolving place, and by slowing or halting subsidence, it can help mitigate risks of levee failure, thus providing multiple benefits. The focus on intertidal habitat—while critically important to sensitive aquatic species—should not diminish the importance of other types of habitats to support non-aquatic sensitive species. Development of non-tidal wetland/managed marsh can be a subsidence reversal action that provides important habitat for avian and terrestrial species, and even has the opportunity to provide food/nutrients for aquatic species. Without the support of state investments in these types of restoration actions because of higher-priority tidal marsh restoration projects, valuable habitat restoration opportunities may be unduly constrained.

We commend the Council for retaining in the Proposed Project new recommendations ER Recommendation "A" (increase funding for restoring ecosystems), "B" (use DWR's good neighbor checklist to coordinate restoration projects with neighboring landowners or users), "F" (coordination of local, state and federal agencies to remove institutional barriers to and streamline or expedite permitting for restoration), and "G" (align local, state and federal restoration to maximize priority attributes). While sound in concept, we continue to encourage the Council to provide more details on how these recommendations should be implemented.

While the text in Core Strategy 1 has been largely modified appropriately to reference to "functional flows," several instances still reference "natural flows." As discussed in our prior comment letter, we agree in concept on the focus of Core Strategy 1: Create More Natural Functional Flows but have concerns with describing them as "more natural." We recommend using "functional flows," which activate or mimic natural processes rather than "natural" flows. We think this is consistent with how ecosystem flows are explained in the text of the preliminary draft chapter discussion of Core Strategy 1.

Again, we appreciate the amount of effort that the Council and its staff have put into the Draft Amendment, including meeting with diverse stakeholders and interests. We hope that the Council will take this opportunity to continue to make improvements as this important process proceeds.

We are interested in continuing to work with the Council and staff as the process moves forward. If you have any questions about our comments or would like to discuss ways we can help support the process, please call me at (916) 447-7357 ext. 203.

Sincerely,

Jennifer Pierre
General Manager

Attachment

	Page	Comment, Question, Concern, or Issue	Recommended Resolution
		NARRATIVE	
1.	4-15	Releases from upstream reservoirs are for more than water exports. Reservoir releases serve multiple purposes such as flood control, meeting in-basin water demands (along river and in the Delta), meeting environmental and water quality regulatory requirements in the rivers and in the Delta. Comparing change in outflow between two years (from 1986 to 2005) does not capture the hydrologic conditions in those years and preceding years (water supply), changes in the water demands, and changes in regulatory requirements among others. All of these factors affect Delta outflow and it is inappropriate to tie the change in outflow between 1986 and 2005 to water exports alone.	Include references to other works that provide a comprehensive picture on historical changes in Delta outflow, such as: Hutton, P.H., Rath, J.S., & Roy, S.B. (2017a). Freshwater flow to the San Francisco Bay-Delta estuary over nine decades (part 1): Trend evaluation. Hydrological Processes. https://doi.org/10.1002/hyp.11201. Hutton, P.H., Rath, J.S., & Roy, S.B. (2017b). Freshwater flow to the San Francisco Bay-Delta estuary over nine decades (part 2): Change attribution. Hydrological Processes. https://doi.org/10.1002/hyp.11195
2.	4-16	Because of its proximity to the ocean, the Delta is projected to be one of the coolest regions in the Central Valley, cooler than average by about 2°F (Dettinger et al. 1995, Cal-Adapt 2017)	Revise to describe other habitat factors (i.e. salinity intrusion due to sea level rise) that should be considered to determine climate change refugia for native species.
3.	4-16	Increasing the extent of riparian habitat throughout the Delta, specifically large woody riparian vegetation which overhangs and shades water from direct sunlight, would also help to lessen the effects of climate change on increasing water temperatures (Davenport et al. 2016).	Describe how this goal aligns with the existing USACE and CVFPB regulatory process for levee stability.
4.	4-26	The assumption of this core strategy is that restoring ecosystem function can be achieved via the five priority attributes. The ecosystem function may be "restored," but delta smelt and longfin smelt are unlikely to recover if climate change pushes temperatures beyond their thermal limits. The ocean is a primary driver of salmon population dynamics. Restoring ecosystem function likely provides resilience to these external drivers, but may not be able to overcome their effect.	Acknowledge uncertainty associated with a changing climate and that "restored ecosystem function" may not produce expected population responses because of environmental drivers outside human control.
5.	4-26	It is unclear whether priority attributes are anchored on historical, current, or future conditions (both environmental and infrastructure).	Explain what "restored ecosystem function" looks like under future climate change and how attributes will consider climate change.
6.	4-26	The strategies ignore water quality and do not address the impacts of pollutants on the quality of the habitat.	Evaluate the potential impacts of contaminants. Utilize the DISB review on Water Quality Science in the Sacramento-San Joaquin Delta as well as other reviews like Brooks et al 2013 and Fong et al 2016. Fong, S., Louie, S., Werner, I., Davis, J., & Connon, R. E. (2016). Contaminant effects on California Bay–Delta species and human health. *San Francisco Estuary and Watershed Science*, *14* (4). Brooks, M.L., Fleishman, E., Brown, L.R., Lehman, P.W., Werner, I., Scholz, N., Mitchelmore, C., Lovvorn, J.R., Johnson, M.L., Schlenk, D. and van Drunick, S., 2012. Life histories, salinity zones, and sublethal contributions of contaminants to pelagic fish declines illustrated with a case study of San Francisco Estuary, California, USA. *Estuaries and Coasts*, *35* (2), pp.603-621.
7.	4-26	"Within Delta channels and sloughs, low flows, combined with pumping at the federal Central Valley Project (CVP) and State Water Project (SWP) export facilities, draw fish toward the southern), create reverse channel flows…."	Include the significant contribution of in-Delta uses when comprehensively describing the impacts.
8.	4-27	"When flow diversions occur simultaneously with certain fish life cycles, fish mortality due to entrainment may increase (Zeug and Cavallo 2014)."	Delete this statement as it is mischaracterizes the conclusions of Zeug and Cavallo (2014).
9.	4-27	Modern water management practices have also led to more stable hydrological conditions that are harmful to native species and conducive to certain nonnative species.	Add information or citation to support this statement.
10.	4-27	Restoring flows to meet the natural history requirements of native species requires managing flows in a manner that mimics the historical natural hydrograph, such that rivers provide the functions that species require throughout their life cycle.	Suggest deleting: "that mimics the historical natural hydrograph," It is not possible to mimic the historical natural hydrograph in a modified system as noted above. The intent of this sentence is preserved even after deleting that phrase.
11.	4-27	The functional flows approach highlights the necessity of providing flows that have sufficient magnitude, duration, and frequency and appropriate timing to affect river geomorphology, promote native species, and drive ecosystem processes (Figure 4-3, Yarnell et al. 2020).	Include the necessary and appropriate landscape elements for the functional flows to provide the ecosystem benefits in this account. The flows should not be shaped in isolation. Any flow requirements should be correlated with hydrology. Furthermore, this depicts an idealized hydrograph over an entire year. In California, typically there is a significant intra-year variability in the natural runoff. There may be weeks of time when the conditions are significantly dry between two storm events. The elements of functional flows outlined may not be achieved given the limited capacity and control to manage the highly variable runoff due to the rigid flood control rules and other regulatory requirements for the upstream reservoirs, tributary flows and in the Delta.
12.	4-28	Figure 3, The altered flow regime is masking the Functional Flow regime due to the way the graph was designed.	Provide all three profiles separately for heightened correlation and clarity.
13.	4-28	Figure 4-3. Comparison of Natural, Altered, and Functional Flow Regimes: The hatched blue areas depict flow augmentation through releases from storage or reduced diversions to mimic key elements of the natural flow regime.	Add "functional" to natural flow regime to read "natural functional flow regime."
14	4-29	Wet Season Initiation Flows.	Add the consideration that the first flush is synonymous with high contaminant loading.
15.	4-29	Peak Magnitude Flows.	Add information or citation to support this statement.
16.	4-29	Paragraph beginning with "More natural flow patterns…"	Add information or citation to support this statement.
17.	4-29	More natural flow patterns will not provide all functions in a channelized and leveed landscape that would be supported in a restored landscape because some functions require that flow connect to and interact with land to create floodplain habitat and support aquatic primary production.	Add "functional" to natural flow patterns to read "natural functional flow patterns."
18.	4-30	The objectives included in the Bay-Delta Plan are largely flow-dependent and are primarily implemented through water rights and associated conditions on water project operations.	Describe how these goals will align with the current regulatory environment. A covered action may not be able to affect Delta flow patterns given the numerous regulatory requirements imposed by agencies such as SWRCB, NMFS, USFWS, CDFW, USACE etc. Given the narrow focus of ESA and CESA, achieving a broader ecosystem goal is highly unlikely pending major legislative changes.
19.	4-31	"Past scientific studies have identified the biological needs of the Delta at up to 80 percent of unimpaired flows (Richter et al. 2011)."	Unimpaired flows is not a realistic metric as it has already been established that the metric does not realistically reflect natural flows. And natural flows is what functional flows are based on. Also by stating "up to 80 percent" it grossly exaggerates the percent of unimpaired flows concluded in most years.
20.	4-31	"Subsequent work to balance biological needs with all other beneficial uses proposed a range of 35 to 75 percent of unimpaired flows…"	Change "unimpaired" to "changes in natural flows."

	Page	Comment, Question, Concern, or Issue	Recommended Resolution
		NARRATIVE	
21.	4-31	"Therefore, several Delta Plan regulatory policies and recommendations promote protecting, restoring, and enhancing riparian floodplains and tidal wetlands in a manner that allows space for flows to access them."	Provide Delta Plan citation.
22.	4-31	"Through a combined effort to create more natural, functional flows and restore land-water connections in low-lying areas in the Delta, floodplain and tidal wetland habitats can support recovery of native species and potentially improve water supply reliability."	Add information or citation to support this statement.
23.	4-31	When management actions use functional flows that reflect natural variability, efforts to create a more reliable water supply can work together with ecosystem protection, restoration, and enhancement.	This is not consistent with the existing SWRCB Decision-1641, ESA and CESA requirements for SWP and CVP. Explain how efforts to create a more reliable water supply can work together under the current regulatory perimeters.
24.	4-33	The priority attribute discussions are very high-level and it is difficult to find the supporting information for each attribute. The structure of the report makes is difficult to follow a single topic through all of the different sections and appendices, etc. The chapter would benefit from cross-references throughout.	Provide reference to the appropriate sections in Appendix 3A, Performance Measures, etc. that support each priority attribute.
25.	4-34	<u>Quote</u>: "It is inappropriate to implement ecosystem protection, restoration, or enhancement actions (whether for mitigation, recovery, or other objectives) that can only achieve one or two of the priority attributes in locations that could potentially support four or more of these attributes, since such areas are extremely limited within the Delta."	Suggest replacing with an affirmative statement: "It is desirable to implement ecosystem protection, restoration, or enhancement actions (whether for mitigation, recovery, or other objectives) that support the maximum priority attributes in locations that could potentially support four or more of these attributes, since such areas are extremely limited within the Delta."
26.	4-38	The text does not explain how the priority areas were identified and evaluated.	Include information on how these areas were identified, evaluated, and selected.
27.	4-48	The text does not explain how the priority areas were identified and evaluated.	Include information on how these areas were identified, evaluated, and selected.
28.	4-51	"Channelizing waterways, altering riparian vegetation structure, stabilizing flow patterns, and impairing water quality have all contributed to conditions that favor nonnative invasive species."	Add information or citation to support this statement.
29.	4-53	"In addition, introduced zooplankton, which are linked to a decrease in nutritional value for fish, have almost completely replaced native zooplankton (Winder and Jassby 2011)."	There are also invasives that prey on key prey for natives (Kayfetz and Kimmerer 2017). Kayfetz, K., & Kimmerer, W. (2017). Abiotic and biotic controls on the copepod Pseudodiaptomus forbesi in the upper San Francisco Estuary. Marine Ecology Progress Series, 581, 85-101.
30.	4-53	"Invasive species are nonnative species that establish and reproduce rapidly outside of their native range and may threaten the diversity or abundance of native species through competition for resources, predation, parasitism, hybridization with native populations, introduction of pathogens, or physical or chemical alteration of the invaded habitat."	Add information or citation to support this statement. It appears as if there is a need to make the distinction between invasive and non-native therefore providing that citation will provide more weight to the designation and would be less arbitrary.
31.	4-54	"By 2030, these actions are expected to reduce the land area covered by nonnative invasive plant species by half (see Appendix E, PM 4.10)."	Add information or citation to support the assertion in this Performance Measure that the specified actions are expected to reduce the land area covered by half.
32.	4-55	"Other physical barriers in the Delta that disrupt fish migration include structures with ledges and drops,…"	Add information or citation to support this statement.
33.	4-56	The use of the term "Remediating"	Remediating is very different than "removing" as was text before. Provide citations for making such definitive statements about the efficacy of remediation.
34.	4-56	"Until priority barriers are remediated and critical migration corridors are restored, maintaining populations of anadromous fish requires the use of hatcheries to ensure sufficient reproduction."	Add information or citation to support this statement.
35.	4-56	Quote: "Recent research evaluating 80 years of hatchery releases in the Central Valley highlights the effect of hatchery release location and other factors on straying rates of hatchery fish and potential impacts on natural stocks (Sturrock et al. 2019)."	Provide a summary of the results of this study such as: Recent research evaluating 80 years of hatchery releases in the Central Valley highlights the effect of hatchery release location and other factors on straying rates of hatchery fish and potential impacts on natural stocks (Sturrock et al. 2019). For example, releasing hatchery fish in the bay upstream of the Golden Gate Bridge lead to higher straying rates (7-89%) than releasing hatchery fish on site (straying rate 0-9%), increasing the effects of hatchery releases on natural spawners.
36.	4-57	Quote: "These migration and reproductive interventions are expected to contribute to increased abundance of native fish species, relative to the abundance of all fish species (see Appendix E, PM 4.10)." References to Appendix E, PM 4.10 which relate to Terrestrial and Aquatic Invasive Species and does not explain how the logic or conceptual model on how reducing genetic risk will lead to increased abundance.	Recommend removing this sentence or include a description of how reproductive interventions are expected to contribute to increased abundance.
37.	4-57	"…to date only U.S. Fish and Wildlife Service's Livingston Stone National Fish Hatchery has a finalized and approved HGMP for a Central Valley species."	Provide the citation for the HGMP.
38.	4-57	"State agencies and academic researchers should coordinate and use best available science and technology to tag fish within the Delta, identify fish migration pathways, estimate survival, and track progress (see ER R9)."	Include federal agencies in the list regarding this activity.
39.	4-58	"Predation hot spots exist in the Delta where predators congregate and consume large numbers of prey that are disoriented by unnatural flow patterns and modified habitat structures, such as water intakes."	Add information or citation to support this statement.
40.	4-58	Nonnative fish species such as striped bass have been shown to prey on native salmon and smelt.	Add information or citation to support this statement.
		POLICIES AND RECOMMENDATIONS	
41.	4-60	Figure 4-7. Priority Migration Corridors.	Provide information on how these corridors were evaluated and selected.
42.	4-76	Quote: "The Delta Conservancy, Delta Science Program, California Department of Fish and Wildlife, California Department of Food and Agriculture, and other State and federal agencies should develop and implement communication and funding strategies for rapid response to new introductions of non-native invasive species, based on scientific expertise and research."	This recommendation could be improved by including a timeline with interim steps.
43.	4-76	Quote: "Hatcheries and harvest regulation are important tools in fisheries management, but they also pose genetic and ecological risks to wild salmon runs, other native species, and the Delta ecosystem."	Describe how hatcheries pose genetic risk to non-salmon species.
44.	4-78	New ER Recommendation "F" outlines actions that the DPICC could pursue with the intent of supporting and streamlining restoration actions.	Revise Recommendation F to clearly indicate that the outcomes of the recommendation are processes to streamline restoration/conservation action implementation that would be available to project proponents on a voluntary basis. Revise language to reflect that streamline processes or support tools developed under Recommendation F would be available to all restoration/conservation action not just Tier 1 and Tier 2 projects as defined under Appendix 3A.
		APPENDIX 3A	

