Appendix A
The Delta Stewardship Council's Role Regarding Conveyance

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Appendix A
The Delta Stewardship Council's Role Regarding Conveyance

The Sacramento-San Joaquin Delta Reform Act of 2009 (Delta Reform Act or Act) potentially gives the Delta Stewardship Council (Council) three distinct but connected roles relating to conveyance: contingent authority to approve proposed conveyance improvements, authority to generally recommend conveyance options in the Delta Plan, and authority to provide comments to other agencies during the Bay Delta Conservation Plan (BDCP) process.[1]

Regulatory Authority over Conveyance

As a practical matter, the Council would have occasion to decide in the first instance what conveyance improvements are permissible only if (a) an agency proposes a conveyance improvement prior to the incorporation of the BDCP into the Delta Plan, (b) the proposed conveyance improvement is a "covered action" under Water Code section 85057.5, and (c) the proposed conveyance improvement, as a covered action, is appealed to the Council as not being consistent with the Delta Plan. For reasons explained below, it is unlikely that an agency will propose a conveyance improvement prior to the completion of (or the failure of) the BDCP process. Accordingly, it would be wasteful now to include in the Delta Plan regulatory policies prescribing/limiting conveyance. If events in subsequent years reveal that the BDCP will not be successful in a timely fashion, the Council will consider then whether to amend the Delta Plan to prescribe conveyance.

The Delta Reform Act mandates that the Council's Delta Plan "promote options" for improving conveyance and storage to meet the coequal goals (Water Code section 85303). Thus, the Council has the authority to dictate in the Delta Plan conveyance improvements it views as meeting the coequal goals. In addition, proposed conveyance improvements that are "covered actions"[2] under the Act must be consistent with the Delta Plan,[3] and the Council determines (upon appeal) consistency.[4] Through specifying conveyance improvements in the Delta Plan (should the Council do so), the consistency

[1] This is an attempt to summarize the Council's relationship with the BDCP and conveyance for the purpose of clarity. However, it does not purport to summarize the Council's complete authority in this regard. The Council retains all authority provided to it under the Delta Reform Act.

[2] Proposed conveyance improvements would almost certainly be a covered action: Such a project would (1) be a California Environmental Quality Act project; (2) occur at least in part within the Sacramento-San Joaquin Delta; (3) be carried out, approved, or funded by a public agency; (4) be covered by one or more provisions of the Delta Plan; and (5) have a significant impact on the coequal goals (Water Code section 85057.5).

[3] An agency proposing a conveyance covered action would have to certify that the project is consistent with the Delta Plan (Water Code section 85225).

[4] The Council would review this consistency determination if and when it was appealed to the Council (Water Code section 85225.10; Council's Appeals Procedures).

requirement, and the Council's appellate role over consistency determinations, the Council has the authority to regulate conveyance improvements.

This is best viewed as *contingent* regulatory authority. The Council may never get to exercise it. Most relevant and as a practical matter, occasion to exercise that authority is contingent in the near term on the BDCP.

Conveyance options are currently being studied *in detail* by the agencies and interested parties preparing the BDCP. A public draft of the BDCP Environmental Impact Statement/Environmental Impact Report is planned for release by the end of 2013. Upon successful completion of the BDCP process, and if the BDCP meets certain requirements explained in Water Code section 85320(e), the BDCP becomes part of the Delta Plan.[5] Subsequently, if another government agency (California Department of Water Resources, most likely) proposes to implement the new conveyance project that is selected by BDCP as the preferred conveyance option and that project qualifies as a "covered action" (it would qualify, most likely), the project would be consistent with the Delta Plan regardless of whether the Delta Plan had previously endorsed a different conveyance option. Accordingly, the Council's regulatory authority over conveyance is contingent upon conveyance being proposed prior to the BDCP's incorporation into the Delta Plan.

It is highly unlikely that a conveyance proposal will come before the Council prior to BDCP completion, or at least the anticipated deadline for BDCP completion. The Council considers it highly unlikely that an agency will propose a new conveyance facility while the BDCP is under way. Accordingly, the Council does not expect to review a conveyance improvement consistency determination separate from the BDCP unless the BDCP process fails.

For this reason, the Delta Plan does not include any regulatory policies regarding conveyance. In addition, the BDCP has been under way since 2006; and in the last 5 years, the involved agencies and interested parties have invested significant time, resources, and expertise in that process. The lead agencies of the BDCP will also be conducting extensive environmental analysis of the various conveyance alternatives they consider. The Council has determined that the best option at this point is to encourage the lead agencies of the BDCP to complete their work in short order. It would be a wasteful and duplicative exercise for the Council *now* to include a regulatory policy regarding conveyance. Doing so would require the same extensive policy, scientific, and environmental analysis the BDCP is already doing.

However, should the BDCP process not be completed by January 1, 2016, the Council intends to revisit the issue of conveyance to determine how to facilitate improved conveyance facilities without the BDCP. If the Council then decides to amend the Delta Plan to include regulatory policies regarding conveyance, the Council would do so only after extensive analysis of the conveyance options and associated detailed environmental review.

Authority to Recommend Options

Implicit in the Council's regulatory authority relating to conveyance (that the Delta Plan shall promote options for improving conveyance) (Water Code section 85304) is its authority to recommend to other agencies conveyance options it views as meeting the coequal goals. This authority can be exercised through making Recommendations about conveyance in the Delta Plan.

The Act, therefore, gives the Council the authority to opine generally about improving conveyance as it may relate to the rest of the Delta Plan and the coequal goals. Accordingly, the Council has authority to recommend to BDCP preferred conveyance options that the BDCP should evaluate. Nevertheless, for the same reasons the Delta Plan at this time does not include any regulatory policies regarding conveyance,

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[5] The California Department of Fish and Wildlife's decision that the BDCP meets the requirements for incorporation into the Delta Plan may be appealed to the Council under Water Code section 85320(e).

the Delta Plan likewise does not include any Recommendations (i.e.¸ opinion preferences) regarding conveyance. At this time, the agencies pursuing BDCP are best positioned to develop possible options, evaluate them, and decide on the best one.

Authority to Provide Comment during the BDCP Process

The Delta Reform Act provides the Council with a consultative and responsible agency role in the BDCP process (Water Code section 85320(c)). Thus, the Council may, separate from the Delta Plan, provide comment and guidance to lead agencies regarding BDCP, including the conveyance options those agencies consider, study, and ultimately choose.

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Appendix B
Regulatory Language and Appendices Submitted to Office of Administrative Law, August 2013

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Final Regulation Text

CALIFORNIA CODE OF REGULATIONS
TITLE 23. WATERS.
DIVISION 6. DELTA STEWARDSHIP COUNCIL.
CHAPTER 2. CONSISTENCY WITH REGULATORY POLICIES CONTAINED IN THE DELTA PLAN.

Note: All text is new.

Article 1. Definitions.

Section 5001. Definitions.

As used in this division, the terms listed below shall have the meanings noted:

(a) "Adaptive management" means a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvement in management planning and implementation of a project to achieve specified objectives.

(b) "Agricultural water management plan" means a plan prepared, adopted, and updated by an agricultural water supplier pursuant to the Agricultural Water Management Planning Act, Water Code section 10800 et seq.

(c) "Agricultural water supplier" under the Water Code refers to both agricultural retail water suppliers and agricultural wholesale water suppliers, but not the California Department of Water Resources or the United States Bureau of Reclamation, and includes both of the following:

(1) A water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water; and

(2) A water supplier or contractor for water, regardless of the basis of the water right, that distributes or sells water for ultimate resale to customers.