	Page	Comment, Question, Concern, or Issue	Recommended Resolution
		NARRATIVE	
45.	3A-5	It is unclear how "large-scale" is determined for Proposed Restored Area designations.	Provide citations or references to other sections of Chapter 4 that provide explanation for these designations.
46.	3A-11	It is unclear how 75% of the aggregate area as the percent needed to qualify as increasing native vegetation cover was determined.	Provide citations or references to other sections of Chapter 4 that provide justification.
47.	3A-23	It is unclear how the identification of the social benefits that would be provided by the covered action, and the disclosure of supporting information in Section 2 would be evaluated.	Clarify how Section 2. Social Benefits will be evaluated.
		APPENDIX E	
48.	E-3	The target thresholds of the long-term goals of the performance measures may be difficult to achieve and are not connected to specific actions that could be altered along the way if meeting the target thresholds is unachievable. There is also no connection between these goals and how they link into adaptive management.	Provide a stronger basis for the goals and steps needed to achieve these goals.
49.	E-4	Metric 4. 10-year rolling average slope of the Delta outflow-inflow ratio, disaggregated by seasonal, annual, and 10-year periods and evaluated annually; outflow-inflow ratio in dry and critically dry years, evaluated annually on a five-year rolling basis.	Suggest deleting since It is unclear how this metric is assessing the achieving "functional" flow, especially if the focus is on ecological floodplain processes.
50.	E-4	Baseline 1. Modeling, for the years 1997–2012…	Include reference for the modeling, the input assumptions, the models used, and any post-processing spreadsheets/tools used in estimating the baseline metrics. This should be made available for any future covered action assessment.
51.	E-4	Baseline 2. Hydrograph data for the Bend Bridge gage station (USGS gage 11377100) indicate that the magnitude of flow for pre-Shasta Dam (1891–1943) and post- Shasta Dam (1960–2013) events, with 14-day duration, are similar at approximately 20,000 cubic feet per second (cfs). However, the pre-Shasta Dam historical 1.5-year recurrence interval peak flow (approximately 75,000 cfs) even now occurs approximately every two years, and the pre-Shasta Dam 10-year recurrence interval flow (206,200 cfs) has been nearly halved (133,842 cfs).	Revise and provide patterns and magnitudes of functional flows that can promote natural processes under a greatly modified landscape. Comparing flow magnitudes from pre-Dams to post-Dams also does not help assess functional flows. Based on the description from the Core Strategy 1, the idea is not to match the pre-Dam magnitude.
52.	E-4	Footnote 2: The definition of spring high flows, or the start of spring recession, is defined as the third consecutive day of decreasing flow following the last peak flow between March 15 and June 1. Low flows are defined as the date when the daily recession rate average, over five days, is less than 3.5 percent per day.	Provide reference for how these were developed.
53.	E-5	By 2030, 10-year rolling average slope of Delta outflow-inflow ratio is greater than zero (i.e., positive),1010 Positive slope of the 10-year rolling average of Delta outflow-inflow ratio means an increasing portion of inflow water flowing out of the Delta over a given period of time and annual average Delta outflow-inflow ratio in dry as well as in critically dry years is greater than 0.5.11.	The feasibility of achieving this performance standard needs to be balanced with the other beneficial uses.
54.	E-5	Baseline 4. Long-term ratio of Delta outflow to Delta inflow. The period before construction of the Central Valley Project, State Water Project, and select major dams (hydrograph between 1931–1954) had a Delta outflow-inflow ratio of 0.88. Post- completion of most components of the State Water Project (hydrograph between 1981–2015), the Delta outflow-inflow ratio was 0.75.	Provide the spreadsheet tool used to compute these metrics. It should be made available for assessing any covered actions in the future. Provide the average period used for these metrics. Also, as previously noted, this is not a metric that can help assess functional flow. Comparing flow magnitudes from pre-Dams to post-Dams also does not help assess functional flows. Based on the description from the Core Strategy 1, the idea is not to match the pre-Dam magnitude but, identify patterns and magnitudes of functional flows that can promote natural processes under greatly modified landscape.
55.	E-5	Core Strategy 4.1 Create More Natural Functional Flows: Target.	Identify why year 2030 is specified. And, clarify if these metrics are only applicable to the covered actions after 2030?
56.	E-5	Target. 1. By 2030, allow for at least 17,000 acres of inundation for at least 14 days in two out of three years, and at least 21 days in one out of two years, between November 1 and March 15. Target. 2. By 2030, at least one peak flow greater than 75,000 cfs, lasting at least 48 hours in duration, every two years, at Bend Bridge on the Sacramento River.	Specify how these meet the functional flow goal.
57.	E-5	Target. 3. By 2030, daily decrease in flow will be less than 3.5 percent per day, as calculated by a five-day rolling average during the period of spring flow recession, in at least 1 out of 5 years, at Bend Bridge on the Sacramento River.	Specify how this meets the functional flow goal. EFT modeling analysis should be made available for future assessment of covered actions.
58.	E-5	Target. 4. By 2030, 10-year rolling average slope of Delta outflow-inflow ratio is greater than zero (i.e., positive),10 and annual average Delta outflow-inflow ratio in dry as well as in critically dry years is greater than 0.5.	Determine the averaging period to be utilized for slope. Also, as previously noted, this is not a metric that can help assess functional flow.
59.	E-6	Metric. 2. A nontidal floodplain12 area that inundates13 at least once every two years.	Provide the basis for this metric.
60.	E-6	Baseline. As of the year 2018: 1. An estimated 75,000 acres of land physically connected to the fluvial river and tidal system. 2. Approximately 15,000 acres of the connected land inundated at a two-year interval, calculated as a long-term average for 1985-2018.	Demonstrate how these are estimated and show which areas are included in these calculations to allow future projects to add to these baseline metrics using the same estimation method used in the baseline.
61.	E-6	Target. 1. Additional 51,000 acres added to the 75,000-acre baseline that are physically connected to the fluvial river and tidal system, for a total of 126,000 acres.	Describe the methodology for the acreage targets and proposed locations for 51,000 acres. Describe how this acreage will this be used to assess individual covered actions.
62.	E-6	Target. 2. At least an additional 19,000 acres of non-tidal floodplain area is inundated on a two-year recurrence interval, for a total of at least 34,000 acres.	Describe the methodology for the acreage targets and proposed locations for 19,000 acres. Describe how this acreage will this be used to assess individual covered actions.
63.	E-6	Quote: "1. Additional 51,000 acres added to the 75,000-acre baseline that are physically connected to the fluvial river and tidal system. 2. At least an additional 19,000 acres of floodplain area is inundated on a two-year recurrence interval, for the total of at least 34,000 acres."	Provide interim time steps towards achieving these goals.
64.	E-7	Quote: "Target: net increase of target acres of natural communities by 2050."	Describe how these targets were established.
65.	E-8	Quote: "1. Number of key new nonnative invasive species of fish, plants, and invertebrates establishing populations in the Delta (e.g., quagga and zebra mussels, Hydrilla verticillata, and others as they are identified)."	Describe how you will determine what are 'key new nonnative invasive species'.
66.	E-8	2. Fish: i. Average percentage of total fish biomass that are native fish species based on USFWS beach seine surveys from the period of 1995-2015.	Describe why the period of 1995-2015 was chosen. The footnote says, "14 Species reported as established in the Delta prior to 2013 Delta Plan adoption will be used for baseline identification of new invasive species established post-2013." According to the foot note and other metrics the timeline here should be 1995-2013.
67.	E-10	The 15-year rolling annual average of natural production for all Central Valley Chinook salmon runs increases for the period of 2035-2065, and reaches 990,000 fish by 2065, for each run on select rivers, the target values are specified below.	1) Describe what measures will be taken if the target is not met. 2) Describe how the timeline that increases from 2035-2065 was determined. This timeline is too short to see if there are increases in doubling. Timeline should be extended as this goal is likely to fail.
68.	E-10	Footnote 20. The baseline values in the table do not add up to the baseline for all runs because not all tributaries are included. The Council will only track individual run types for the select rivers specified in the table.	Describe how the Council selected which rivers they would track.

	Page	Comment, Question, Concern, or Issue	Recommended Resolution
		NARRATIVE	
69.	E-11	Table titled: Central Valley Chinook Salmon Natural Production Baseline and Target Levels by Run Type and Selected Rivers.	Consider extending the timeline, the targets for 2065 are unrealistic.
70.	E-13	Targets listed for Performance Measure 4.13 Barriers to Migratory Fish Passage (NEW) seem ambitious.	The majority of these targets are 2030, 10 years to get all of the projects completed with limited funding resources seem ambitious. Consider extending the targets to 20 years.
71.	E-19	Strategy focuses on a specific life-stage (migratory juvenile salmonids) of large enough size that can be tagged. The Winter Run Life Cycle Model workshops and CVPIA Science Integration Team have both shown that population dynamics are much more sensitive to our uncertainty about survival at earlier life-stages (smaller than what can be tagged acoustically) and not necessarily associated with migration pathways (e.g. survival benefits associated with restored habitats).	Revise to in include investigations of proximate causes beyond predation.
		PERFORMANCE MEASURES	
72.	2	Quote: "3. By 2050, remediate fish passage at all (100 percent) large rim dams in the Sacramento-San Joaquin River watershed."	Propose adaptive management approach to sequencing of fish passage projects; prioritize actions where habitat is currently limiting and/or newly accessible habitat provides cold water refugia under future climate change scenarios.
73.	2	Quote: "Large rim dams in the Sacramento–San Joaquin River watershed identified in the National Marine Fisheries Service's Central Valley Recovery Plan for Central Valley Salmon and Steelhead (2014) with recovery actions."	Define how the dams to be removed would be selected.
74.	10	Table 1. Comparative List of Priority Fish Migration Barriers Identified in the Sacramento River Watershed.	It is unclear which barriers are being recommended in these tables and if only the priorities in 2018 will be considered. If a barrier was a priority in 2016 but not in 2018 will it be considered? Provide clarification on which barriers are top priority.
75.	11	Table 2. Comparative List of Priority Fish Migration Barriers Identified in the San Joaquin River Watershed.	It is unclear which barriers are being recommended in these tables and if only the priorities in 2018 will be considered. If a barrier was a priority in 2016 but not in 2018 will it be considered? Provide clarification on which barriers are top priority.
76.	12	Table 3. Rim Dams to Provide Fish Passage Identified in Recent Recovery Plan Biological Opinion for Salmonids. 2009 BO did not require passage above all dams but did require a fish passage assessment for evaluating steelhead passage above Goodwin, Tulloch, and New Melones Dams on the Stanislaus River and a pilot program on the American River above Nimbus and Folsom dams, and on the Sacramento River above Keswick and Shasta dams. Fish passage above rim dams is extremely difficult and expensive and may not be appropriate if waters above dams are too warm under predicted climate change scenarios. The Council does not have authority to require this, but could be supportive of evaluations and pilot programs.	Change title table to: Table 3. Rim Dams to Provide Fish Passage. Remove the following dams from list: Thermalito Diversion Dam, Englebright Dam and Daguerre Point Dam, Friant Dam, La Grange Dam, Crocker-Huffman Dam, Merced Falls dam, McSwain Dam, and Camache Dam.
77.	12	Quote "Large rim dams are to be 100% remediated by 2050." Timeline is aggressive and it is unknown if passage above rim dams is feasible or warranted.	Provide interim time steps and consequence of not achieving this target in the timeline given.
78.	6/7	Dividing the modeled areas needed to meet CVPIA goals by 17 percent greatly expands the required area. The 17 percent suitability of floodplains for salmonids is based on existing floodplain. This methodology implies that future floodplain restoration covered actions would be suitable for salmonids at the same rate as existing floodplains. This seems like a flawed assumption in that future floodplain restorations would likely be designed specifically to provide suitability for salmonids, so are likely to be more suitable.	Develop a methodology for calculating a connectivity target based on suitability of future floodplain restorations.
79.	6/7	Quote: "Basin. Analysis for the CVFPP identified that on average, only 17 percent of floodplains are considered suitable for salmonid species (DWR 2016a). To account for this, the areas required were divided by 17 percent to generate 64,705 acres needed for the Sacramento River Basin and 26,471 acres for the San Joaquin River Basin. Council staff then scaled these areas by the relative proportion of the Conservation Planning Areas (CPA) for the CVFPP within the Delta and Suisun Marsh as determined by a spatial analysis: approximately 52 percent of the Lower Sacramento CPA and 67 percent of the Lower San Joaquin CPA fall within this area. Multiplying by these respective factors (see equations below) results in 33,647 acres in the Lower Sacramento CPA and 17,735 acres in the Lower San Joaquin CPA, for a sum of 51,382 acres of floodplain habitat (see below). After rounding, the connectivity target is set to 51,000 acres. Here are the equations to set the targets: Sacramento CPA: 64,705 acres x 52% = 33,647 acres San Joaquin CPA: 26,471 acres x 67% = 17,735 acres"	Conduct an analysis to see if these areas are actually capable of having connectivity rather than assigning based on scale. PM should target defined suitable habitat criteria for groups of target species (salmonids, smelts, etc.) and regions (riverine vs. tidal).
80.	6	An inundation frequency of 50% to 90% in this context would imply inundation of some unknown duration once every two years up to nine out of every 10 years. This does not translate to a percent of time that a floodplain would be inundated.	The data set used to develop this metric appears to be inadequate. In addition to frequency of inundation, this metric should reflect a duration of inundation and ideally depth of inundation. Frequency of inundation on its own provides little information about the potential value of a floodplain.
81.	Overall	PM 4.15 (Seasonal Inundation) seems to be redundant as it is nested within 4.16 (Acres of Natural Communities Restored).	Either delete PM 4.15 or clarify how it is different from PM 4.16 and necessary as its own PM.
82.	5	Quote: "Targets for each natural community (ecosystem) type were derived from conservation and restoration targets identified in conservation and recovery plans within the Delta and Suisun Marsh (Council 2019, Delta Plan Amendment, Appendix Q4 Conservation and Recovery Plan Target Species -Preliminary Draft)."	Ensure that the targets identified in Appendix Q4 have gone through an external review and approval process before adopting them.
83.	6	Quote: "These targets were identified based on the modeled estimate of rearing habitat area required to help recover spring and fall-run Chinook salmon to meet the 1992 Central Valley Project Improvement Act salmon doubling goal."	Describe the consequences of using fall-run values to set conservation and restoration targets for all species and establish a process such that if achieving these goals is successful for fall-run, but not for other species (for instance, longfin) then this will not be considered a failure.

From: Tim Stroshane
To: Delta Council Ecosystem Amendment
Cc: Barbara Barrigan-Parrilla; Tatayon, Susan@DeltaCouncil; Fiorini, Randy@DeltaCouncil; Gatto, Mike@DeltaCouncil; Villegas, Oscar@DeltaCouncil; Damrell, Frank@DeltaCouncil; Malissa Tayaba; Caleen Sisk; Kelley Taber; Thomas H. Keeling; dean@mohanlaw.net; John Herrick Esq.; Dante J. Nomellini Esq.; Osha Meserve; Roger Moore; Jonas Minton; Bob Wright; Bill Jennings; Chris Shutes; Carolee Krieger; Michael Jackson Esq.; Barbara Vlamis; Regina Chichizola; Tom Stokely; Patricia Schifferle; Kathryn Phillips; Brandon Dawson; Adam Keats; Doug Obegi; Kate Poole; Jon Rosenfield; Gary Bobker; Mike Conroy; Michelle Ghafar; Nina Robertson; Dillon Delvo; Elaine Barut; Jasmine Leek; Nathan Werth; Tama Brisbane; Nicholas Hatten; Pearson, Jessica@DeltaCouncil
Subject: Re: Delta Plan Ecosystem Amendment NOP
Date: Friday, July 10, 2020 11:50:42 AM
Attachments: 20200710 DSC Ecosystem Amendments NOP Comments.pdf

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This is a re-send. There were technical problems with the first PDF version of our comment letter. I believe the problem has been corrected.

Best wishes to all, and a good weekend.

Tim Stroshane
Restore the Delta

> On Jul 10, 2020, at 10:58, Tim Stroshane <spillwayguy@gmail.com> wrote:
>
> Dear Ms. Ross,
>
> On behalf of Barbara Barrigan-Parrilla, executive director of Restore the Delta, I submit RTD's comments on the above-referenced Notice of Preparation, attached below.
>
> Please confirm the Council's receipt of these comments by replying to this email to that effect.
>
> Thank you for the opportunity to comment on the above-referenced Notice of Preparation.
>
> <20200710 DSC Ecosystem Amendments NOP Comments.pdf>
>
> Truly,
>
> Tim Stroshane
> Policy Analyst
> Restore the Delta
>

via: ecosystemamendment@deltacouncil.ca.gov

July 10, 2020

Harriet Ross, Assistant Planning Director
Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, CA 95814

Subject: Delta Plan Ecosystem Amendment NOP

Dear Ms. Ross:

This letter originates from lands of the Ohlones in the East Bay and of Yokut lands in the Stockton area, and Miwok lands of the Delta further north. These lands represent the great connections of the San Francisco Bay and Delta estuary, the kinds of connections that Draft Chapter 4 Ecosystem Restoration Amendments to the Delta Plan strive to represent. We at Restore the Delta strive to be mindful of these connections on our advocacy work. We respectfully remind the Delta Stewardship Council of this California tribal history because we have had to raise once again in this comment letter the need for the DSC to complete a full analysis of California tribal history, culture, and current needs in relation to the Delta Plan Ecosystem Amendment NOP—and to avoid erasure of the history and continuing contributions of California tribes to the Delta as the unique place it is.

Our mission is to ensure the health of the San Francisco Bay-Delta estuary and Delta communities. Restore the Delta works in the areas of public education and outreach so that all Californians recognize the Sacramento-San Joaquin Bay Delta as part of California's natural heritage, deserving of restoration. Restore the Delta is a grassroots campaign of residents and organizations committed to restoring the Sacramento-San Joaquin Delta so that fisheries and farming can thrive there together again. We fight for a Delta with waters that are fishable, swimmable, drinkable, and farmable, able to support the health of the estuary, San Francisco Bay, and the ocean beyond. A coalition of California residents, business leaders, civic organizations, community groups, faith-based communities, union locals, farmers, fishermen, and environmentalists, Restore the Delta envisions the Sacramento-San Joaquin Delta as a place where a vibrant local economy, tourism, recreation, farming, wildlife, and fisheries thrive as a result of resident efforts to protect our waterway commons. Based in the Delta, California, Restore the Delta has worked since 2006 in the areas of public education and outreach and has grown to 60,000 members from throughout California. Restore the Delta advocates for local Delta stakeholders to ensure that they have a direct impact on water management decisions affecting the well-being of their communities, and water sustainability policies for all Californians.

This letter provides the Delta Stewardship Council (DSC) with our comments on the above referenced Notice of Preparation concerning Delta Plan ecosystem amendments. The content of the NOP is deceptively large beyond the 16 pages of the official notice to the public. Its full and complete project description consists of the proposed draft Chapter 4 amendments, as well as three regulatory appendices, four technical appendices, and an appendix containing new and revised ecosystem-related performance measures pertaining to the co-equal goals (NOP, pp. 8-9). Our comments here will reflect review not just of the public notice document but of many if not all project description documents in hopes that our comments will assist DSC with making revisions during the preparation of the draft environmental impact report on the amendments. Specific comments are provided in Attachment 1 to this letter.

General Comments

- We urge the DSC to incorporate into its narrative, policies, performance measures, and appendix-based checklists that facilitate the Council's consistency certification process the needs of California Indian tribes and other environmental justice communities to obtain and receive social benefits from ecosystem restoration projects that are consistent with the Delta Plan. Much the way the DSC wishes to avoid losing opportunity sites for ecosystem restoration, California Indian tribes with cultural and material ties to the Delta wish to avoid missing opportunities to expand ethnobotanical and faunal supplies important to their cultures in the Delta portions of their homelands. As they were here first, this is an essential step toward reparations the DSC and other state agencies must extend to the tribes, easily justified as consistent with Governor Newsom's 2019 apology to California Indian tribes for past genocidal treatment.

- Our comments address what we see as a "fatal flaw" or Achilles heel in on one hand relying on State Water Resources Control Board D-1641 flow objectives as the underlying flow assumptions for a performance measure calling for the laudable goal of doubling salmonid populations—a policy goal in place already for 32 years.

- It is contrary to the 2009 Delta Reform Act that Draft Delta Plan Chapter 4 Ecosystem Restoration Amendments have no policy that addresses existing (not strictly new, as does current Policy ER P5) nonnative invasive species as a threat and stressor to existing ecosystem management but also to ecosystem restoration investments in the future, especially if flows are not adequate. Delta scientific research into the life histories, biogeographic strategies, and metabolism of nonnative invasive invertebrate clams, for example, indicate that they consume vast quantities of food resources exported to open water habitats and often outcompete Delta pelagic resident fish species, contributing to the difficulty of recovering and enhancing these fish populations.

Thank you for the opportunity to comment on this Notice of Preparation. If you have questions or concerns, please contact us at the email addresses below.

Sincerely,

Barbara Barrigan-Parrilla
Executive Director
barbara@restorethedelta.org

Tim Stroshane
Policy Analyst
tim@restorethedelta.org

Attachments:

1. Specific Comments from Restore the Delta
2. Restore the Delta Letter of January 21, 2020

cc: Susan Tatayon, Chair, Delta Stewardship Council
Randy Fiorini, Vice-Chair, Delta Stewardship Council
Mike Gatto, Member
Maria Mehranian, Member
Oscar Villegas, Member
Daniel Zingale, Member
Frank Damrell, Member
Malissa Tayaba, TEK Director, Shingle Springs Band of Miwok Indians
Caleen Sisk, Spiritual Leader and Tribal Chief, Winnemem Wintu Tribe
Kelley Taber, Somach & Simmons
Thomas H. Keeling, The Freeman Firm
S. Dean Ruiz, South Delta Water Agency
John Herrick, South Delta Water Agency
Dante Nomellini, Central Delta Water Agency
Osha Meserve, Soluri Meserve LLC
Roger Moore, Law Office of Roger B. Moore
Jonas Minton, Planning & Conservation League
Bob Wright, Sierra Club California
Bill Jennings, California Sportfishing Protection Alliance
Chris Shutes, California Sportfishing Protection Alliance
Carolee Krieger, California Water Impact Network
Michael B. Jackson, California Water Impact Network
Barbara Vlamis, AquAlliance
Regina Chichizola, Save California Salmon
Tom Stokely, Save California Salmon

Patricia Schifferle, Pacific Advocates
Kathryn Phillips, Sierra Club California
Brandon Dawson, Sierra Club California
Adam Keats, Center for Food Safety
Doug Obegi, NRDC
Kate Poole, NRDC
Jon Rosenfield, San Francisco Baykeeper
Gary Bobker, The Bay Institute
Mike Conroy, PCFFA
John McManus, Golden State Salmon
Michelle Ghafar, Earthjustice
Nina Robertson, Earthjustice
Dillon Delvo, Little Manila Rising
Elaine Barut, Little Manila Rising
Jasmine Leek, Third City Coalition
Nathan Werth, Substratum Systems
Tama Brisbane, With Our Words
Nicholas Hatten, LGBT Social Justice Initiative

Attachment 1
Specific Comments from Restore the Delta

Restore the Delta's specific comments on this Notice of Preparation (NOP) are organized around two main sections—the substance and scope of the project description, and the scope of the environmental analysis (to be derived from the substance and scope of the project description). We have also focused our comments on Delta Plan policies since they are the primary enforcement tools the DSC possesses to seek and achieve compliance of covered actions with the Delta Plan and intent of the Delta Reform Act. In between these two sections we provide brief specific comments about Draft Chapter 4 narrative passages.

Comments on Substance and Scope of NOP Project Description:

Unchanged Chapter 4 Policies:

- **ER P1**—This policy essentially states that whatever flow objectives for the Sacramento and San Joaquin River contained in State Water Resources Control Board (SWRCB) flow objectives are those of the DSC as well. This policy is reasonable given the DSC's jurisdictional limitations (i.e., the Legal Delta), but because this policy relies entirely on SWRCB Delta flow criteria (since DSC lacks authority to set such water quality objectives), the Draft EIR should fully disclose an up-to-date status of the SWRCB's Bay-Delta Plan process, including any and all "voluntary agreements." This Delta Plan policy is protective of Delta ecosystems and resources only so long as flow objectives approved by the SWRCB for the updated Bay-Delta Plan (especially on the Sacramento River side) strengthen Delta inflow, outflow, and the long-term seasonally regulated position of X2, the estuarine habitat water quality objective in the Bay-Delta Plan. We have further comments about this policy in relation to Performance Measure 4.6, the salmon doubling goal, below.

- **ER P5**—This policy is addressed to stemming the introduction and spread of new nonnative invasive species. This is a policy for grasping low-hanging fruit, we hope. We recommend strengthening this policy to help the state of California address the need to manage better the Bay-Delta Estuary's nonnative invasive clams (especially *Potamocorbula amurensis*, which inhabits brackish waters of the estuary from Suisun Bay often to the western Delta, and *Corbicula fluminea*, which inhabits fresher waters in the central and southern Delta). By having no policy to address these invasive clams, the DSC fails to recognize that for these clams, flow is key to limiting their habitat ranges, and that these two clam species pose grave threats to habitat restoration contributions (also known as "exports") to open water food supplies for the very resident native fish species (e.g., Delta smelt, longfin smelt) the DSC aspires to help with its habitat restoration policies in the Chapter 4 amendments. This is omission represents a likely fatal flaw in the overall strategy of these amendments to the Delta Plan. These were the same problems identified by an independent panel of scientists sponsored by American Rivers and the Nature Conservancy in 2013.[1] They concluded:

> *BDCP documents acknowledge (but then mostly ignore) that grazing by clams that settle in or near restored subtidal areas may remove all or most of the phytoplankton production and some of the zooplankton. Grazing by clams and zooplankton (including microzooplankton) removed all of the phytoplankton production in the LSZ nearly all the time from late spring through fall during 1988 – 2008 (Kimmerer and Thompson submitted.). Whether clams settle in the newly restored areas is critical in determining whether the area can export any phytoplankton (Lucas and Thompson 2012). At present clams are not abundant in Suisun Marsh except for the larger Suisun and Montezuma Sloughs, where they probably remove a substantial fraction of the phytoplankton and small zooplankton that would otherwise enter Grizzly Bay.*[2]

The DSC acknowledges that these clams exist, but also ignores the policy relevance of the problems they pose to tidal and subtidal ecosystem restoration projects' production and export of food supplies to open water habitat. The fact that managing these clams would require investment of flow goes unacknowledged. The DSC states:

> **Widespread and Unmanaged Species:** These nonnative species are widespread and known to cause problems (e.g., invasive Asian clams that rapidly deplete plankton from the water column), but they are not currently being actively managed—typically because of lack of feasible control options.[3]

Ecologists studying San Francisco Bay and Delta ecosystems may refer to invasive species like *P. amurensis* as "stressors"; that is, such species "stress" native or long-established Bay and Delta species by creating stiff competition for niches, consumption of food resources, and energy—the bases for reproductive advantage in ecology.[4] *P. amurensis* has had two important "stressor" roles:

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[1] American Rivers and The Nature Conservancy, *Independent Panel Review of the Bay Delta Conservation Plan*, September 19, 2013, pp. 73-79. See also footnote 6 of Attachment 2 to this letter, Restore the Delta's letter of January 21, 2020 to the DSC concerning a prior draft of Chapter 4.

[2] *Ibid.*, p. 78.

[3] Draft Chapter 4, *Protect, Enhance, and Restore the Delta Ecosystem*, p. 4-52, item 2.

[4] For example, the *BDCP 2013*, Appendix 5.F, included among biotic stressors on covered fish invasive vegetation, invasive mollusks (*P. amurensis* and *C. fluminea*), and *Microcystis*, a key cyanobacterium causing harmful algal blooms.

- First, its voracious consumption of plankton outcompetes native open water larval fish like Delta smelt.

- Second, its physiology takes up bioavailable selenium and eliminates it only very slowly. The clam's shallow burial in sediments makes it easy prey, and its predators bioaccumulate the selenium it contains into their tissues.

Both of these stressor impacts are directly related to flow and water quality changes that result from water project operations.

The overbite clam poses a sustained threat to the food web of the Delta estuary, contributes to the risk of extinction of Delta smelt, and its further spread—made potentially easier by removing fresh Sacramento River flows from the estuary by north Delta diversions to a tunnel project—could pose a public health threat because of its affinity for bioaccumulating selenium. A reasonable policy toward these nonnative overbite clams should be to contain it, keep its range as narrow as possible by applying fresh water to its range from the east and north. ***First do no more harm to the Delta Estuary***, should be the underlying premise of such a policy. That means keeping the Sacramento River flowing through its mainstem from I Street in Sacramento through to Chipps Island the way we now do. And mimicking the patterns (though not the historical volumes) of inflow from both the Sacramento and San Joaquin should also help contain spread of the overbite clam.