(d) "Base Flood" means the flood that has a 1-percent probability of being equaled or exceeded in any given year (also referred to as the 100-year flood).

(e) "Base Flood Elevation" (BFE) means the water surface elevation associated with the base flood.

(f) "Best available science" means the best scientific information and data for informing management and policy decisions. Best available science shall be consistent with the guidelines and criteria found in Appendix 1A.

(g) "Central Valley Flood Protection Board" or "Board" means the Central Valley Flood Protection Board (formerly The Reclamation Board) of the Resources Agency of the State of California as provided in Water Code section 8521.

(h) "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. In addition, "achievement" for the purpose of determining whether a plan, program, or project meets the definition of a "covered action" under section 5001(j) is further defined as follows:

(1) "Achieving the coequal goal of providing a more reliable water supply for California" means all of the following:

(A) Better matching the state's demands for reasonable and beneficial uses of water to the available water supply. This will be done by promoting, improving, investing in, and implementing projects and programs that improve the resiliency of the state's water systems, increase water efficiency and conservation, increase water recycling and use of advanced water technologies, improve groundwater management, expand storage, and improve Delta conveyance and operations. The evaluation of progress toward improving reliability will take into account the inherent variability in water demands and supplies across California;

(B) Regions that use water from the Delta watershed will reduce their reliance on this water for reasonable and beneficial uses, and improve regional self-reliance, consistent with existing water rights and the State's area-of-origin statutes and Reasonable Use and Public Trust Doctrines. This will be done by improving, investing in, and implementing local and regional projects and programs that increase water conservation and efficiency, increase water recycling and use of advanced water technologies, expand storage, improve groundwater management, and enhance regional coordination of local and regional water supply development efforts; and

(C) Water exported from the Delta will more closely match water supplies available to be exported, based on water year type and consistent with the coequal goal of protecting, restoring, and enhancing the Delta ecosystem. This will be done by improving conveyance in the Delta and expanding groundwater and surface storage both north and south of the Delta to optimize diversions in wet years when more water is available and conflicts with the ecosystem are less likely, and limit diversions in dry years when conflicts with the ecosystem are more likely. Delta water that is stored in wet years will be available for water users during dry years, when the limited amount of available water must remain in the Delta, making water deliveries more predictable and reliable. In addition, these improvements will decrease the vulnerability of Delta water supplies to disruption by natural disasters, such as, earthquakes, floods, and levee failures.

(2) "Achieving the coequal goal of protecting, restoring, and enhancing the Delta ecosystem" means successfully establishing a resilient, functioning estuary and surrounding terrestrial landscape capable of supporting viable populations of native resident and migratory species with diverse and biologically appropriate habitats, functional corridors, and ecosystem processes.

(3) "Achieving the coequal goals in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place" means accepting that change, including change associated with achieving the coequal goals, will not cease, but that the fundamental characteristics and values that contribute to the Delta's special qualities and that distinguish it from other places can be preserved and enhanced while accommodating these changes. In this regard, the following are core strategies for protecting and enhancing the unique values that distinguish the Delta and make it a special region:

(A) Designate the Delta as a special place worthy of national and state attention;
(B) Plan to protect the Delta's lands and communities;
(C) Maintain Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life;
(D) Encourage recreation and tourism that allow visitors to enjoy and appreciate the Delta and that contribute to its economy;

(E) Sustain a vital Delta economy that includes a mix of agriculture, tourism, recreation, related industries and business, and vital components of state and regional infrastructure; and
(F) Reduce flood and other risks to people, property, and other interests in the Delta.

(i) "Commercial recreational visitor-serving uses" means a land use designation that describes visitor-serving uses, accommodations, restaurants, and shops, that respect the rural character and natural environmental setting. These uses also include campgrounds and commercial recreational facilities.

(j)(1) "Covered action" means a plan, program, or project that meets all of the following criteria (which are collectively referred to as covered action screening criteria):

(A) Is a "project," as defined pursuant to section 21065 of the Public Resources Code;

(B) Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;

(C) Will be carried out, approved, or funded by the State or a local public agency;

(D) Will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and State interests in the Delta; and

(E) Is covered by one or more provisions of the Delta Plan, which for these purposes, means one or more of the regulatory policies contained in Article 3.

(2) "Covered action" does not include any plan, program, or project that is exempted pursuant to Water Code section 85057.5(b).

(3) A State or local public agency that proposes to carry out, approve, or fund a plan, program, or project that may be subject to this Chapter must determine whether that proposed plan, program, or project is a covered action. That determination, which is subject to judicial review, must be reasonable, made in good faith, and consistent with the Delta Reform Act and this Chapter.

(4) Nothing in the application of the definition of a "covered action" shall be interpreted to authorize the abrogation of any vested right whether created by statute or by common law.

(k) "Delta" means the Sacramento-San Joaquin Delta as defined in section 12220 of the Water Code and the Suisun Marsh, as defined in section 29101 of the Public Resources Code.

(l) "Delta Plan" means the comprehensive, long-term management plan for the Delta to further the achievement of the coequal goals, as adopted by the Delta Stewardship Council in accordance with the Sacramento-San Joaquin Delta Reform Act of 2009.

(m) "Designated Floodway" means those floodways, as defined in California Code of Regulations, Title 23, section 4 (i), under the jurisdiction of the Central Valley Flood Protection Board.

(n) "Encroachment" means any obstruction or physical intrusion by construction of works or devices, planting or removal of vegetation, or by any means for any purpose, into or otherwise affecting a floodway or floodplain.

(o) "Enhancement" or "enhancing," for purposes of section 5001(h)(2), means improving existing desirable habitat and natural processes. Enhancement may include, by way of example, flooding the Yolo Bypass more often to support native species or to expand or better connect existing habitat areas. Enhancement includes many fish and wildlife management practices, such as managing wetlands for waterfowl production or shorebird habitat, installing fish screens to reduce entrainment of fish at water diversions, or removing barriers that block migration of fish to upstream spawning habitats.

(p) "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

(q) "Floodplain" means any land area susceptible to being inundated by flood waters from any source.

(r) "Floodplain values and functions" has the same meaning as set forth in 33 Code of Federal Regulations section 320.4(l)(1).

(s) "Floodproofing" means any combination of structural and nonstructural additions, changes, or adjustments appropriate for residential structures, which reduce or eliminate risk of flood damage to real estate, improved real property, or structures with their contents.

(t) "Floodway" means the portion of the floodplain that is effective in carrying flow (that is, the channel of a river or other watercourse and the adjacent land areas that convey flood waters).

(u) "Government-sponsored flood control program to reduce risks to people, property, and State interests in the Delta" means any State or federal strategy, project, approval, funding, or other effort that is intended to reduce the likelihood and/or consequences of flooding of real property and/or improvements, including risks to people, property, and State interests in the Delta, that is carried out pursuant to applicable law, including, but not limited to the following:

(1) State Water Resources Law of 1945, Water Code section 12570 et seq.;

(2) Sacramento-San Joaquin River Flood Control Projects (Flood Control Act of 1941, P.L. 77-228);

(3) Local Plans of Flood Protection prepared pursuant to the Local Flood Protection Planning Act (Water Code section 8200 et seq.), that are consistent with the Central Valley Flood Protection Plan pursuant to Water Code section 9612;

(4) Central Valley Flood Protection Plan (Water Code section 9600 et seq.);

(5) Subventions Program, Special Projects Program (Water Code section 12300 et seq.);

(6) Way Bill 1973-Subventions Program, Special Projects Program (Water Code section 12980 et seq.);

(7) Central Valley Flood Protection Board Authority (California Code of Regulations, Title 23, Division 1); and

(8) National Flood Insurance Program (National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., P.L. 90-448).