Testimony Restore the Delta supplied to the SWRCB during the change petition hearing on water rights of the California WaterFix project provided detailed compilation of scientific papers and summary analysis. **The DSC is not using best available science in reviewing and updating its ecosystem restoration policies.**

Water Code section 85302(c)(4) states that the Delta Plan shall include measures that promote (among other characteristics) reduced threats and stresses on the Delta ecosystem. We point out that this the construction of this passage is inclusive about all stressors. It does not distinguish between whether, for example, nonnative invasive species are new or existing. The Delta Reform Act (from which the above summarized section is obtained, and p. 2 of "Relevant Legislation") requires the Delta Plan to include measures to reduce the threats and stresses of nonnative invasive species whether they are new or not. In this respect Policy ER P5 is contrary to plain language in the Delta Reform Act that requires you to develop a policy for existing nonnative invasive species. This part of the DRA does not provide the DSC with a "where feasible" exemption for dealing with the overbite clam. **The DRA compels DSC to put establish and implement a policy for existing nonnative invasive species, including the overbite clam.**

Revised Chapter 4 Policies

- **ER P4**—This policy seeks to expand floodplains and riparian habitats in levee projects. We think this is a good policy since it seeks to create balance in the need to invest in Delta levees (since they are crucial to protecting ongoing public health and safety[5], agricultural productivity, and "through-Delta" conveyance whether a tunnel project is built or not) while creating space and opportunities for new habitat restoration.

- **ER P2**—This policy seeks to restore habitats at appropriate elevations. This strikes us as a good idea as well, and that it will function as a reasonable climate adaptation strategy. It reflects the DSC's change in Core Strategy 3 to safeguarding against land loss. No explanation is given for why the old Core Strategy 3 was deleted for "improving water quality to protect the ecosystem." While a climate adaptation strategy, it is likely not sufficient, since Delta habitat and ecosystem restoration projects are to address "process" restoration—that is, projects should create pathways by which water, sediment, nutrients, and other essential restoration components connect sources of these components with sites that need them. There is no associated policy that seeks to connect needed supplies of sediment to the Delta, even though the narrative earlier in Draft Chapter 4 acknowledges sediment issues. Sediment supply will be vital for establishing and buttressing ecosystem restoration projects from the ravages of sea level rise in the Delta. Sediments are accumulating behind upstream dams in the Delta's Central Valley watershed (part of the extended planning area). The DSC should address this issue squarely. It appears to represent another fatal flaw in the overall ecosystem restoration strategy of Draft Chapter 4.

- **ER P3**—This policy seeks to protect opportunities to restore habitat. As we see it, it applies logic of the California Environmental Quality act to opportunity restoration sites. This is a good idea. The revisions as proposed appear to clarify and simplify the language used to express the policy. Potential covered actions are to avoid or mitigate to a less than significant level the pre-emption or elimination of restoration opportunity sites, which the DSC identifies in Draft Chapter 4 at Figure 4-7 on page 4-48.

New Draft Chapter 4 Policies

There is only one new policy proposed for Draft Chapter 4.

- **ER Policy "A"**—This new policy appears to us to combine a habitat checklist with an implicit scoring system to force project designs to be mindful of all Delta Plan policies, and thereby improve the quality of project designs, it is hoped. We thing

[5] On this see Restore the Delta, *Climate Equity and Seismic Resilience in the San Francisco Bay-Delta Estuary*, 2019, pp. 41-42. Accessible at https://www.restorethedelta.org/climate-equity-and-seismic-resilience-for-the%E2%80%A8-san-francisco-bay-delta-estuary/.

this is a good policy. However, we note that the problem statement appearing just before New Policy A seem misaligned to us. On one hand, state agencies need “new funding sources” to implement large-scale restoration project and to “support multi-benefit projects that go above and beyond mitigation of impacts.” The same agencies, says the problem statement, “have limited ability to change [single-species conservation and recovery projects] due to permitting requirements and restrictions on the amount and use of public funds.” These two statements reflect a lack of clarity, we think, on the DSC’s part. Is the problem a lack of new funding, or is it that the existing funding sources for restoration projects are considered by DSC to be hamstrung by problems it associates with policies in existing endangered species laws and regulations? And what does this problem, however much merit it may have, have to do with requiring restoration project covered actions to complete its checklists in Appendix 3A, Section 1?

To the extent that Restoring Ecosystem Function must also be elevation-conscious and therefore climate-adaptive, we suggest the DSC take a leadership role in publicizing the problem to educate the public about these two problems—funding and endangered species act policies. In the meantime, it strikes us that New Policy A does not address its problem statement at all.

We were glad to see that in Appendix 3A, Section 1, that the DSC incorporates sediment “delivery” as an important process for tidal wetland, nontidal wetland, willow thicket, willow riparian/shrub, and valley foothill riparian ecosystems in Table 1-1. We would expect that the degree to which proponents of covered actions include sediment delivery—while also noting the source—could be useful information to inform DSC policy making, perhaps for devising a new performance measure regarding sediment supply to the Delta for restoration purposes.

We also gladly note that the DSC has incorporated a number of environmental justice-friendly elements into Section 2 of Appendix 3A as concerns cultural, recreational, natural, and agricultural benefits of restoration-related covered actions. We recommend that the DSC work with Indigenous experts in “Tribal Ecological Knowledge” (TEK) with the Miwok, Ohlone, Yokut, and Nisenan and other interested tribal communities to identify botanical and faunal species as well as spiritual sites using land use and other mechanisms for increasing tribal members’ access to gathering and spiritual sites within restoration projects as part of implementing social benefits that project proponents could achieve.

We further recommend that as part of the Section 2 social benefits checklist that the DSC seek out opportunities with covered action proponents to create greater connections linking Delta ecosystem restoration projects with disadvantaged communities and environmental justice communities in the cities that ring and the legacy communities of the legal Delta, including recreational, cultural, and natural benefits. Such a strategy will invest in creating and expanding a future constituency for protecting the Delta. The DSC cannot do alone, that much is clear.

Comments on Draft Chapter 4 Narratives

Role of Indigenous Peoples in Delta Ecological History

We appreciate that the DSC has incorporated several new passages that describe the life ways and deep knowledge that Indigenous people have about the Delta region. We thank you that some of your narrative additions reflect contributions we submitted in our letter of January 21, 2020. We remain disappointed that you continue to present Figure 4-1, and that the caption for this map contains no acknowledgement of the geography of Indigenous villages in the Delta region, even after we supplied you in this above mentioned letter with two maps indicating where Indigenous villages were known based on ethnographic research. You have even cited to the very research we supplied to you for the narrative descriptions. It should also be employed to update the Figure and its caption. Otherwise the DSC is still contributing to the erasure of Indigenous peoples who did in fact live and actively manage Delta wetlands for their life ways and livelihoods. See Attachment 2 to this letter.

Other Passages

- **Basic Delta Reform Act Policies**—The DSC continues, we think errantly, to elevate the coequal goals in framing its mission at the expense of the state's clearly mandated policy that water users reduce their reliance on the Delta when determining California's future water needs. The point of reducing reliance on the Delta as a source of water is to free up flows into and through the Delta with less exportation occurring. In so doing, it also reduces reverse flows in Old and Middle River because export pumping there would be decreased. This in turn would increase hydrologic connection between the San Joaquin River and the rest of the central and western Delta. This policy, not the shifting of export diversions to the north Delta, does much to shift the general flows in the Delta from north-south to east-west, contrary to former California WaterFix orthodoxy. The reduced Delta reliance policy then is key to the types of process restoration concepts and actions Draft Chapter 4 seeks to implement. Its omission from the "Relevant Legislation" portion of the narrative should be rectified by including it.

- **"A Call for Action"**—This passage (pp. 4-19 to 4-22) states, "Within the restoration science community there is an emerging emphasis on the importance of implementing process-based restoration because such actions address the fundamental causes of degradation of the ecosystem, rather than the symptoms." (p. 4-21, top) Flow is a fundamental driver of ecosystem processes, since water flows transport nutrients, suspended contaminants, sediment, organisms of various kinds migrating downstream, and so on. Here we reiterate our view that the reduced Delta reliance policy be recognized as an ecosystem restoration-friendly policy and included in the "Relevant Legislation" portion of the narrative.

Performance Measure Comments

- **PM 4.6, Salmon Doubling Goal**—Water Rights Decision 1641 (D-1641) has been in effect for 20 years now, and during that 20 years, salmonid populations have generally continued to decline. We appreciate that the DSC wants to not only state as a goal but quantify as a performance measure the doubling of California's Central Valley salmonid populations. This is an important matter for California Indian tribes that revere salmonids in their culture and spiritual lives, and for the state's commercial fishing industry. We applaud the goal and the performance measure and wish you Godspeed in achieving it.

  We are doubtful you can achieve it, however, in the absence of clear flow objectives, water project operational changes, and ecosystem restoration actions that create a net increase in food resources for the fish. The DSC, as we pointed out regarding Policy ER P1, relies on the SWRCB's flow objectives which at present provide flows in the Sacramento and San Joaquin Rivers that have been insufficient to even maintain salmonid abundances in since the objectives took effect. There is little reason, given climate change, to believe that salmonids will benefit from status quo flow objectives, and so we feel that this Performance Measure 4.6 will document a record of failure, rather than of success. **If the DSC truly cares about doubling the populations of all salmon runs and Central Valley steelhead, its appointed members and executive director should be lobbying Governor Newsom to abandon the voluntary agreements—which are a delaying tactic, not a real, honest thing—and direct the SWRCB to complete its Sacramento River Basin Bay-Delta Plan flow objectives and environmental review process post haste.**

<u>*Comments on NOP CEQA Required Analysis:*</u>

Restore the Delta requests that the Draft EIR on Draft Chapter 4 Ecosystem Restoration Amendments address several matters:

- **Human Right to Water (AB 685)**—This law requires that all relevant state agencies must take account of the fundamental human right to water, and to do so when undertaking state planning efforts, such as this set of ecosystem restoration amendments to the Delta Plan. We think this required policy analysis should be undertaken in the water quality section if the Draft EIR. Within the framework of AB 685, the Draft EIR should examine effects of the ecosystem restoration amendments on:

  - Small community water systems throughout the Delta. By our count of data from DWR's recent report on small community water systems in California, we count at least such systems many of which provide domestic water to rural communities within and around the Delta. [6]

  - Municipal drinking water treatment plants and water quality as well as drinking water treatment costs that may be associated with implementation of ecosystem restoration amendment projects.

- We appreciate the separation and distinction—although we also find it somewhat confusing—between "Tribal Cultural Resources" and "Cultural and Paleontological Resources." "Cultural Resources" is nowhere defined in the NOP, nor is it defined in the glossary appearing after Appendix 4A in other NOP materials. On the face of it, one might think they should be combined. We don't recommend this. But we do suggest the DSC provide clear definitions of Tribal cultural resources and "cultural resources" in the Draft EIR. In fact, we recommend that the DSC change the "Cultural and Paleontological Resources" section of the Draft EIR to "Archaeological and Paleontological Resources" so that this section focuses archaeological assessment on Euro-American colonial-era resources (starting with mission influences, Spanish military expeditions, fur trappers, and early American period structures, cemeteries and other such sites.

- **Suggested Cumulative Impacts' Project List**

Delta Conveyance Project and SWP Contract Amendment	Various water projects contained in the Water Resilience Portfolio
Sites Reservoir	Shasta Lake expansion and Dam raise
San Joaquin Valley Water Blueprint projects	California Aqueduct repairs due to land subsidence from excessive groundwater pumping.
Del Puerto Reservoir	Permanent Water Contracts of Westlands Water District and other CVP contractors.
Long-term Operations of the CVP and SWP (not necessarily coordinated.	Eco-Restore Projects completed, under construction, and in planning stages.

- **Alternatives**

  We request that the DSC analyze an alternative in the Draft EIR that examines impacts of a "Reduced Delta Reliance Alternative" that reduces exports by 20 percent and examines the ecosystem, social, and water quality benefits of doing so.

[6] See "DWR Releases Drought Planning Report," for data on Delta small community water systems, accessible at https://water.ca.gov/News/Blog/2020/April/DWR-Releases-Drought-Planning-Report.

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21 January 2020

Susan Tatayon, Chair
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Subject: Preliminary public review draft of amendments to Chapter 4, Ecosystems, of Delta Plan

Dear Chair Tatayon:

Restore the Delta advocates for local Delta stakeholders to ensure that they have a direct impact on water management decisions affecting the water quality and well-being of their communities, and water sustainability policies for all Californians. We work through public education and outreach so that all Californians recognize the Sacramento-San Joaquin Delta as part of California's natural heritage, deserving of restoration. We fight for a Delta whose waters are fishable, swimmable, drinkable, and farmable, supporting the health of the San Francisco Bay-Delta Estuary, and the ocean beyond. Our coalition envisions the Sacramento-San Joaquin Delta as a place where a vibrant local economy, tourism, recreation, farming, wildlife, and fisheries thrive as a result of resident efforts to protect our waterway commons.

We appreciate the opportunity to comment on the amended preliminary public review draft of Chapter 4 of the Delta Plan. We also thank the Delta Stewardship Council's (DSC) for deciding to push back the comment deadline from January 6 to today. The extra two weeks to review documents and prepare comments we have appreciated, and hopefully will provide the DSC with better comments from the public as a result.

Restore the Delta recognizes that the Delta Stewardship Council (DSC), while a relatively small agency within the state of California, is charged with addressing the needs of a relatively complex region of the state, the Delta. Not only is the Delta conceptually complicated, the reality and implications of climate change mean that the Delta becomes something of a moving target for purposes of planning and regulation.

We recognize too that the DSC a year ago bravely declined to issue a certification of consistency for the California WaterFix dual-tunnels project because as a covered action it failed to comply with key features of the Delta Plan as it was then. This decision was a critical step in the eventual decision of the Newsom Administration to shelve California WaterFix in favor of other potential actions, and it has given the Delta community a badly needed opportunity to not only recover from the campaign against the project, but to formulate alternative futures for the Delta region in an era of climate change, economic uncertainty, and opportunities for youth to envision alternatives for the Delta's future.

The DSC has also articulated in its Delta Plan Five-Year Review a number of key planning topics and emerging issues in which the Delta Plan could serve as a policy and programmatic vehicle for improving conditions in and throughout the Delta. These include the DSC's recognition of environmental justice and disadvantaged communities, as well as the legacy Delta communities as key long-term stakeholders in the Delta's future; climate change, and coordination and participation with federal agencies, not just other state and local agencies.

It is in these diverse contexts that the DSC proposes changes to Chapter 4 of the Delta Plan, to protect, restore, and enhance the Delta ecosystem.

General Comments

- The preliminary public review draft of Chapter 4 retains important ecosystem protection, restoration, and enhancement policies from the previous version. However, the preliminary draft is clearly different from the previous chapter 4, with numerous changes to narrative and to policies and recommendations have been made. We request that the DSC staff prepare a summary of exactly what those changes are and where they are located when it comes before the Council for review.

- We appreciate that the DSC retains Policy ER P1, Delta Flow Objectives, without change. This is vital because Delta inflow is the driving mechanism for the health and sustainability of all other ecosystem elements in the Delta, including Delta water quality, and the unique character of Delta communities and cities.

- We appreciate also that the DSC proposes ER Policy A to extend environmental justice and other social issues and concerns to DSC evaluations of consistency certifications for covered actions. There are important things the DSC should do to ensure meaningful public outreach to these communities and applicant compliance (not just to the letter but to the spirit of the policy), we are grateful to see this proposed policy come into consideration. We look forward to working with DSC to implement ER Policy A.

- We sense from this preliminary draft of Chapter 4 that there is much uncertainty as to the rate at which sea level rise and other effects of climate change will challenge the efficacy and sustainability of ecosystem restoration projects that come before the DSC as covered actions. We have concerns about this too, many of which we stated in our 2019 report on *Climate Equity and Seismic Resilience in the San Francisco Bay-Delta Estuary*. We attach and incorporate by reference this report and refer the DSC to our concerns and findings about seismic risk and climate change contained especially in Chapters 2 and 3, and Appendix E to the report.

- In its Five-Year Delta Plan Review, the DSC states, "The Delta will experience climate change effects both from gradual changes and from extreme events that are likely to become more frequent." Preliminary Draft Chapter 4 appears to follow this line of thinking from the Five-Year Delta Plan Review. Extreme events and gradual change are not the only climate change realities we and the DSC face. More frequent extreme events (atmospheric rivers, droughts, wildfires) are distinct from "gradual climate change," but we also think these two manifestations of climate change are distinct from "abrupt climate change." These are instances where a climate-based tipping point is passed.[1] Abrupt climate changes may occur in the very near future, if it has not already commenced. Our attached report states some key reasons for it, including ice sheet melting and massive releases of carbon to the atmosphere from arctic permafrost regions. We urge the DSC and its Delta Science Program to acknowledge and incorporate abrupt climate change into planning efforts, including Chapter 4.

- To help increase the DSC's understanding and application of principles of climate justice in the reality of climate change, we also request that you add definitions for both "environmental justice communities" and "disadvantaged communities" to 23 CCR 5001 (Definitions, p. 4A-3 of Appendix 4A). Please be aware that environmental justice communities were originally defined in Presidential Executive Order 12898 as including communities of color, including non-white race and ethnic groups, as well as people who are impoverished, which can include persons from any race or ethnic group. This is the definition on which Restore the Delta relies for our understanding of communities facing disproportionate burdens from environmental hazards and injustices. It is also important to include in these suggested definitions reference to state and federal civil rights provisions in law that outlaw discrimination on a variety of grounds. Such policies of necessity govern within the scope of DSC's jurisdiction and deserve explicit recognition through regulatory definition.

- DSC should redouble its efforts to ensure that the historical role of Indigenous California communities in the Delta and in its broader watershed are accurately portrayed in scientific representations in Chapter 4 and elsewhere in the Delta Plan. In our specific comments in Attachment 1, we note an ongoing problem with Figure 4-1,

[1] Two examples of abrupt climate change include: first, massive releases of methane and carbon dioxide from the permafrost in the Arctic region that could rapidly and irreversibly increase greenhouse gas emissions and accelerate global temperature increases; and second, abrupt and accelerated melting of arctic sea ice, the Greenland ice sheet, and the West Antarctic and/or East Antarctic ice sheets melting and calving into the Southern Ocean.

where "early 1800s" Indigenous tribal communities are omitted from a comparison with "early 2000s" ecosystems and human communities.

- The existing nonnative invasive invertebrate species, *Potamocorbula amurensis*, is not merely one of many stressors. It threatens eventual toxic pollution of benthic food webs in the Estuary as well as the ongoing overconsumption of primary ecological production by phytoplankton that threatens starvation for other species reliant on primary production species. The DSC needs to assert policy guidance that addresses existing nonnative invasive that threaten to undermine future ecosystem and habitat restoration projects, as well as existing food webs.

- Accordingly, Restore the Delta-proposes the following policy, since flow is the master ecological variable in the Delta: "Covered actions involving flow and diversion alterations shall only be certified as consistent with the Delta Plan when they demonstrate that they will contribute to permanent reductions in existing populations and/or geographic ranges of nonnative invasive species and cyanobacteria, sufficient for (not just protection) but restoration and enhancement of Delta ecosystems."

We have more specific comments below in Attachment 1 to this letter that are intended to increase the scientific and evidentiary basis of the narrative sections supporting Chapter 4 policies. Strengthening and clarifying narrative findings is vital to the success of Chapter policies, since they are the legal and policy structures that support DSC consistency determinations for covered actions.

In sum, Restore the Delta remains concerned that the DSC continues to cherrypick, consciously or not, what it view as "best available science." Authentic science goes where the evidence leads. We do agree that DSC is charged with using best available science—and in the best sense of that phrase we think it means that the best and most current data, the most insightful concepts, and the most revealing methodologies contribute greatly to achieving the application of best available science to the policy problems the DSC faces.

Thank you again for the opportunity to comment. Please contact us via email below if you have questions for us.

Sincerely,

Barbara Barrigan-Parrilla
Executive Director
barbara@restorethedelta.org

Tim Stroshane
Policy Analyst
tim@restorethedelta.org

Attachments:

1. Specific comments by Restore the Delta
2. Restore the Delta, *Climate Equity and Seismic Resilience for the San Francisco Bay-Delta Estuary,* August 2019. Accessible at https://www.restorethedelta.org/wp-content/uploads/RTD_Climate_Equity_Report_2019_Final.pdf

cc: Randy Fiorini, Vice-Chair
Frank C. Damrell, Member
Mike Gatto, Member
Maria Mehranian, Member
Oscar Villegas, Member
Ken Weinberg, Member
Thomas H. Keeling, The Freeman Firm
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Osha Meserve, Soluri Meserve LLC
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Brandon Dawson, Sierra Club California
Adam Keats, Center for Food Safety
Doug Obegi, NRDC
Kate Poole, NRDC
Jon Rosenfield, San Francisco Baykeeper
Gary Bobker, The Bay Institute
Noah Oppenheim, PCFFA
John McManus, Golden State Salmon
Michelle Ghafar, Earthjustice
Nina Robertson, Earthjustice
Dillon Delvo, Little Manila Rising
Elaine Barut, Little Manila Rising
Jasmine Leek, Third City Coalition
Sammy Nunez, Fathers and Families San Joaquin

Irene Calimlim, Fathers and Families San Joaquin
Nathan Werth, Substratum Systems
Tama Brisbane, With Our Words
Nicholas Hatten, LGBT Social Justice Initiative

Attachment 1
Restore the Delta's Specific Comments on
Preliminary Draft Chapter 4 of the Delta Plan

NARRATIVE SECTION

- ***Climate Change:*** In addition to our comments about abrupt climate change in the cover letter, we note that the preliminary draft Chapter 4 fails to incorporate findings about climate change impacts to water supply and environmental quality from the Fourth California Climate Assessment (4CA). It is nowhere cited to in the references of the preliminary draft, nor are any supporting studies associated with 4CA employed and referred to that we could identify. We think this is a grave oversight, and strongly suggests that the preliminary draft Chapter 4 is not based on best available science. While not typically specifically focused on the Delta, the 4CA reports contain numerous analyses and supporting reports and special reports that DSC staff could have availed itself of, particularly as concerns sea level rise impacts in the Delta and indigenous tribal impacts of climate change that may impact ongoing indigenous tribal usage of the Delta. We respectfully suggest references we employed in our attached Restore the Delta report that would help fill these and other gaps between preliminary draft Chapter 4 and 4CA. If the Delta Science Program or Delta Independent Science Board has issues or concerns with the quality and scope of the 4CA, this should be addressed in preparation of the final draft of Chapter 4.

- ***Indigenous Tribal Presence and Use of Delta:*** We appreciated seeing reliance on research on pages 4-6 to 4-7. However, given that, as the DSC writes, "Research over the past several decades has revealed extensive indigenous knowledge of the use of burning to manage the Delta landscape," it would be entirely appropriate to elaborate on what their land management practices, especially as they may relate to management of channel margins, riparian corridors, upland ecosystems, and other prey species for which they managed. This is especially concerning since these are lands that will either be directly affected by sea level rise in the Delta, will provide adaptation space, or will become new areas of littoral or shoreline environments.

- ***Indigenous Tribal Presence in Delta Historical Ecology:*** Figure 4-1, p. 4-8, of preliminary draft Chapter 4, presents a mapped comparison of "early 1800s" versus "early 2000s" historical and modern Delta waterways. The early 1800s map indicates no Indigenous California tribal settlements, while several Delta cities are located on the early 2000s map. The comparison, unfortunately, is not of apples and apples, but of apples and oranges. While the maps do provide a comparison of water way dendritic flow and channel patterns, inclusion of cities in one and of no settlements in the other suggests inaccurately that there were no Indigenous tribal settlements or communities present in the early 1800s. In 1926 UC Berkeley archaeologist W. Egbert Schenk, published a literature search for potential archaeological sites in the Delta and northern San Joaquin Valley region identified within the Delta.[2] He studied sixteen historical journal accounts of Spanish military personnel and priests. From that information he developed an estimate of population for the area that ranged from 3,000 to 15,000 indigenous persons, which at that time would have greatly outnumbered European Americans in the region.[3]

1926] *Schenck: Aboriginal Groups of the California Delta Region* 133

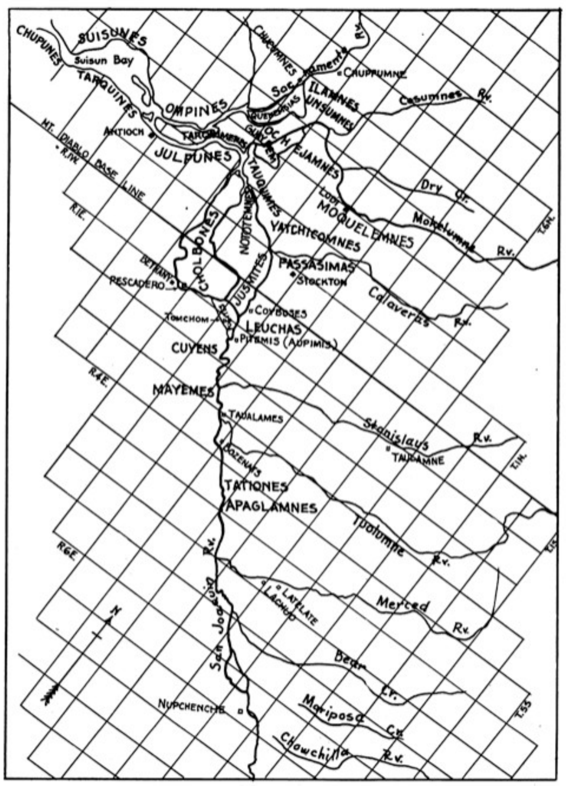

Fig. 1. Map showing location, according to streams, of groups mentioned in Spanish reports.

1926] *Schenck: Aboriginal Groups of the California Delta Region* 139

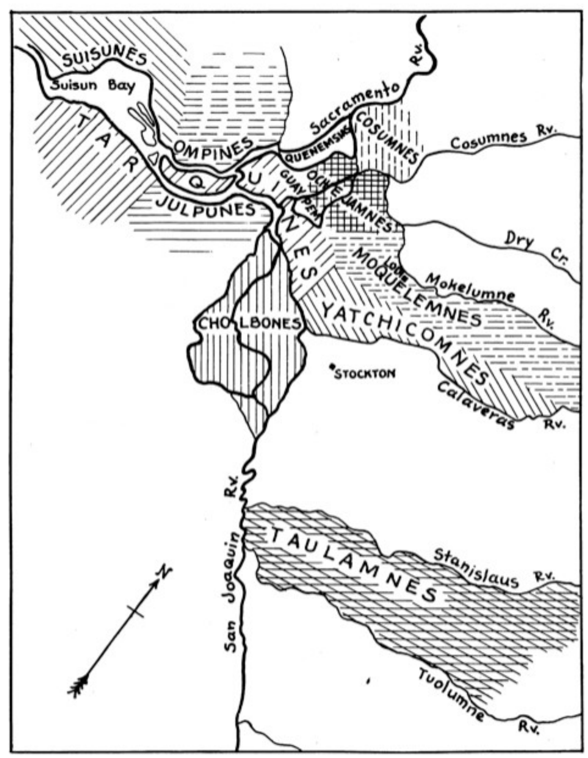

Fig. 2. Map showing probable areas occupied by the major groups of the aboriginal population in the Sacramento-San Joaquin delta region.

From Schenk 1926, see footnote 2 of this letter.

Schenk also included two maps that should be of interest to the DSC, reproduced below. These two maps indicate general territories where Indigenous communities laid

[2] W. Egbert Schenk. 1926. "Historical Aboriginal Groups of the California Delta Region." *University of California Publications in American Archaeology and Ethnology* 23(2): 123-146, issued November 13. Accessible at http://dpg.lib.berkeley.edu/webdb/anthpubs/search?all=&volume=23&journal=1&item=3.

[3] *Ibid.*, p. 132.

claim to resources and at least seasonal residences in the region. There may be more recent such research, including by Indigenous researchers, that we are unaware of. But we present this information to insist that a balanced comparison be provided in Figure 4-1, so that the DSC does not continue to perpetuate erasure of the record of Indigenous peoples' Delta residency at a time of more sinuous and tidal marsh-dominated habitat. Both maps need to convey the human-nature presence, and the comparison is how that human-nature presence has changed, not one of an imaginary pristine Delta 200 years ago to one that is now urbanized and channelized. Without changes to Figure 4-1, the DSC is not employing best available scientific methods in publishing such a comparison.

- ***Stressors and Nonnative Invasive Species:*** The DSC has omitted toxic contaminants from its treatment of stressors in preliminary draft Chapter 4**.** On p. 4-9, Chapter 4 states, "The current state of the Delta ecosystem has been severely affected by loss of natural communities, loss of land-water connections, and alteration of hydrology. These stressors have caused a loss of ecosystem function, imperiling many native species and decreasing their resilience to other stressors such as nonnative invasive species, predation, and climate change." This paragraph goes on to list "major causes of ecosystem decline" which will be discussed in this section of Chapter 4. We wish to remind the DSC that as part of its Delta Ecosystem Stressors synthesis report (dated April 5, 2018 the primary stressors of the Delta system (of which DSC lists eight) included "water quality impairment" which covered "fl ow alterations, and nutrient and contaminant inputs from agriculture and wastewater treatment facilities affect food web function, facilitate non-native aquatic plant growth, and create toxic conditions for native species." The Stressors synthesis also noted that "Aquatic species are directly impacted and water quality is implicated as a major driver of the Pelagic Organism Decline."[4] This omission from Chapter 4 truncates the significance of nonnative invasive invertebrate species, especially *Potamocorbula amurensis*, the overbite claim. In our comments on the Stressors synthesis to DSC on April 23, 2018, we suggested that the DSC rely upon the conceptual models available to the public by the California Department of Fish and Wildlife (the "DRERIP models").[5] While employing DFW's Delta Conservation Framework and Ecosystem Restoration Program Conservation Strategy for the Delta, DSC has ignored use and certainly reference to any of DFW's conceptual models, which represent a scientific community consensus on the conceptual and causal mechanisms and factored associated with Delta ecosystems and their biophysical and biochemical interrelationships. **By ignoring application and acknowledgement of these models, DSC is failing to base its Chapter 4 narrative and policies on best available science.**

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[4] Delta Stewardship Council. 2018. *Delta Ecosystem Stressors: A Synthesis*. Public Review Draft. April 5, p. 23, Table 2. Accessible at

[5] See pages 4-5 of our comment letter, footnote 2.