(v) "Nonnative invasive species," for purposes of section 5009, means 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.

(w) "Nonproject levee" means a local levee owned or maintained by a local agency or private owner that is not a project facility under the State Water Resources Law of 1945, Chapter 1 (commencing with Water Code section 12570) and Chapter 2 (commencing with section 12639 of Part 6 of the Water Code).

(x) "Project levee" means a federal flood control levee that is a project facility under the State Water Resources Law of 1945, Chapter 1 (commencing with Water Code section 12570) and Chapter 2 (commencing with section 12639 of Part 6 of the Water Code).

(y) "Proposed action" means a plan, program, or project that meets the covered action screening criteria listed in section 5001(j)(1)(A) through (D). Proposed action is also a "covered action," and therefore subject to compliance with the regulatory policies contained in Articles 2 and 3—if the proposed action meets the covered action screening criterion listed in section 5001(j)(1)(E).

(z) "Protection" or "protecting," for purposes of section 5001(h)(2), means preventing harm to the ecosystem, which could include preventing the conversion of existing habitat, the degradation of water quality, irretrievable conversion of lands suitable for restoration, or the spread of invasive nonnative species.

(aa) "Regulated stream" means those streams identified in Table 8.1 of California Code of Regulations, Title 23, section 112, under the jurisdiction of the Board.

(bb) "Restoration" or "restoring," for purposes of section 5001(h)(2), has the same meaning as in Water Code section 85066. Restoration actions may include restoring interconnected habitats within the Delta and its watershed, restoring more natural Delta flows, or improving ecosystem water quality.

(cc) "Setback levee" means a new levee constructed behind an existing levee which allows for removal of a portion of the existing levee and creation of additional floodplain connected to the stream. In the Delta, a "setback levee" may not necessarily result in removal of the existing levee.

(dd) "Significant impact" for the purpose of determining whether a project meets the definition of a "covered action" under section 5001(j)(1)(D) means a substantial positive or negative impact on the achievement of one or both of the coequal goals or the implementation of a government-sponsored flood control program to reduce risks to people, property, and State interests in the Delta, that is directly or indirectly caused by a project on its own or when the project's incremental effect is considered together with the impacts of other closely related past, present, or reasonably foreseeable future projects. The following categories of projects will not have a significant impact for this purpose:

(1) "Ministerial" projects exempted from CEQA, pursuant to Public Resources Code section 21080(b)(1);

(2) "Emergency" projects exempted from CEQA, pursuant to Public Resources Code section 21080(b)(2) through (4);

(3) Temporary water transfers of up to one year in duration. This provision shall remain in effect only through December 31, 2016, and as of January 1, 2017, is repealed, unless the Council acts to extend the provision prior to that date. The Council contemplates that any extension would be based upon the California Department of Water Resources' and the State Water Resources Control Board's participation with stakeholders to identify and recommend measures to reduce procedural and

administrative impediments to water transfers and protect water rights and environmental resources by December 31, 2016. These recommendations should include measures to address potential issues with recurring transfers of up to 1 year in duration and improved public notification for proposed water transfers.;

(4) Other projects exempted from CEQA, unless there are unusual circumstances indicating a reasonable possibility that the project will have a significant impact under Water Code section 85057.5(a)(4), as further defined by this section. Examples of unusual circumstances could arise in connection with, among other things:

(A) Local government general plan amendments for the purpose of achieving consistency with the Delta Protection Commission's Land Use and Resource Management Plan; and

(B) Small-scale habitat restoration projects, as referred to in CEQA Guidelines, section 15333 of Title 14 of the California Code of Regulations, proposed in important restoration areas, but which are inconsistent with the Delta Plan's policy related to appropriate habitat restoration for a given land elevation (section 5006 of this Chapter).

(ee) "Urban area" means a developed area in which there are 10,000 residents or more.

(ff) "Urbanizing area" means a developed area or an area outside of a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years.

(gg) "Urban water management plan" means a plan prepared, adopted, and updated by an urban water supplier pursuant to the Urban Water Management Planning Act, Water Code section 10610 et seq.

(hh) "Urban water supplier" refers to both "urban retail water suppliers" and "urban wholesale water suppliers":

(1) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(2) "Urban wholesale water supplier" means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of potable water annually at wholesale for municipal purposes.

(ii) "Water supplier" refers to both "urban water suppliers" and "agricultural water suppliers," but for purposes of section 5003, does not include agricultural water suppliers during the time that they may be exempted by section 10853 of the Water Code from the requirements of Parts 2.55 and 2.8 of Division 6 of the Water Code.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85057.5, 85059, 85058, 85066, 85020, 85054, 85052, 85302(g), 85308, 85300, 10608.12, and 10853, Water Code.

Article 2. Certifications of Consistency

Section 5002. Detailed Findings to Establish Consistency with the Delta Plan.

(a) This policy specifies what must be addressed in a certification of consistency filed by a State or local public agency with regard to a covered action. This policy only applies after a "proposed action" has been determined by a State or local public agency to be a covered action because it is covered by one or more of the regulatory policies contained in Article 3. Inconsistency with this policy may be the basis for an appeal.

(b) Certifications of consistency must include detailed findings that address each of the following requirements:

(1) Covered actions, in order to be consistent with the Delta Plan, must be consistent with this regulatory policy and with each of the regulatory policies contained in Article 3 implicated by the covered action. The Delta Stewardship Council acknowledges that in some cases, based upon the nature of the covered action, full consistency with all relevant regulatory policies may not be feasible. In those cases, the agency that files the certification of consistency may nevertheless determine that the covered action is consistent with the Delta Plan because, on whole, that action is consistent with the coequal goals. That determination must include a clear identification of areas where consistency with relevant regulatory policies is not feasible, an explanation of the reasons why it is not feasible, and an explanation of how the covered action nevertheless, on whole, is consistent with the coequal goals. That determination is subject to review by the Delta Stewardship Council on appeal;

(2) Covered actions not exempt from CEQA must include applicable feasible mitigation measures identified in the Delta Plan's Program Environmental Impact Report (unless the measure(s) are within the exclusive jurisdiction of an agency other than the agency that files the certification of consistency), or substitute mitigation measures that the agency that files the certification of consistency finds are equally or more effective;

(3) As relevant to the purpose and nature of the project, all covered actions must document use of best available science;

(4) Ecosystem restoration and water management covered actions must include adequate provisions, appropriate to the scope of the covered action, to assure continued implementation of adaptive management. This requirement shall be satisfied through both of the following:

(A) An adaptive management plan that describes the approach to be taken consistent with the adaptive management framework in Appendix 1B; and

(B) Documentation of access to adequate resources and delineated authority by the entity responsible for the implementation of the proposed adaptive management process.

(c) A conservation measure proposed to be implemented pursuant to a natural community conservation plan or a habitat conservation plan that was:

(1) Developed by a local government in the Delta; and

(2) Approved and permitted by the California Department of Fish and Wildlife prior to May 16, 2013

is deemed to be consistent with sections 5005 through 5009 of this Chapter if the certification of consistency filed with regard to the conservation measure includes a statement confirming the nature of the conservation measure from the California Department of Fish and Wildlife.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85225, 85225.10, 85020, 85054, 85302(g), and 85308, Water Code.

Article 3. Consistency with the Regulatory Policies Contained in the Delta Plan.

Section 5003. Reduce Reliance on the Delta through Improved Regional Water Self-Reliance.

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);

(2) That failure has significantly caused the need for the export, transfer, or use; and

(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

(b)For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action to export water from, transfer water through, or use water in the Delta, but does not cover any such action unless one or more water suppliers would receive water as a result of the proposed action.

(c)(1) Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

(2) Programs and projects that reduce reliance could include, but are not limited to, improvements in water use efficiency, water recycling, stormwater capture and use, advanced water technologies, conjunctive use projects, local and regional water supply and storage projects, and improved regional coordination of local and regional water supply efforts.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 10608, 10610.2, 10610.4, 10801, 10802, 85001(c), 85004(b), 85020(a), 85020(d), 85020(h), 85021, 85022(d)(1), 85022(d)(5), 85023, 85054, 85300, 85302(d), 85303, and 85304, Water Code.

Section 5004. Transparency in Water Contracting.

(a) The contracting process for water from the State Water Project and/or the Central Valley Project must be done in a publicly transparent manner consistent with applicable policies of the California Department of Water Resources and the Bureau of Reclamation referenced below.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers the following:

(1) With regard to water from the State Water Project, a proposed action to enter into or amend a water supply or water transfer contract subject to California Department of Water Resources Guidelines 03-09 and/or 03-10 (each dated July 3, 2003), which are attached as Appendix 2A; and

(2) With regard to water from the Central Valley Project, a proposed action to enter into or amend a water supply or water transfer contract subject to section 226 of P.L. 97-293, as amended or section 3405(a)(2)(B) of the Central Valley Project Improvement Act, Title XXXIV of Public Law 102-575, as amended, which are attached as Appendix 2B, and Rules and Regulations promulgated by the Secretary of the Interior to implement these laws.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85021, 85300, and 85302, Water Code.

Section 5005. Delta Flow Objectives.

(a) The State Water Resources Control Board's Bay Delta Water Quality Control Plan flow objectives shall be used to determine consistency with the Delta Plan. If and when the flow objectives are revised by the State Water Resources Control Board, the revised flow objectives shall be used to determine consistency with the Delta Plan.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, the policy set forth in subsection (a) covers a proposed action that could significantly affect flow in the Delta.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85054, 85086, 85087, 85300, and 85302, Water Code.

Section 5006. Restore Habitats at Appropriate Elevations.

(a) Habitat restoration must be carried out consistent with Appendix 3, which is Section II of the Draft Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions (California Department of Fish and Wildlife 2011). The elevation map attached as Appendix 4 should be used as a guide for determining appropriate habitat restoration actions based on an area's elevation. If a proposed habitat restoration action is not consistent with Appendix 4, the proposal shall provide rationale for the deviation based on best available science.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that includes habitat restoration.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300, and 85302, Water Code.

Section 5007. Protect Opportunities to Restore Habitat.

(a) Within the priority habitat restoration areas depicted in Appendix 5, significant adverse impacts to the opportunity to restore habitat as described in section 5006, must be avoided or mitigated.

(b) Impacts referenced in subsection (a) will be deemed to be avoided or mitigated if the project is designed and implemented so that it will not preclude or otherwise interfere with the ability to restore habitat as described in section 5006.

(c) Impacts referenced in subsection (a) shall be mitigated to a point where the impacts have no significant effect on the opportunity to restore habitat as described in section 5006. Mitigation shall be determined, in consultation with the California Department of Fish and Wildlife, considering the size of the area impacted by the covered action and the type and value of habitat that could be restored on that area, taking into account existing and proposed restoration plans, landscape attributes, the elevation map shown in Appendix 4, and other relevant information about habitat restoration opportunities of the area.

(d) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions in the priority habitat restoration areas depicted in Appendix 5. It does not cover proposed actions outside those areas.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300, 85302, and 85305, Water Code.

Section 5008. Expand Floodplains and Riparian Habitats in Levee Projects.

(a) Levee projects must evaluate and where feasible incorporate alternatives, including the use of setback levees, to increase floodplains and riparian habitats. Evaluation of setback levees in the Delta shall be required only in the following areas (shown in Appendix 8): (1) The Sacramento River between Freeport and Walnut Grove, the San Joaquin River from the Delta boundary to Mossdale, Paradise Cut, Steamboat Slough, Sutter Slough; and the North and South Forks of the Mokelumne River, and (2) Urban levee improvement projects in the cities of West Sacramento and Sacramento.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action to construct new levees or substantially rehabilitate or reconstruct existing levees.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300, 85302, and 85305, Water Code.

Section 5009. Avoid Introductions of and Habitat Improvements for Invasive Nonnative Species.

(a) The potential for new introductions of or improved habitat conditions for nonnative invasive species, striped bass, or bass must be fully considered and avoided or mitigated in a way that appropriately protects the ecosystem.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that has the reasonable probability of introducing or improving habitat conditions for nonnative invasive species.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85054, 85300, and 85302, Water Code.

Section 5010. Locate New Urban Development Wisely.

(a) New residential, commercial, and industrial development must be limited to the following areas, as shown in Appendix 6 and Appendix 7:

(1) Areas that city or county general plans, as of May 16, 2013, designate for residential, commercial, and industrial development in cities or their spheres of influence;

(2) Areas within Contra Costa County's 2006 voter-approved urban limit line, except no new residential, commercial, and industrial development may occur on Bethel Island unless it is consistent with the Contra Costa County general plan effective as of May 16, 2013;

(3) Areas within the Mountain House General Plan Community Boundary in San Joaquin County; or

(4) The unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde, and Walnut Grove.

(b) Notwithstanding subsection (a), new residential, commercial, and industrial development is permitted outside the areas described in subsection (a) if it is consistent with the land uses designated in county general plans as of May 16, 2013, and is otherwise consistent with this Chapter.

(c) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions that involve new residential, commercial, and industrial development that is not located within the areas described in subsection (a). In addition, this policy covers any such action on Bethel Island that is inconsistent with the Contra Costa County general plan effective as of May 16, 2013. This policy does not cover commercial recreational visitor-serving uses or facilities for processing of local crops or that provide essential services to local farms, which are otherwise consistent with this Chapter.

(d) This policy is not intended in any way to alter the concurrent authority of the Delta Protection Commission to separately regulate development in the Delta's Primary Zone.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85300, 85302, and 85305, Water Code.

Section 5011. Respect Local Land Use When Siting Water or Flood Facilities or Restoring Habitats.

(a) Water management facilities, ecosystem restoration, and flood management infrastructure must be sited to avoid or reduce conflicts with existing uses or those uses described or depicted in city and county general plans for their jurisdictions or spheres of influence when feasible, considering comments from local agencies and the Delta Protection Commission. Plans for ecosystem restoration must consider sites on existing public lands, when feasible and consistent with a project's purpose, before privately owned sites are purchased. Measures to mitigate conflicts with adjacent uses may include, but are not limited to, buffers to prevent adverse effects on adjacent farmland.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions that involve the siting of water management facilities, ecosystem restoration, and flood management infrastructure.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300, and 85305, Water Code.

Section 5012. Prioritization of State Investments in Delta Levees and Risk Reduction.

(a) Prior to the completion and adoption of the updated priorities developed pursuant to Water Code section 85306, the interim priorities listed below shall, where applicable and to the extent permitted by law, guide discretionary State investments in Delta flood risk management. Key priorities for interim funding include emergency preparedness, response, and recovery as described in paragraph (1), as well as Delta levees funding as described in paragraph (2).