- ***The existing nonnative invasive invertebrate species, Potamocorbula amurensis, is not merely one of many Delta stressors.*** The preliminary draft Chapter 4 fails to foreground the seriousness of this bivalve's continuing occupation of the Bay-Delta Estuary. It threatens eventual toxic pollution of benthic food webs in the Estuary as well as the ongoing overconsumption of primary ecological production by phytoplankton that threatens starvation for other species reliant on primary production species. The DSC needs to assert policy guidance that addresses existing nonnative invasive that threaten to undermine future ecosystem and habitat restoration projects, as well as existing food webs. This policy guidance should encourage use of freshwater flows to better control this nonnative invasive bivalve and ensure that covered actions do not worsen existing nonnative invasive species presence and damage to Delta ecosystems. This is a fundamental part of protecting the Delta, before even restoration and enhancement can become meaningful outcomes. **To ignore this problem means that the DSC is not relying on best available science to protect, restore, and enhance Delta ecosystems.**

- ***Selenium and Potamocorbula amurensis, the nonnative invasive bivalve:*** Restore the Delta and the California Water Impact Network have prepared summary syntheses in testimony provided to the State Water Resources Control Board concerning interactions between selenium, a recognized toxic contaminant-stressor in the Delta, and *P. amurensis*.[6] The essential points are that selenium arrives in the Delta water from two directions—from the west where point sources are petroleum refineries, and from the southeast where nonpoint sources are irrigated selenium-containing lands of the western San Joaquin Valley. *P. amurensis* arrived about 1986 and has significantly colonized the benthic (bottom sediment) communities of Suisun Bay and the western Delta. Unfortunately, *P. amurensis* is a dramatic bio-accumulator of water-borne chemical species of selenium that become bioavailable in slow flows. *P. amurensis* prefers brackish to salty water, and the Delta's western waters often have that water quality profile. US Geological Survey studies indicate that this bivalve is dramatically reduced, if not eliminated during high, sustained fresh water flows. Unfortunately, the dominant water export regime in the Delta tends to sustain conditions that are more brackish. *P. amurensis* also is a voracious filter feeder in open waters, which has resulted in dramatic alteration of the phytoplankton foundation of the Delta's estuarine food webs. It is the combination of these three factors—export-oriented flow regimes in the Delta leaving the western Delta brackish, with *P. amurensis*'s proclivities toward selenium bioaccumulation and voracious filter feeding that have caused resident fish to become listed species and threaten ecosystem

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[6] Testimony of Tim Stroshane, policy analyst with Restore the Delta, Before California State Water Resources Control Board Hearing in the Matter of California Department of Water Resources and United States Bureau of Reclamation Request for a Change in Point of Diversion for California WaterFix, November 29, 2017, pages 13-25. Accessible at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/RestoretheDelta/part2/RTD_12.pdf; and California Water Impact Network, Recent Salinity and Selenium Science, prepared by Tim Stroshane, for Workshop 1, August 12, 2012. Accessible at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/cmnt081712/tim_stroshane.pdf

restoration projects that seek to promote tidal marsh food exports to open waters in the estuary. This latter problem comes about because such food supplies will largely be inhaled by *P. amurensis*, rather than the intended, desired species such projects seek to feed. A fourth factor in *P. amurensis'*s reign as a vexing nonnative invasive species is state and federal agencies' unwillingness to manage the system to eliminate this species from the Bay-Delta Estuary. That would take greater fresh water flow, the one thing that no regulator, fisheries agency, nor water agency has yet had the courage to act on. DSC leadership through a new policy and related recommendations addressing P. amurensis's threat to both existing food webs and future restoration efforts is badly needed. **Without addressing existing nonnative invasive species like *P. amurensis*, the DSC is not proceeding in the preliminary draft Chapter 4 on the basis of best available science.**

- **More analysis of harmful algal blooms is needed and policy attention directed to it by the DSC in preliminary draft Chapter 4**. Warmer water temperatures are expected to lead to more, and more frequent HAB occurrence under climate change. HABs threaten to undermine benefi ts of ecosystem restoration projects in the future, which as covered actions that are found consistent with the Delta Plan, the DSC must be concerned about. The implications of this threat to restoration works is glossed over in preliminary draft Chapter 4. Warmer water is not the only condition for HAB formation, for there must be absence of fl ow—lengthened residence time of water which often occurs during drought periods (intra-annual as well as inter-annual)—as well as abundant sunlight, ample nutrient concentrations, such as phosphates and ammonium. Unfortunately, a team of scientists (led by Dr. Peggy Lehman of the California Department of Water Resources) found that "once established" cyanobacteria that cause harmful algal blooms are "likely to be resistant to extreme wet conditions, as long as water temperature and other key water quality conditions are favorable."[7] This strongly suggests that the preliminary draft Chapter 4 of the Delta Plan should ensure that such ecological factors are given priority in covered actions certifiable as consistent with the Delta Plan going forward. Desirable levee and ecosystem restoration projects must include features and elements that counteract the conditions—either passively or actively—that contribute to HAB formation.

  Recently, we learned that DWR scientists gathered data on 2019 HABs in the Delta and found a total of eleven (11) different species of cyanobacteria that bloom, many of which have cyanotoxins. We understand some species of cyanotoxins can become airborne, meaning that HABs are not just toxic when ingested by humans or dogs, but may be inhaled by human beings next to or not far from water bodies where HABs are present. This raises a serious public health concern for Delta residents in warm seasons. Stockton environmental justice tracts near the Port of Stockton and South Stockton waterways were recently awarded AB617 status to foster improved air quality

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[7] P.W. Lehman, T. Kurobe, and S.J. Teh. 2020. Impact of extreme wet and dry years on the persistence of *Microcystis* harmful algal blooms in San Francisco Estuary. *Quaternary International*, accessible at https://doi.org/10.1016/j.quaint.2019.12.003. This article is designated open access.

conditions. The proliferation of airborne cyanobacteria could undercut other efforts to improve air quality for these impacted Delta environmental justice communities. Policies that support public and environmental health should be considered an element in the DSC's mandate for protecting the Delta as place. **In the absence of such a policy based on a fuller interpretation of HAB formation factors, the DSC is not proceeding in the preliminary draft Chapter 4 on the basis of best available science.**

- **Controlling and reducing HAB formation from now on should be an important policy goal in Chapter 4** not just because of benefi ts that can be expected for ecosystem and habitat restoration projects, but because they will also benefi t Delta legacy communities and Delta environmental justice and disadvantaged communities (about which the DSC wrote eloquently in its recent 5-year Delta Plan review). HABs are also a public health concern, and it goes to the heart of how communities can enjoy summer water-based recreation or subsistence fi shing when its waters may be polluted with unsightly and toxic HABs. Over time, a community's perception that its summertime water access is choked off because of such toxicity will languish into a disconnection of that community to its local water environment. This is an incalculable tragedy that for many in the Delta's environmental justice and disadvantaged communities has already occurred: young people feel disconnected from their neighboring sloughs and rivers, and to the environmental values that they might otherwise enjoy in the presence of healthy water bodies.

POLICY SECTION

- ***New ER Policy A:*** Section (a)1 is awkwardly worded, sprawling, and repetitive. May we suggest this friendly rewrite for section (a):
  (a) Certifications of consistency for covered actions described in Subsection (b) shall:
    1. Identify priority attributes for each covered action and disclose the action's contribution to restoration of a resilient, functioning Delta ecosystem using Appendix 3A (Section 1, including documentation required), and associated ecosystem restoration tier for the action based on its priority attributes.
    2. Identify and disclose the action's cultural, recreational, agriculture, and/or natural resource attributes anticipated from project implementation using Appendix 3A, Section 2.

- ***Revised ER P4:*** We respectfully suggest a clarification to state in section (a): *"Consistency certifications for levee projects must evaluate, and, where feasible, incorporate alternatives [or take advantage of all opportunities] to increase floodplain and riparian habitats."*

- ***New ER Recommendation A:*** There is a typographical error in Appendix 3A, Table 1.62.2, p. 3A-18. Field 1, we believe, should refer to Table 1.6.2, not 2.6.1?

- ***New ER Recommendation B:*** We respectfully suggest that this recommendation be revised to include application of the Good Neighbor Checklist not only to restoration projects but to levee projects as well. It could be rewritten to state: "*Project managers should use the Department of Water Resources' Good Neighbor Checklist when planning and designing restoration and levee projects, in order to demonstrate that their project avoids or reduces conflicts with existing uses.*"

- There is a typographical error in Policy ER P2 section (b), p. 4-63. "The certification of consistency for a covered action that takes place, in whole or in part, in the Intertidal Elevation Band and Sea Level Rise Accommodation Band shall ***be*** based on best available science."

- Restore the Delta-proposes the following policy, since flow is the master ecological variable in the Delta: "Covered actions involving flow and diversion alterations shall only be certified as consistent with the Delta Plan when they demonstrate that they will contribute to permanent reductions in existing populations and/or geographic ranges of nonnative invasive species and cyanobacteria, sufficient for (not just protection) but restoration and enhancement of Delta ecosystems."

From:	Steve Volker
To:	Delta Council Ecosystem Amendment
Cc:	"Alexis Krieg"
Subject:	Delta Plan Ecosystem Amendment NOP
Date:	Friday, July 10, 2020 3:51:18 PM
Attachments:	2020-07-10 Comments on Delta Plan NOP.pdf

Dear Assistant Planning Director Harriet Ross,

Attached please find our comments on the Delta Plan Ecosystem Amendment NOP.

Please include our comments in the public record.

Thank you for your attention.

Regards,

Stephan Volker
Attorney for Pacific Coast Federation of Fishermen's Associations, et al.

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July 10, 2020

VIA EMAIL
Harriet Ross, Assistant Planning Director
Delta Stewardship Council
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Sacramento, CA 95814
ecosystemamendment@deltacouncil.ca.gov

Re: Delta Plan Ecosystem Amendment NOP

Dear Ms. Ross:

On behalf of the Pacific Coast Federation of Fishermen's Associations, the Institute for Fisheries Resources, San Francisco Crab Boat Owners Association, and North Coast Rivers Alliance (collectively "Conservation Groups"), we submit the following comments in response to the Delta Stewardship Council's ("DSC's") Notice of Preparation of a Draft Program Environmental Impact Report ("PEIR") for the so-called Ecosystem Amendment to the Delta Plan. Please include this comment letter in the public record for this matter.

I. INTRODUCTION

Pacific Coast Federation of Fishermen's Associations ("PCFFA") is a nonprofit membership organization incorporated in 1976 with headquarters located in San Francisco, California. PCFFA comprises more than 14 separate commercial fishing and vessel owners' associations situated along the West Coast of the United States. By virtue of its combined membership of approximately 750 fishermen and women, PCFFA is the single largest commercial fishing advocacy organization on the West Coast. PCFFA represents the majority of California's organized commercial salmon fishermen and has been an active advocate for the protection of Pacific salmon and their spawning, rearing and migratory habitat for more than 30 years.

Institute for Fisheries Resources ("IFR") is a non-profit, tax-exempt organization that works to protect and restore salmon and other fish populations and the human economies that depend on them. IFR maintains its principal place of business in San Francisco, California. IFR both funds and manages many fish habitat protection programs and initiatives. In that capacity, IFR advocates for reforms to protect fish health and habitat throughout the West Coast of the United States and has successfully advocated for dam removals, improved pesticide controls, better forestry stream protection standards, reduced discharge of pollutants, and enhanced marine and watershed conservation regulations throughout the West Coast. IFR has worked tirelessly for years to restore and enhance the Delta and its beleaguered fish and wildlife.

San Francisco Crab Boat Owners Association, Inc. ("San Francisco Fishermen") is a century-old association of owners and operators of small, family-owned fishing boats that catch Dungeness crab, wild California King salmon, Pacific herring, and other species that live in and depend upon the cold waters of the Pacific Ocean, and San Francisco Bay-Delta and the Sacramento and San Joaquin Rivers and their tributaries. San Francisco Fishermen is also actively involved in community education and advocacy concerning fisheries resources legislation to ensure that the rich heritage of commercial fishing in the Bay Area will survive for future generations.

North Coast Rivers Alliance ("NCRA") is a non-profit unincorporated association with members throughout Northern California. NCRA was formed for the purpose of protecting California's rivers and their watersheds from the adverse effects of excessive water diversions, ill-planned urban development, harmful resource extraction, pollution, and other forms of environmental degradation. Its members use and enjoy California's rivers and their watersheds – including the Delta – for recreational, aesthetic, scientific study, and related non-consumptive uses.

Each of these groups is vitally interested in the DSC's Delta Plan Amendment process and all of them urge the DSC to learn from the State's past mistaken management of the Delta and to strengthen the Delta Plan to protect the fish and wildlife resources that depend on the Delta for survival. We expect the DSC to fully comply with the California Environmental Quality Act , Public Resources Code section 21000 et seq. ("CEQA"), the Sacramento-San Joaquin Delta Reform Act of 2009, Water Code section 85000 et seq. ("Delta Reform Act"), the Clean Water Act, 33 U.S.C. § 1251 et seq., and the Public Trust Doctrine.

II. THE PEIR MUST COMPLY WITH CEQA

A. THE PEIR MUST INCLUDE AN ADEQUATE DISCUSSION OF THE BASELINE CONDITIONS AND APPLICABLE PLANS AND REGULATIONS

1. Environmental Setting

The "EIR must include a description of the physical environmental conditions in the vicinity of the project . . . as they exist at the time the notice of preparation is published." 14 C.C.R. ("CEQA Guidelines") § 15125(a).

There can be no dispute that the Delta is in crisis. Water Code § 85001(a). Indeed, the Delta's imminent ecologic collapse is well-recognized, and has two principal causes. First, the

Central Valley Project ("CVP") and the State Water Project ("SWP") have significantly hampered fish survival, by damming and eliminating or reducing cold freshwater flows from tributary rivers and streams, destroying or rendering inaccessible miles of spawning and rearing habitat, removing natural protections from predators, entraining fish in diversion pumps, decreasing dissolved oxygen, and unsustainably diverting for consumptive use excessive quantities of the Delta's freshwater flows. And second, for too long, agricultural diverters have discharged contaminated runoff into the rivers and groundwater that are tributary to the Delta. These assaults, which have lead to diminished freshwater flows and increased temperature, salinity, herbicides, pesticides, sediment and heavy metals such as selenium, render the Delta ecosystem increasingly inhospitable to the now imperiled species that rely upon it for survival. The PEIR's discussion of the baseline environmental setting must fairly disclose the Delta's historically beneficent ecological conditions, the degradation of those conditions due to mismanagement of the Delta by the CVP, the SWP, and other contributing causes, and how these factors have caused the Delta's ecological collapse. Otherwise, we have no hope of reversing this tragic decline and restoring the Delta to its previous ecological health.

2. The PEIR Must Address the Delta Plan Amendment's Inconsistency with Applicable Plans

The PEIR must address the Delta Plan Amendment's inconsistency with applicable plans and policies. *E.g.* CEQA Guidelines § 15125(d). Applicable plans include "water quality control plans," and other regional and statewide environmental plans. *Id.*

a. The Delta Plan Amendment's Salmon-Doubling by 2065 Objective is Inconsistent with Applicable Plans and Water Quality Standards

The Delta Plan Amendment's proposal to defer achievement of the salmon-doubling standard for over 50 *more* years is, in a word, unconscionable. It grossly violates federal law. In 1992, Congress passed the Central Valley Project Improvement Act ("CVPIA"), which mandates that "natural production of anadromous fish in the Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991" by 2002 – *nearly 20 years ago.* CVPIA § 3406(b)(1).