(1) Delta Emergency Preparedness, Response, and Recovery: Develop and implement appropriate emergency preparedness, response, and recovery strategies, including those developed by the Delta Multi-Hazard Task Force pursuant to Water Code section 12994.5.

(2) Delta Levees Funding: The priorities shown in the following table are meant to guide budget and funding allocation strategies for levee improvements. The goals for funding priorities are all important, and it is expected that, over time, the California Department of Water Resources must balance achievement of those goals. Except on islands planned for ecosystem restoration, improvement of nonproject Delta levees to the Hazard Mitigation Plan (HMP) standard may be funded without justification of the benefits. Improvements to a standard above HMP, such as that set by the U.S. Army Corps of Engineers under Public Law 84-99, may be funded as befits the benefits to be provided, consistent with the California Department of Water Resources' current practices and any future adopted investment strategy.

Priorities for State Investment in Delta Integrated Flood Management

Categories of Benefit Analysis

Goals	Localized Flood Protection	Levee Network	Ecosystem Conservation
1	Protect existing urban and adjacent urbanizing areas by providing 200-year flood protection.	Protect water quality and water supply conveyance in the Delta, especially levees that protect freshwater aqueducts and the primary channels that carry fresh water through the Delta.	Protect existing and provide for a net increase in channel-margin habitat.
2	Protect small communities and critical infrastructure of statewide importance (located outside of urban areas).	Protect flood water conveyance in and through the Delta to a level consistent with the State Plan of Flood Control for project levees.	Protect existing and provide for net enhancement of floodplain habitat.
3	Protect agriculture and local working landscapes.	Protect cultural, historic, aesthetic, and recreational resources (Delta as Place).	Protect existing and provide for net enhancement of wetlands.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that involves discretionary State investments in Delta flood risk management, including levee operations, maintenance, and improvements. Nothing in this policy establishes or otherwise changes existing levee standards.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85305, and 85306, Water Code.

Section 5013. Require Flood Protection for Residential Development in Rural Areas.

(a) New residential development of five or more parcels shall be protected through floodproofing to a level 12 inches above the 100-year base flood elevation, plus sufficient additional elevation to protect against a 55-inch rise in sea level at the Golden Gate, unless the development is located within:

(1) Areas that city or county general plans, as of May 16, 2013, designate for development in cities or their spheres of influence;

(2) Areas within Contra Costa County's 2006 voter-approved urban limit line, except Bethel Island;

(3) Areas within the Mountain House General Plan Community Boundary in San Joaquin County; or

(4) The unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde, and Walnut Grove, as shown in Appendix 7.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that involves new residential development of five or more parcels that is not located within the areas described in subsection (a).

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85305, and 85306, Water Code.

Section 5014. Protect Floodways.

(a) No encroachment shall be allowed or constructed in a floodway, unless it can be demonstrated by appropriate analysis that the encroachment will not unduly impede the free flow of water in the floodway or jeopardize public safety.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that would encroach in a floodway that is not either a designated floodway or regulated stream.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85302, and 85305, Water Code.

Section 5015. Floodplain Protection.

(a) No encroachment shall be allowed or constructed in any of the following floodplains unless it can be demonstrated by appropriate analysis that the encroachment will not have a significant adverse impact on floodplain values and functions:

(1) The Yolo Bypass within the Delta;

(2) The Cosumnes River-Mokelumne River Confluence, as defined by the North Delta Flood Control and Ecosystem Restoration Project (McCormack-Williamson), or as modified in the future by the California Department of Water Resources or the U.S. Army Corps of Engineers (California Department of Water Resources 2010); and

(3) The Lower San Joaquin River Floodplain Bypass area, located on the Lower San Joaquin River upstream of Stockton immediately southwest of Paradise Cut on lands both upstream and downstream of the Interstate 5 crossing. This area is described in the Lower San Joaquin River Floodplain Bypass Proposal, submitted to the California Department of Water Resources by the partnership of the South Delta Water Agency, the River Islands Development Company, Reclamation District 2062, San Joaquin Resource Conservation District, American Rivers, the American Lands Conservancy, and the Natural Resources Defense Council, March 2011. This area may be modified in the future through the completion of this project.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that would encroach in any of the floodplain areas described in subsection (a).

(c) This policy is not intended to exempt any activities in any of the areas described in subsection (a) from applicable regulations and requirements of the Central Valley Flood Protection Board.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85302, and 85305, Water Code.

Article 4. General Provisions.

Section 5016. Miscellaneous Provisions.

(a) The provisions in this Chapter are not intended and shall not be construed as authorizing the Delta Stewardship Council or any entity to exercise its power in a manner that will take or damage private property for public use without the payment of just compensation.

(b) The provisions in this Chapter are not intended to affect the rights of any owner of property under the Constitutions of the State of California or the United States.

(c) The provisions in this Chapter shall not increase the State's flood liability.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85032(j) and 85057.5(d), Water Code.

Appendix 1A
Best Available Science

Note: All content of this appendix is newly adopted.

Best Available Science

The Delta Reform Act requires the Council to make use of the best available science in implementing the Delta Plan. Best available science is specific to the decision being made and the time frame available for making that decision. Best available science is developed and presented in a transparent manner consistent with the scientific process (Sullivan et al. 2006), including clear statements of assumptions, the use of conceptual models, description of methods used, and presentation of summary conclusions. Sources of data used are cited and analytical tools used in analyses and syntheses are identified. Best available science changes over time, and decisions may need to be revisited as new scientific information becomes available. Ultimately, best available science requires scientists to use the best information and data to assist management and policy decisions. The processes and information used should be clearly documented and effectively communicated to foster improved understanding and decision making.

Steps for Achieving the Best Science

Science consistent with the scientific process includes the following elements:

- Well-stated objectives
- A clear conceptual or mathematical model
- A good experimental design with standardized methods for data collection
- Statistical rigor and sound logic for analysis and interpretation
- Clear documentation of methods, results, and conclusions

The best science is understandable; it clearly outlines assumptions and limitations. The best science is also reputable; it has undergone peer review conducted by active experts in the applicable field(s) of study. Scientific peer review addresses the validity of the methods used, the adequacy of the methods and study design in addressing study objectives, the adequacy of the interpretation of results, whether the conclusions are supported by the results, and whether the findings advance scientific knowledge (Sullivan et al. 2006).

There are several sources of scientific information and tradeoffs associated with each (Sullivan et al. 2006, Ryder et al. 2010). The primary sources of scientific information, in a generalized ranking of most to least scientific credibility for informing management decisions, include the following:

- Independently peer-reviewed publications including scientific journal publications and books (most desirable)
- Other scientific reports and publications
- Science expert opinion
- Traditional knowledge

Each of these sources of scientific information may be the best available at a given time and contain varying levels of understanding and uncertainty. These limitations should be clearly documented when scientific information is used as the basis for decisions.

Guidelines and Criteria

There have been several efforts to develop criteria for defining and assessing best available science. In 2004, the National Research Council Committee on Defining the Best Scientific Information Available for Fisheries Management prepared a report (National Research Council Report) that concluded guidelines and criteria must be defined in order to apply best available science in natural resource management (National Research Council 2004). Major findings and recommendations included establishing procedural and implementation guidelines to govern the production and use of scientific information. The guidelines were based on six broad criteria: relevance, inclusiveness, objectivity, transparency and openness, timeliness, and peer review.

Best available science for proposed covered actions and for use in the Delta Plan should be consistent with the guidelines and criteria in Table 1A-1. These criteria were adapted from criteria developed by the National Research Council. Proponents of covered actions should document their scientific rationale for applying the criteria in Table 1A-1 (i.e., the format used in a scientific grant proposal).

Table 1A-1
Criteria for Best Available Science

Criteria	Description
Relevance	Scientific information used should be germane to the Delta ecosystem and/or biological and physical components (and/or process) affected by the proposed decisions. Analogous information from a different region but applicable to the Delta ecosystem and/or biological and physical components may be the most relevant when Delta-specific scientific information is nonexistent or insufficient. The quality and relevance of the data and information used shall be clearly addressed.
Inclusiveness	Scientific information used shall incorporate a thorough review of relevant information and analyses across relevant disciplines. Many analysis tools are available to the scientific community (e.g., search engines and citation indices).[a]
Objectivity	Data collection and analyses considered shall meet the standards of the scientific method and be void of nonscientific influences and considerations.
Transparency and openness	The sources and methods used for analyzing the science (including scientific and engineering models) used shall be clearly identified. The opportunity for public comment on the use of science in proposed covered actions is recommended. Limitations of research used shall be clearly identified and explained. If a range of uncertainty is associated with the data and information used, a mechanism for communicating uncertainty shall be employed.
Timeliness	Timeliness has two main elements: (1) data collection shall occur in a manner sufficient for adequate analyses before a management decision is needed, and (2) scientific information used shall be applicable to current situations. Timeliness also means that results from scientific studies and monitoring may be brought forward before the study is complete to address management needs[c]. In these instances, it is necessary that the uncertainties, limitations, and risks associated with preliminary results are clearly documented.
Peer review	The quality of the science used will be measured by the extent and quality of the review process. Independent external scientific review of the science is most important because it ensures scientific objectivity and validity. The following criteria represent a desirable peer review process[e]. Coordination of Peer Review. Independent peer review shall be coordinated by entities and/or individuals that (1) are not a member of the independent external review team/panel and (2) have had no direct involvement in the particular actions under review. Independent External Reviewers. A qualified independent external reviewer embodies the following qualities: (1) has no conflict of interest with the outcome of the decision being made, (2) can perform the review free of persuasion by others, (3) has demonstrable competence in the subject as evidenced by formal training or experience, (4) is willing to utilize his or her scientific expertise to reach objective conclusions that may be incongruent with his or her personal biases, and (5) is willing to identify the costs and benefits of ecological and social alternative decisions. When to Conduct Peer Review. Independent scientific peer review shall be applied formally to proposed projects and initial draft plans, in writing after official draft plans or policies are released to the public, and to final released plans. Formal peer review should also be applied to outcomes and products of projects as appropriate.

a. McGarvey 2007
b. National Research Council 2004, Sullivan et al. 2006
c. National Research Council 2004
d. Meffe et al. 1998
e. Adapted from Meffe et al. 1998

It is recognized that differences exist among the accepted standards of peer review for various fields of study and professional communities. When applying the criteria for best available science in Table 1A-1, the Council recognizes that the level of peer review for supporting materials and technical information (such as scientific studies, model results, and documents) included in the documentation for a proposed covered action is variable and relative to the scale, scope, and nature of the proposed covered action. The Council understands that varying levels of peer review may be commonly accepted in various fields of study and professional communities.

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Appendix 1B
Adaptive Management

Note: All content of this appendix is newly adopted.

Adaptive Management

Adaptive management is defined in the Delta Reform Act as "a framework and flexible decision making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives" (Water Code section 85052). Adaptive management can be applied at a program, plan or project level.

Adaptive management is a strategy that provides for making management decisions under uncertain conditions using the best available science rather than repeatedly delaying action until more information is available. Adaptive management allows for continuous learning resulting in management decisions based on what was learned, rather than adopting a management strategy and implementing it without regard for scientific feedback or monitoring. Adaptive management is an approach to resources management that increases the likelihood of success in obtaining goals in a manner that is both economical and effective because it provides flexibility and feedback to manage natural resources in the face of often considerable uncertainty.

To be effective, governance to support and implement adaptive management in the Delta must be flexible and have the capability to make timely changes to policies and practices in response to what is learned over time (e.g., the Delta Plan adaptive management approach described in Chapter 2). Governance for adaptive management should provide a decision-making structure that fosters communication among scientific experts, independent scientific reviewers, the relevant decision making authorities (e.g., state and federal fisheries agencies on issues related to aquatic ecosystem restoration) and a balanced approach to the involvement of interested stakeholders.

A Three-phase and Nine-step Adaptive Management Framework

The Council will use the three-phase and nine-step adaptive management framework in Figure 1B-1 that is described in detail below. The Council will use this framework to evaluate the usefulness of adaptive management for reviewing proposed covered actions involving ecosystem restoration and water management along with developing, implementing, and updating the Delta Plan (See Chapter 2). Ecosystem restoration and water management covered actions should include an adaptive management plan that considers all nine steps of this framework; however, they need not be rigidly included and implemented in the order described here and should not be used as a means to prevent action, but rather as a tool to enhance decision making. The intent is to build logical and clear information exchange and decision points into management actions that increase options and improve outcomes. In developing an adaptive management plan, the best available science should be used to inform the various steps of the adaptive management process.