Likewise, it violates state law. For a quarter of a century, the State Water Resources Control Board's ("SWRCB's") Water Quality Control Plan for the Bay-Delta ("1995 Bay-Delta Plan") has included a narrative (i.e., non-numerical) flow-related water quality standard mandating that "[w]ater quality conditions shall be maintained, together with other measures in the watershed, *sufficient to achieve a doubling of natural production of chinook salmon from the average production of 1967-1991*, consistent with the provisions of State and Federal Law." 1995 Bay-Delta Plan at 18, emphasis added. This narrative objective requiring the restoration of water quality sufficient to restore and protect salmon and related beneficial uses was replicated in the 2006 and 2018 Water Quality Control Plans for the Bay-Delta.[1] It is required by the Clean Water Act's anti-backsliding prohibition, 33 U.S.C. § 1342 (o), its implementing regulation, 40 C.F.R. § 131.12, and California's corresponding anti-degradation policy set forth in State Water Resources Control Board Resolution No. 68-16 (October 28, 1968). *Citizens for a Better Environment v. Union Oil Co. of California,* 83 F.3d 1111, 1120 (9th Cir. 1996) (Clean Water Act's anti-backsliding provision applies to state-issued discharge permits); *Asociacion de Gente Unida por el Agua v. Central Valley Regional Water Quality Control Board* (2012) 210 Cal.App.4th 1255, 1278-1286 (California's anti-degradation policy enforced against Central Valley Regional Board's deficient waste discharge order).

The State of California's half-century-long failure to protect the Delta is well documented, and tragic. Because the State had for decades failed to protect the Delta and its fish and wildlife from excessive diversions and pollution, and the federal Environmental Protection Agency ("EPA") had, in turn, neglected its statutory duty under 33 U.S.C. § 1313(b)-(d) to promulgate adequate Delta water quality standards to remedy the State's failure to do so, *more than 25 years ago* – in 1993 and 1994 – the United States District Court for the Eastern District of California, per the Honorable Lawrence Karlton, in response to litigation prosecuted by the Golden Gate Audubon Society and others (and over the objections of the State of California and a host of water diverters), ordered EPA to promulgate water quality standards for the Delta. On January 24, 1995, those standards became law, and were codified at 40 C.F.R. §131.37 (60 Fed.Reg 4664 et seq.). The State has never recognized, let alone enforced, these standards even though they were duly promulgated pursuant to federal court orders and the mandate set forth in section 303 of the Clean Water Act. Under the Supremacy Clause of the United States Constitution, and as recognized by Water Code section 13377, the Clean Water Act's more stringent water quality standards preempt California's less protective water quality standards. U.S. Constitution, Art. VI, cl. 2; 33 U.S.C. § 1313(b)-(d); Water Code § 13377. The EIR must disclose the fact that the Delta Plan Amendment is less protective of the Delta's water quality than the water quality standards set forth in 40 C.F.R. § 131.37, and therefore unlawful.

In 2001, the United States Department of the Interior adopted the Final Restoration Plan for the Anadromous Fish Restoration Program ("Final AFRP Restoration Plan").[2] This plan established objectives that were intended to meet the CVPIA's fish doubling goal, including (1)

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[1] *See* Table 3, p. 14 of the 2006 and 2018 Bay-Delta Plans, available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plans/2006wqcp/docs/2006_plan_final.pdf and https://www.waterboards.ca.gov/plans_policies/docs/2018wqcp.pdf.

[2] Available at: https://www.fws.gov/cno/fisheries/CAMP/Documents/Final_Restoration_Plan_for_the_AFRP.pdf

"improve habitat for all life stages of anadromous fish through provision of [suitable] flows . . . and improved physical habitat," (2) "improve survival rates by reducing or eliminating entrainment of juveniles at diversions," and (3) "improve the opportunity for adult fish to reach their spawning habitats in a timely fashion" among others. 2001 Final AFRP Restoration Plan, p. 4. In 2008, the implementing agencies for the AFRP Restoration Plan developed a revised plan of action to implement the fish-doubling goal, recognizing that the existing approach was not working. January 2016 Bureau of Reclamation Final Environmental Impact Statement for Coordinated Long-Term Operation of the Central Valley Project and State Water Project, p. 3-11.[3]

Despite these plans, standards, and goals, due to the State of California's and other agencies' continuing failure to recognize and enforce the Clean Water Act's requirements, instead of doubling, salmon and steelhead populations have continued to plummet. This regulatory failure is indisputable. For this reason, the National Marine Fisheries Service observed in its 2009 Final Biological Opinion for the Long-Term Operations of the Central Valley Project and State Water Project, that "it is far from clear that the agencies . . . have done what is possible and necessary to improve freshwater conditions to help these species weather environmental variability, halt their decline and begin rebuilding in a sustainable way." NMFS 2009 Biological Opinion, p. 155.[4] The Biological Opinion acknowledged that the Anadromous Fish Restoration Program "'effectively ignores the larger system problems that inhibit the natural production of anadromous fish" including dams that cut-off otherwise viable spawning and rearing habitat thus reducing capacity for spawning and rearing, unnatural flow regimes and diversions, levied and channeled river habitat, and degraded conditions for fish caused by exports, degraded water quality, entrainment, and predation. *Id.*, at pp. 155-156 (quoting from Cummins *et al.* Listen to the River: An Independent Review of the CVPIA Fisheries Program (prepared under contract with Circlepoint for the U.S. Bureau of Reclamation and the U.S. Fish and Wildlife Service (2008)).

The Clean Water Act, the CVPIA, and the narrative objective in the applicable water quality control plan all demand that conditions be "maintained, together with other measures in the watershed, sufficient to achieve doubling" of chinook salmon. While the water quality control plan does not provide a specific time schedule for doubling to be attained, the deadline set by the CVPIA – 2002 – has long passed.

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[3] Available at https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=23659

[4] Available at:
https://archive.fisheries.noaa.gov/wcr/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/nmfs_biological_and_conference_opinion_on_the_long-term_operations_of_the_cvp_and_swp.pdf

To address the undeniably perilous state of the Delta, the California Legislature enacted the Delta Reform Act, declaring that "[t]he Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and *existing Delta policies are not sustainable*." Water Code § 85001(a), emphasis added. The Legislature found that "'the Delta' . . . is a critically important natural resource for California and the nation. It serves Californians concurrently as both the hub of the California water system and the most valuable estuary and wetland ecosystem on the west coast of North and South America." Water Code § 85002. "Resolving the crisis requires *fundamental reorganization* of the state's management of Delta watershed resources." Water Code § 85001(a), emphasis added. The Delta Reform Act acknowledges the fish doubling goal of the CVPIA, and requires the DSC's Delta Plan to include measures that promote "[c]onditions conducive to meeting or exceeding the goals in existing species recovery plans and state and federal goals with respect to doubling salmon populations." Water Code § 85302(c)(5).

In response to the Delta Reform Act's mandate, the DSC's 2013 Delta Plan included a wholly inadequate performance measure for fish doubling: "Progress toward achieving the State and federal 'doubling goal' for wild Central Valley salmonids relative to 1995 levels. Trends will be derived from long-term salmonid monitoring surveys conducted by the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and others. (ER R2)." 2013 Delta Plan, p. 157. This performance measure was expanded in the DSC's 2018 Amendment, by adding a discussion of the rivers that would be evaluated for salmon doubling. 2018 Delta Plan, Appendix E, p. E-9. But, like the 2013 Delta Plan, this performance measure failed to set a deadline for attaining the fish doubling goal. *Id.*

The current draft Delta Plan Amendment, like those before it, fails to rectify this deficiency. It conflicts with the applicable water quality control plan, the water quality standards for the Delta promulgated by EPA, and the CVPIA. Contrary to governing law and irrefutable science that demand immediate action to save the Delta's fisheries from extirpation, the proposed Performance Measure 4.6: Doubling Goal for Central Valley Chinook Salmon Natural Production, sets the attainment deadline at 2065, more than *70 years* after the CVPIA established the fish- doubling standard., and more than *60 years* after the CVPIA's deadline for meeting that standard. By deferring compliance nearly one half *century* into the future, the Delta Plan Amendment would render the standard illusory. The DSC must address, confront and repudiate this shameful denial of existing law and science.

b. The PEIR Must Address the Delta Plan Amendment's Demonstrable Inconsistency with the DSC's Public Trust Obligations

The PEIR must address the Plan Amendment's demonstrable inconsistency with the DSC's obligation to protect the public trust resources under its jurisdiction. In adopting the Delta Reform Act, the Legislature made clear that the reasonable use and public trust doctrines "shall be the foundation of state water management policy and are particularly important and applicable to the Delta." Water Code § 85023.

In *United States v. State Water Resources Control Board* (1986) 182 Cal.App.3d 82, the court noted that the Public Trust Doctrine mandates "that the state as trustee of the public trust retains supervisory control over the state's waters such that no party has a vested right to appropriate water in a manner harmful to the interests protected by the public trust." *Id.* at 149, citing *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 445. The court held that the Public Trust Doctrine necessarily requires agencies to "consider water quality for the protection of beneficial uses" when determining whether or not to approve a project. *Id.* at 150-151.

"Public trust easements are traditionally defined in terms of navigation, commerce and fisheries. They have been held to include the right to fish, hunt, bathe, swim, to use for boating and general recreation purposes the navigable waters of the state, and to use the bottom of the navigable waters for anchoring, standing, or other purposes." *Marks v. Whitney* (1971) 6 Cal.3d 251, 259. For nearly 50 years it has been settled law in California that public trust values also "encompass[] . . . the preservation of those lands in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life, and which favorably affect the scenery and climate of the area." *Id.* at 259-260.

The PEIR must incorporate and address these paramount principles of California's public trust, and water quality, law – and the demonstrable inconsistency of the proposed Plan Amendment with them – in its discussion of the existing regulatory setting.

B. THE PEIR MUST ADDRESS THE IMPACTS OF THE PROPOSED PLAN AMENDMENT

CEQA mandates that the PEIR adequately analyze a project's effects in order to foster informed decisionmaking and enable the public to understand those impacts. Pub.Res.Code § 21002.1; CEQA Guidelines §§ 15121, 15126, 15126.2. Where possible, the lead agency must employ feasible mitigation measures that could minimize the project's significant adverse impacts. Pub.Res.Code § 21002; CEQA Guidelines §§ 15121, 15126.4.

Among the impacts the EIR must address are the reasonably foreseeable cumulative effects of the expanded upstream Delta conveyance proposal that the Department of Water Resources ("DWR") is once again promoting. CEQA Guidelines § 15130(a). DWR's politically-driven determination to wring yet more water from a depleted Delta that is already vastly over-committed threatens to pound the final nail into the Delta's ecological coffin. DWR's proposed diversion of massive quantities of water away from the Sacramento River upstream of the Delta will only exacerbate the Delta's ongoing ecological collapse, and further harden the harmful practices of the past five decades by pushing upstream reservoir management and downstream project operations in exactly the wrong direction.

The impacts of the Plan Amendment's performance measures are likely to be cumulatively considerable. For example, the Plan Amendment proposes to add Performance Measure 4.15, which calls for "[r]estoring land-water connections to increase hydrologic connectivity and seasonal floodplain inundation." Draft Plan Amendment E-5. That seasonal inundation could, if done appropriately, help restore the Delta's natural ecological rhythms. But it would at the same time impact flow rates throughout the Delta, and thus have a cumulative effect on both upstream and downstream operations. CEQA requires analysis of these, and other, cumulative impacts. CEQA Guidelines § 15130(a); *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, 871; *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 953.

C. THE PEIR MUST ADDRESS ALTERNATIVES TO THE PROPOSED PLAN AMENDMENT

"An EIR's discussion of alternatives must contain analysis sufficient to allow informed decision making." *Laurel Heights Improvement Association v. Regents of University of California* ("*Laurel Heights*") (1988) 47 Cal.3d 376, 404. An alternative may "not be eliminated from consideration solely because it would impede to some extent the attainment of the project's objectives." *Habitat and Watershed Caretakers v. City of Santa Cruz* ("*HAWC*") (2013) 213 Cal.App.4th 1277, 1304; CEQA Guidelines § 15126.6(b). "The EIR is required to make an in-depth discussion of those alternatives identified as at least potentially feasible." *HAWC,* 213 Cal.App.4th at 1303 (emphasis and quotation omitted).

1. The DSC Must Consider an Alternative That Includes a More Aggressive Timeline for Attaining the Salmon Doubling Standard

In determining whether an alternative is feasible, the DSC must consider applicable "plans or regulatory limitations." CEQA Guidelines § 15126.6(f)(1). As discussed above, the Delta Plan Amendment's 2065 deadline for attaining salmon doubling is inconsistent with applicable plans and laws, including the CVPIA, the Clean Water Act, the Delta water quality standards adopted by EPA (40 C.F.R. § 131.37), the SWRCB's Bay-Delta Plan, and the purposes and text of the Delta Reform Act itself. The DSC must consider an alternative that requires immediate rather than endlessly deferred attainment of this essential goal.

2. The DSC Must Consider an Alternative That Includes Enforceable, Quantifiable, and Measurable Targets

The Legislature mandated the creation of a "*legally enforceable* Delta Plan" with *specific content.* Water Code §§ 85001, 85020-85021, 85302, 85308. It commanded that the Delta Plan "shall ... include quantified or otherwise measurable targets associated with achieving the objectives of the Delta Plan." Water Code § 85308(b). Chapter 4 of the Delta Plan "presents core strategies, policies, and recommendations for protecting, restoring, and enhancing the Delta ecosystem." Draft Plan Amendment 4-5. But the strategies, policies, and recommendations presented in the amendment fail to include quantified or otherwise measurable targets. Because the Legislature requires that targets be quantifiable, enforceable, and measurable, the PEIR should include an alternative that presents such targets.

The Delta Plan fails to provide measurable targets with respect to the objective of protecting, restoring, and enhancing the Delta ecosystem. "Target" is defined as an "objective or result toward which efforts are directed."[5] It further defines "objective" to mean "goal," which in turn means the "destination of a journey" or an "aim or desired result." *See id.* The common theme of these definitions is an *end point.* By requiring the Delta Plan to include "quantified or otherwise measurable targets," the Legislature thus commanded the DSC to create *quantitative goals* that could be measured, tracked, and someday *attained.* Water Code § 85308(b). The Delta Plan contains no such goals about the objective of protecting, restoring, and enhancing the Delta ecosystem.

The Draft Plan Amendment proposes to protect, restore, and enhance the ecosystem by (1) creating more natural functional flows, (2) restoring ecosystem function, (3) protecting land for restoration, (4) protecting native species, and (5) improving institutional coordination. But there are no quantified or otherwise measurable targets to achieve those objectives. Notably, the Draft Plan Amendment states that "[f]reshwater flows should be allocated and adaptively managed to more closely resemble the natural volume, timing, frequency, and duration to achieve the desired ecosystem functions." Draft Plan Amendment 4-68. But the plan fails to set any quantifiable, enforceable, or measurable targets to ensure that natural flows are restored. Rather, the plan calls for a "regular schedule of reviews of the Bay-Delta Plan to reflect changing conditions," yet it does not set any measurable goals for that review or a timeline for when those reviews should occur. Draft Plan Amendment 4-69.

The objective of restoring ecosystem function also lacks necessary measurable targets. The Draft Plan Amendment acknowledges that "[a]chieving the Delta Reform Act vision for the Delta ecosystem requires the reestablishment of tens of thousands of acres of functional, diverse, and interconnected habitat," and that existing approaches will not achieve that goal, but the policies implementing that objective are not quantifiable. For example, levee projects "must incorporate[] alternatives to increase floodplains and riparian habitats" where feasible, but no quantifiable, enforceable, or measurable targets are identified regarding how or when floodplains and riparian habitats will be increased. Draft Plan Amendment 4-70. The recommendation to increase public funding likewise lacks any enforceable targets, such as funding goals or timelines. Draft Plan Amendment 4-71.