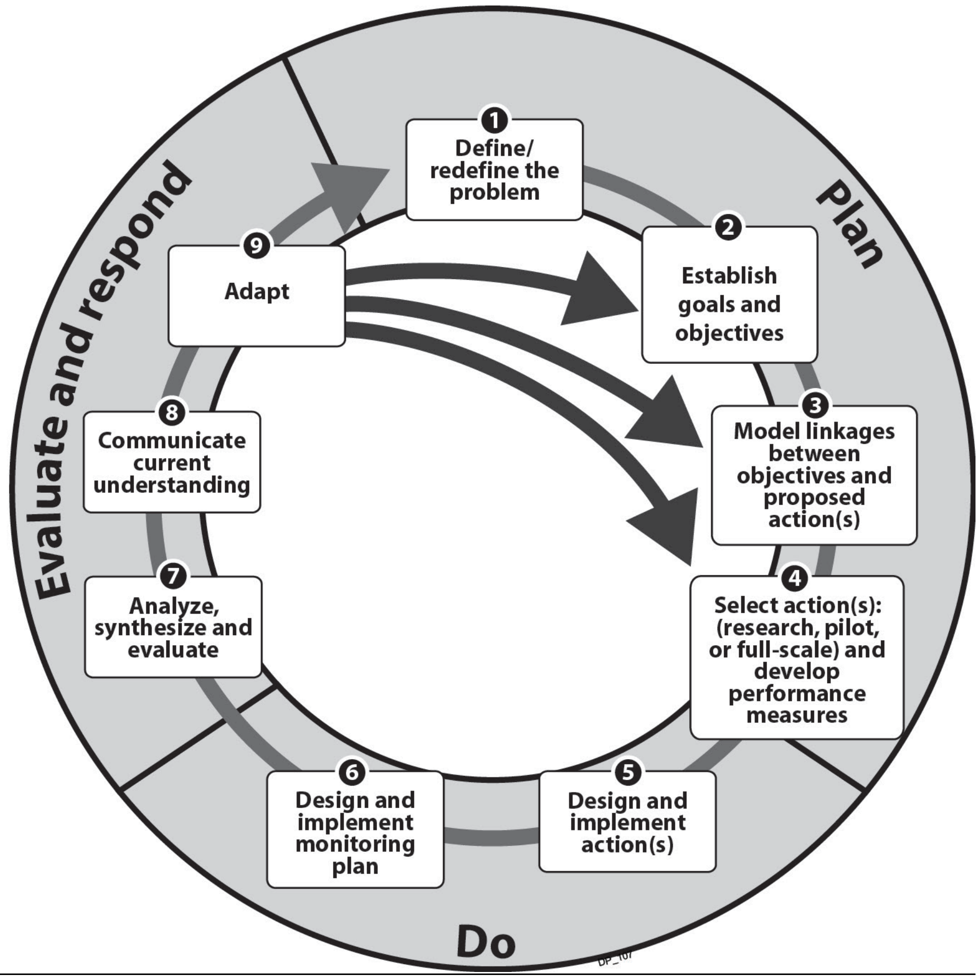

Figure 1B-1
A Nine-step Adaptive Management Framework
The shading represents the three broad phases of adaptive management (Plan, Do, and Evaluate and Respond), and the boxes represent the nine steps within the adaptive management framework. The circular arrow represents the general sequence of steps. The additional arrows indicate possible next steps for adapting (for example, revising the selected action based on what has been learned). This framework and the description of each step are largely derived from Stanford and Poole (1996), CALFED Bay-Delta Program (2000), Abal et al. (2005), and the Bay Delta Conservation Plan Independent Science Advisors on Adaptive Management (2009).

Plan

The *Plan* phase of the adaptive management framework is presented as four steps.

1. Define/Redefine the Problem

The first step of effective adaptive management is to clearly define the problems that will be addressed in the form of a problem statement. The problem statement should clearly link to program goals and to specific objectives, which should be developed by proponents in an open manner. The boundaries of the problem (e.g., its geographic and temporal scales) should be defined in the problem statement.

2. Establish Goals and Objectives

Clear goals and objectives must be established by proponents of proposed covered actions for ecosystem restoration and water management and be based on the best available science (See GP 1 in Chapter 2).

Goals are broad statements that propose general solutions. Objectives are more specific than goals, and are often quantitative, specific narrative statements of desired outcomes allowing evaluation of how well the objectives are being achieved.

3. Model Linkages between Objectives and Proposed Action(s)

Models formalize and apply current scientific understanding, develop expectations, assess the likelihood of success, and identify tradeoffs associated with different management actions. Models can be conceptual, statistical, physical, decision support, or simulation. Models link the objectives to the proposed actions and clarify why an intended action is expected to result in meeting its objectives. Models provide a road map for testing hypotheses through statements that describe the expected outcome of an action.

Both qualitative (conceptual) and quantitative models can effectively link objectives and proposed actions by illuminating if and how different actions meet specific objectives. Conceptual models are particularly useful for decision makers, scientists, and the public because they illustrate the most critical cause-and-effect pathways. Conceptual models provide an articulation of the hypotheses being tested and how various actions might achieve particular objectives. Conceptual models also help to develop performance measures, which are qualitative or quantitative information that tracks status and trends toward meeting objectives. Conceptual models should be used in adaptive management planning because they help explain how other types of models, research, and actions will be used to explore hypotheses and address specific existing and anticipated uncertainties.

Recent conceptual models developed specifically for the Delta include comprehensive models developed as part of the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP). The DRERIP models were designed to aid in the identification and evaluation of ecosystem restoration actions in the Delta, and include both ecosystem models (processes, habitats, and stressors) and species life history models. Another set of conceptual models was developed to plan the IEP's Pelagic Organism Decline (POD) investigations and to synthesize the POD results into "stories" about what may have happened to cause the rapid decline of multiple open-water fish species.

4. Select Action(s) (Research, Pilot, or Full-scale) and Develop Performance Measures

The process for selecting an action or several actions to meet objectives includes an evaluation of the best available science represented in the conceptual model. This evaluation should guide development of the action. Consideration should be given to the following:

- Level of the action(s) to be taken (research, pilot-scale project, or full-scale project)
- Geographical and temporal scale of the action(s)
- Degree of confidence in the benefits
- Consequences of being wrong

The scale of the action selected should be informed by the certainty of the relevant scientific information, consider the reversibility of the action, and account for the potential cost of delaying larger-scale actions. For example, when the best available science cannot predict the outcome of an action with a reasonable degree of certainty, and irreversible consequences exist for incorrectly predicting the outcomes of an action, further research or a pilot-scale action is likely more appropriate than a full-scale action, unless the cost of delaying a larger-scale action is very high (for example, a species of concern goes extinct or urban water supplies are cut off). In some instances, choosing to take no action could be the best selection (when no foreseen benefit would result from a research, pilot-scale, or full-scale action). Where possible, the action(s) selected should test cause-and-effect relationships in the conceptual model so that the model can be adapted using the information learned from implementing the action(s).

Performance measures derive from goals and objectives, and help to address the status and trends of progress toward achieving the goals and objectives. Performance measures can be placed in three general classes:

- Administrative: performance measures that describe decisions made by policy makers and managers to finalize plans or approve resources (funds, personnel, projects) for implementation of a program or group of related programs
- Output (also known as driver): performance measures that evaluate factors that may be influencing outcomes and include on-the-ground implementation and management actions
- Outcome: performance measures that evaluate ecosystem responses to management actions or natural outputs

The distinction between performance measure types is not rigid. In some cases, an outcome performance measure for one purpose may become an output performance measure for another purpose.

Development of informative performance measures is a challenging task. Performance measures must be designed to capture important trends and to address whether specific actions are producing expected results. Performance measures are selected based on the conceptual model. In addition the monitoring plan should be designed so that the information collected supports performance measure analysis and reporting.

Efforts to develop performance measures in complex and large-scale systems with many ecosystem types like the Delta are commonly multi-year endeavors; however, initial performance measures provide value for initial assessments of progress made in the interim. The process for developing performance measures should address the rationale for each performance measure, metrics, method for analysis, baseline and reference conditions, expected outcomes, timeline for evaluation, and a communication/visualization element. The development of performance measures should be informed by the best available science and involve key stakeholders.

Do

The *Do* phase of adaptive management includes two steps that occur in parallel.

5. Design and Implement Action(s)

The design and implementation of action(s) include clearly describing specific activities that will occur under the selected action(s) and how they will link to the monitoring plan. Design includes creating a plan for implementing the action(s) and monitoring responses resulting from the action(s). The design of the action(s) should be informed by existing uncertainties, and should be directly linked to meeting the goals and objectives.

6. Design and Implement Monitoring Plan

A well-designed monitoring plan includes a data management plan. A data management plan describes the process for organizing and clearly documenting observations, including how data are collected; the methods, quality assurance, and calculations used; the time and space scales of the variables; and accurate site locations and characteristics. Data management is critical for analyses, syntheses, and evaluations.

A well-designed monitoring plan goes beyond data collection and data management. A monitoring plan often includes targeted research to answer why certain results are observed and others are not. A monitoring plan also includes clear communication of the information gathered and current understanding drawn from this information. A complete monitoring plan includes:

- Compliance monitoring (required by permits)
- Performance monitoring with pre-project monitoring (measuring achievement of targets)

- Mechanistic monitoring with concurrent targeted research (testing the understanding of linkages in the conceptual model)
- System-level monitoring (holistic, integrative and long term)

These types of monitoring can measure and communicate various types of information, including administrative/inputs (such as dollars awarded and spent or projects funded), compliance/outputs (such as tons of gravel added or acres exposed to tidal action), and effectiveness/outcomes (such as actual outcome expected from implementing an action at the local scale, suites of actions at the system-wide scales, and status and trends assessments). The monitoring plan design must include the development of monitoring metrics that can be integrated and summarized to inform decision makers and the public as described in step eight, *Communicate Current Understanding*.