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[5] http://www.oxforddictionaries.com/us/definition/american_english/target

The Draft Plan Amendment also fails to include any legally enforceable measures to restore Delta habitat. Water Code § 85302(c)(1)-(3), (e)(1), (e)(2), (e)(6). Policy ER P3 only states that adverse impacts to future opportunities to restore habitat "must be avoided or mitigated;" it does not require any restoration of habitat. Draft Plan Amendment 4-73. Because the Delta Plan contains no quantified or otherwise measurable targets for habitat or ecosystem restoration, it virtually ensures that destructive projects will be approved.

Rather than include the specific, enforceable policies required by the Delta Reform Act, the Draft Plan Amendment includes policies that do not actually require environmental restoration, and vague recommendations that make no pretense of being enforceable. Accordingly, the PEIR must include an alternative that identifies and requires measurable and enforceable policies to restore the Delta ecosystem.

II. THE DSC'S DELTA PLAN AMENDMENT MUST COMPLY WITH APPLICABLE LAW

A. THE DELTA REFORM ACT

The Delta Reform Act governs the form and content of the Delta Plan. Yet, the Plan Amendment, as proposed, fails to comply with the Delta Reform Act for at least two reasons.

First, as discussed above, the Delta Reform Act mandates a "legally enforceable Delta Plan" with specific content. §§ 85001, 85020-85021, 85302, 85308. It commands that the Delta Plan "shall ... include quantified or otherwise measurable targets associated with achieving the objectives of the Delta Plan." § 85308(b). For the reasons discussed above, the Proposed Delta Plan Amendment fails to satisfy this mandate. Accordingly, the DSC should revise and strengthen the Delta Plan to comply with the Delta Reform Act's enforcement mandates.

Second, the Delta Reform Act contemplates bold action to restore the Delta ecosystem. It mandates that the Delta Plan include measures to attain the subgoal and strategy of "[r]estor[ing] Delta flows and channels to support a healthy estuary and other ecosystems." Water Code § 85302. To that end, it requires the SWRCB to develop "new flow criteria for the Delta ecosystem necessary to protect public trust resources," informed by the recommendations of the Department of Fish and Wildlife, the United States Fish and Wildlife Service and the National Marine Fisheries Service. Water Code §§ 85084.5, 85086(c)(1). The Legislature mandated that the flow criteria process be "accelerated" to expedite "planning decisions that are required to achieve the objectives of the Delta Plan." Water Code § 85086(b). The SWRCB's flow criteria "shall be subject to modification over time based on a science-based adaptive management program that integrates scientific and monitoring results . . ." Water Code § 85086(c)(2). The Legislature contemplated that the Delta Plan would consider this flow criteria in developing and adopting the Delta Plan.

The SWRCB's 2010 Delta Flow Criteria Report established the minimum flows necessary to protect public trust resources. Yet neither the SWRCB nor the DSC has required compliance with the instream flow levels identified in that report. Instead, they have continued to prioritize the water demands of diverters. The DSC's Draft Plan Amendment ignores the Delta Flow Criteria Report mandated by the Delta Reform Act and relies entirely on the SWRCB's water quality control planning process for the purposes of the Delta Plan. *See* Recommendation ER R1. By relegating the 2010 Delta Flow Criteria Report to a symbolic exercise left to collect dust, the DSC fails to meet the Delta Reform Act's mandates.

B. THE PUBLIC TRUST DOCTRINE

As discussed above, Water Code section 85023 commands that "the longstanding constitutional principle of reasonable use and the public trust doctrine shall be the foundation of state water management policy and are particularly important and applicable to the Delta."

Compliance with CEQA does not excuse the DSC from performing its duties under the Public Trust Doctrine. Although satisfying its CEQA obligations "may assist an agency in complying with its duties under the public trust doctrine . . . . [,] CEQA review of a project does not necessarily or automatically satisfy the agency's affirmative duties to take the trust into account and protect public trust uses whenever feasible." *San Francisco Baykeeper Inc. v. State Lands Com.* ("*Baykeeper II*") (2018) 29 Cal.App.5th 562, 571. "[A] public trust use is not any use that may confer a public benefit, but rather a use that facilitates public access, public enjoyment, or public use of trust land." *Id.* at 570. Consequently, uses of public trust resources for commercial purposes that do not facilitate public enjoyment of the resource are not public trust uses protected public trust doctrine. *San Francisco Baykeeper, Inc. v. State Lands Com.* ("*Baykeeper I*") (2015) 242 Cal.App.4th 202, 235-238. In deciding whether an activity impermissibly harms the public trust resource, "the determinative fact is the impact of the activity on the public trust resource." *Environmental Law Foundation v. State Water Resources Control Board* (2018) 26 Cal.App.5th 844, 859.

The Public Trust Doctrine "imposes an obligation on the state trustee [here, the DSC] 'to protect the people's common heritage of streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases when the abandonment of that right is consistent with the purposes of the trust.'" *Baykeeper II*, 29 Cal.App.5th at 569; *Baykeeper I*, 242 Cal.App.4th at 234; *National Audubon*, 33 Cal.3d at 441. The Delta and its tributaries are public trust resources that must be protected. The Public Trust Doctrine "impose[s] an affirmative duty" on the DSC "to take the public trust into account" before authorizing the continued degradation of already imperiled waterways. *Baykeeper II*, 29 Cal.App.5th at 570-571. Although "the state trustee has broad discretion . . . to promote [one public trust use] over other legitimate trust uses," it does not have discretion to promote *non*-public trust uses such as consumptive extraction of water over "legitimate trust uses" such as fish and wildlife. *Id.* at 577.

Therefore, as the DSC considers the proposed Delta Plan Amendment it must, in compliance with Water Code section 85023, reject vague and unenforceable targets, and repudiate endlessly deferred deadlines, that allow continued destruction of public trust resources. Long overdue restoration of ecosystem health and thriving populations of fish and wildlife must not be sacrificed on the altar of unsustainable diversions of water for consumptive uses.

By irresponsibly and unlawfully deferring the already long-passed statutory deadline for attaining the salmon doubling standard, the Delta Plan Amendment hastens the extinction of California's historic salmon runs. A more stunning example of openly defying the Public Trust Doctrine can scarcely be imagined.

III. CONCLUSION

The DSC must act to protect, restore, and enhance the Delta ecosystem as well as provide a more reliable water supply for the State. Water Code § 85054. To that end, it must adopt a Delta Plan that provides quantified standards for protecting, restoring, and enhancing the Delta ecosystem. Unfortunately, the proposed amendments fail to rectify the Delta Plan's profound deficiencies. They fail to provide quantified standards to restore natural flows and reverse the environmental degradation caused by the CVP and SWP. And for these reasons, they fail to comply with the Public Trust Doctrine – the doctrine that animates the Delta Reform Act and serves as the "foundation of state water management policy." Water Code § 85023.

The Delta Reform Act, Clean Water Act, CEQA and the Public Trust Doctrine all require the DSC to consider feasible alternatives that accomplish the Delta Reform Act's co-equal goals, protect and restore the Delta's public trust resources, and avoid or reduce to insignificance the Delta Plan's potentially significant environmental impacts. The DSC's proposed plan amendments fail to meet these requirements. The DSC's PEIR must recognize and address the proposed plan amendments' deficiencies as identified above, and consider a reasonable range of alternatives that would remedy those deficiencies.

Respectfully submitted,

Stephan C. Volker
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Fishermen's Associations, the Institute for Fisheries
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Association, and North Coast Rivers Alliance

From:	Doug Brown
To:	Delta Council Ecosystem Amendment
Subject:	DSC Delta Plan Ecosystem Chapter NOP Comments
Date:	Monday, July 13, 2020 6:13:08 PM
Attachments:	image.png

Dear Ms. Ross:

The six public agencies that make up the Lower Sacramento River/Delta North Regional Flood Management Program (RFMP) appreciate the opportunity to present comments on the Notice of Preparation to prepare a Draft Program Environmental Impact Report (EIR) for the Proposed Delta Plan Ecosystem Amendment. The RFMP agencies include Solano County, Yolo County, the Sacramento Area Flood Control Agency, the West Sacramento Area Flood Control Agency, the Solano County Water Agency, and Reclamation District 2068. These six agencies came together in 2014 to work on implementing a collective vision of integrated flood, habitat and agriculture within the Yolo Bypass/Cache Slough Complex and the surrounding region.

The following are the RFMP agency comments on the NOP for your consideration:

Constrained List of Potential Activities. The NOP states on page 12 that "Projects or actions taken by other public agencies in response to the Proposed Ecosystem Amendment could include: changes in water flows; restoration of natural communities, including but not limited to wetland, upland, or riparian habitat; subsidence reversal activities; protection of native species and reduction of nonnative invasive species impacts; construction of new infrastructure and improvements to existing infrastructure, including screened diversions and improvements to fish passage, and modifications to improve hydrologic surface water connectivity and increase frequency of seasonal inundation." The NOP further states that "The PEIR will consider the environmental impacts of reasonably foreseeable projects that could be undertaken in compliance with the Proposed Ecosystem Amendment."

This list of potential activities is solely focused on ecosystem enhancement projects or infrastructure improvements that support ecosystem enhancement projects. This definition excludes a broad range of projects that are regularly needed to protect public safety and maintain the Delta's agricultural heritage including, but not limited to, drainage canal and levee repair projects, utility infrastructure upgrades, erosion repair projects, long-term flood system operations and maintenance, water supply/municipal water quality protections, installation and maintenance of agricultural water supply diversions, stormwater improvements, road and bridge repairs and replacements, and recreational improvements.

The EIR needs to consider how the ecosystem amendment will affect the ability to implement these needed infrastructure improvements within the Delta. If the ecosystem amendment adds additional regulatory burdens that reduce the ability to implement needed infrastructure improvements or restrict their implementation entirely, the environmental, public health and safety, and regional economic effects could be devastating.

The "example" projects evaluated in the EIR should represent the broader range of actions undertaken by public agencies in the study area to address critical public health and safety, transportation, water supply, utility services, and flood protection needs. By limiting the "example" projects to just those that would have ecosystem benefits, the EIR will be underestimating the potential adverse environmental impacts that could occur if the ecosystem amendment constrains the implementation of critical public infrastructure projects that by their nature do not include ecosystem components.

Covered Action Process Not Considered in Amendment. The criteria used to determine whether a project would be considered a Covered Action subject to the jurisdiction of the Delta Plan is broad and captures many non-ecosystem projects. These projects would be subject to the Covered Action process including the policies and regulations included in the ecosystem amendment. For example, a proposed marina and RV park in the Suisun Marsh has been required to submit consistency findings to the Delta Stewardship Council following the completion of the California Environmental Quality Act (CEQA) process and local project approvals. The Draft EIR needs to consider how non-ecosystem projects would be affected by the ecosystem amendment, whether these effects would result in significant environmental impacts, and develop separate policies to evaluate non-ecosystem projects in the Delta.

Loss of Agricultural Productivity. The viability of agricultural lands within the Delta, which contribute directly to preserving the Delta as a Place, is increasingly uncertain with the continued conversion of agricultural land to habitat. This conversion creates land that no longer produces income that can be assessed for levee maintenance or for applicable water agency fees. Without this revenue source, levees that protect viable agricultural lands and communities cannot be maintained or repaired and without levees, the farm economy and the communities that are supported by agricultural productivity cannot function and new habitat areas cannot be protected. We strongly encourage the Delta Stewardship Council to consider a broad agricultural mitigation approach that fully offsets the loss of agricultural productivity anticipated with habitat restoration projects supported by the ecosystem amendment. This mitigation should include habitat restoration proponents providing direct investments to enhance agricultural productivity as well as addressing the loss of revenue dedicated to flood system operation and maintenance. Developing such an approach would provide the basis for addressing agricultural productivity impacts programmatically in a way that would facilitate implementation of the cumulative habitat restoration projects being planned in the region.

Impacts on Water Rights Holders. Based on the assumption that the ecosystem amendment will encourage ecosystem projects, the Draft EIR should evaluate how the introduction of new listed species and/or the increase in the presence of listed species in the region could affect the ability of water rights holders to withdraw the water necessary to meet existing municipal drinking water beneficial uses, manage wetlands, and ensure continued agricultural water diversions and operations consistent with historic practices. The Draft EIR should address what assurances can be put into place to ensure that existing water rights holders are not harmed by ecosystem projects implemented in response to the ecosystem amendment.

Impacts of Intertidal Land Conversion. The ecosystem chapter of the Delta Plan was originally focused on implementing the habitat element of the Bay Delta Conservation Plan (BDCP). BDCP is no longer a "project", but the document still encourages habitat corridors along what are project levees and tens of thousands of acres of land in the intertidal zone. There may be opportunities to increase habitat along the corridors, but levee setbacks and significant habitat establishment would likely not be consistent with the responsibilities of the local maintaining agencies, the state, and the U.S. Army Corps of Engineers who manage these lands. In addition, much of the intertidal area is located in the Cache Slough Complex, and north and east Delta. These areas are currently protected by levees. In order to access these areas, levees would need to be removed and deeper water areas would necessarily be created in the effort to develop intertidal habitat. Mandating the expansion of floodplains as part of levee projects can cause hydraulic effects to neighboring levees and system-wide operational effects. Further, the removal of levees would have a devastating impact on agriculture and the economy of local communities. For example, the upper portion of Hastings Island is at intertidal elevations but to convert this land to intertidal habitat, over 4,000 acres of the island would need to be flooded. The Draft EIR needs to describe the landscape-scale impacts on the flood system, water supply infrastructure and agricultural resources within the Delta that would occur if the "example" projects are implemented and the objectives of the ecosystem amendment are achieved.

Cumulative Impacts. The Delta is the focus area for multiple ecosystem restoration initiatives. The Draft EIR needs to evaluate the cumulative effects these habitat restoration initiatives can have when combined with the ecosystem amendment on the operation and maintenance of existing agricultural and municipal water diversions, particularly in the Lower Yolo Bypass/Cache Slough Complex such as the North Bay Aqueduct, due to the increased attraction and presence of listed species and the potential for increased exposure to water intakes that could lead to new restrictions on beneficial water supply uses and the degradation of municipal water quality. In addition, storm water drainage within this watershed may be adversely affected and subject to increased regulation. Finally, the land use conversion and associated changes in vegetative cover often associated with habitat improvement projects should be cumulatively evaluated against the conveyance requirements of the flood system to either improve system performance or demonstrate no effect. The Draft EIR should evaluate these cumulative impacts in the appropriate sections of the document.

Continued Engagement with RFMP Agencies. We appreciate this opportunity to provide input on the content of the Draft EIR and would appreciate the opportunity to continue to remain engaged in the CEQA process as the Delta Stewardship Council prepares the Draft EIR. Our combined agencies provide a wealth of knowledge regarding Delta land uses and the issues of concern for our constituents who live and work in the Delta. While we understand the critical need to improve ecosystem function within the Delta, we believe this goal can be achieved with solutions that do not undermine the Delta's invaluable existing environmental and agricultural resources. We are available and willing to continue to engage with Delta Stewardship Council staff and the EIR consultant team during preparation of the Draft EIR and look forward to opportunities to do so.

Submitted on behalf of the six RFMP agencies.

Sincerely,

Doug Brown

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