Monitoring plan design requires making tradeoffs between resources spent on monitoring and resources spent on actions and analyses. To aid in this evaluation of tradeoffs, a rigorous pre-analysis using simulation models can show the information value of different variables that might be monitored. These values assessments can then be used to compare the benefits from monitoring certain variables against the benefit of using resources for other actions.

Implementation of actions and monitoring should be closely coordinated. Before an action is implemented, initial conditions should be clearly documented to the extent practical so that a baseline is established. Baseline data includes characterization of natural variation observed in the examined system over space and time. For many ecological and hydrological variables, an extensive set of baseline data is available because of the efforts of the Interagency Ecological Program and repositories of information such as those available from the U.S. Geological Survey and the California Department of Water Resources. The implementation of action(s) and monitoring should be clearly executed and communicated to the public. Status and trends metrics that compare conditions before and after action implementation are often good assessment and communication tools.

Evaluate and Respond

The *Evaluate and respond* phase of adaptive management includes three key steps.

7. Analyze, Synthesize, and Evaluate

Analysis, synthesis, and evaluation of the action(s) and monitoring are critical for improving current understanding. Analysis and synthesis should incorporate information on how conditions have changed, expectedly and unexpectedly, as a result of implementing the action(s). Because measurable change might not occur on short timescales, evaluations should also examine whether actions prevented further deteriorating conditions that would have occurred if no actions were taken. The evaluation should examine whether performance measures indicate that one or more of the objectives have been met as a result of the implemented action(s), and if so, why. If an objective is not met, the potential reasons why it was not met should be clearly identified and communicated. Analyses should be cumulative. As each year's data becomes available, analyses should assess whether the probability of the desired outcome has changed and, if so, how this affects decisions about the action. The results of the analysis, synthesis, and evaluation step could be published in technical peer-reviewed papers and reports for the purpose of external review, disclosure, and accessibility where results warrant this level of communication. Scientists and technical experts will be critical for carrying out this step.

8. Communicate Current Understanding

Communication of current understanding gained through analysis, synthesis, and evaluation of implemented action(s) and monitoring is a key step for informing and equipping policy makers, managers, stakeholders, and the public to appropriately respond and adapt. This step spans the *Do* and the *Evaluate and respond* phase of adaptive management because the communication of current understanding and related recommendations for change requires both policy and technical expertise. The information communicated should be technically sound, well synthesized, and translated into formats conducive to informing a nontechnical audience (e.g., a report card format or a general science outlet such as a newsletter). The information should then be disseminated to those directly involved in the adaptive management process for the plan, program, or project and to those interested in the outcome of the action.

Technical staff and decision makers should be regularly involved in the exchange of information as data are analyzed and synthesized. Communication should be ongoing and occur at appropriate intervals at which an improved understanding could help refine other steps of the adaptive management framework.

The key to successful communication is a skilled and dedicated interdisciplinary person or team who understands the technical information learned, the functional needs of the decision makers, and how to best transmit this information. Communication should utilize various media (e.g., web-based materials, social media, outreach opportunities, public forums, etc.) and strive to meet the goals of transparency and clarity.

9. Adapt

Proponents of covered actions for ecosystem restoration and water management should be engaged and prepared to adapt to changes in current understanding and changes in current conditions (e.g., environmental or socio-economic). Informed and equipped with new results and understanding, decision makers should reexamine the other steps of the adaptive management framework and revise these steps where current understanding suggests doing so. Possible next steps could include redefining the problem statement, amending goals and objectives, altering the conceptual model, or selecting an alternative action for design and implementation. Also, decisions to adapt might be needed at various time intervals for the same adaptive management experiment. For example, decisions might need to be made daily (e.g., Delta water operations), yearly (e.g., implementation of landscape-scale restoration), or decadal (adaptive management of landscape-scaled restoration design).

Knowing when to adapt is not always obvious. Adaptive management actions should have a planned time frame that includes when to adapt (based on understandings of the system and its uncertainties), and that time frame should be abandoned only if the results show that the action is doing more harm than good or the anticipated benefit is not noted within a reasonable timeframe beyond what was expected. In general, one year’s results, however anomalous, are seldom enough to demonstrate that the action should be subject to adaptive measures. Furthermore, when the analysis, synthesis, and evaluation of information learned from implementing an action indicates that no benefit results from the undertaken action, resources should no longer be spent on that action no matter how popular the action might be.

Decisions made within the adaptive management process for ecosystem restoration and water management actions should be made by decision makers for the entity responsible for implementing adaptive management. Adaptive management decisions relevant to revising and updating the Delta Plan will be made by the Council.

Appendix 2A
Transparency in Water Contracting: Water from the SWP

Note: All content of this appendix is newly adopted.

STATE OF CALIFORNIA • RESOURCES AGENCY • DEPARTMENT OF WATER RESOURCES

NOTICE TO

STATE WATER PROJECT CONTRACTORS

NUMBER: 03-09

DATE: 7/3/03

SUBJECT: Guidelines for Review of Proposed Permanent Transfers of State Water Project Annual Table A Amounts

FROM:
INTERIM DIRECTOR, DEPARTMENT OF WATER RESOURCES

The Department of Water Resources is issuing the following guidelines prepared in connection with the Settlement Agreement, dated May 5, 2003, reached in *Planning and Conservation League et al. v. Department of Water Resources, 83 Cal. App. 4th 892 (2000).* These guidelines are effective upon the superior court's approval of the Settlement Agreement on May 20, 2003.

1. Purpose: The purpose of these guidelines is to describe the process for DWR's review of proposed permanent transfers of State Water Project Annual Table A Amounts and, by so doing, provide disclosure to SWP contractors and to the public of DWR's process and policy for approving permanent transfer of SWP Annual Table A Amounts. Such disclosure should assist contractors in developing their transfer proposals and obtaining DWR review expeditiously, and assist the public in participating in that review.

2. Coverage: These guidelines will apply to DWR's approval of proposed permanent transfers of water among existing SWP contractors and, if and when appropriate, to proposed permanent transfers of water from an existing SWP contractor to a new SWP contractor.

3. Interpretation: These guidelines are in furtherance of the State policy in favor of voluntary water transfers and shall be interpreted consistent with the law, including but not limited to Water Code Section 109, the Burns-Porter Act, the Central Valley Project Act, the California Environmental Quality Act, area of origin laws, the public trust doctrine, and with existing contracts and bond covenants. These guidelines are not intended to change or augment existing law.

4. Revisions: Revisions may be made to these guidelines as necessary to meet changed circumstances, changes in the law or long-term water supply contracts, or to address conditions unanticipated when the guidelines are adopted. Revisions shall be in accordance with the Settlement Agreement.

5. Distribution: The transfer guidelines shall be published by DWR in the next available edition of Bulletin 132, and also as part of the biennial disclosure of SWP reliability as described in the Settlement Agreement.

6. Contract Amendment: Permanent transfers of SWP water are accomplished by amendment of each participating contractor's long-term water supply contract. The amendment consists of amending the Table A upwards for a buying contractor and downwards for a selling contractor. The amendment shall be in conformity with all provisions of the long-term water supply contracts, applicable laws, and bond covenants. Other issues to be addressed in the contract amendment will be subject to negotiation among DWR and the two participating contractors. The negotiations will be conducted in public, pursuant to the Settlement Agreement and Notice to State Water Project Contractors Number 03-10.

7. Financial Issues: The purchasing contractor must demonstrate to DWR's satisfaction that it has the financial ability to assume payments associated with the transferred water. If the purchasing entity was not a SWP contractor as of 2001, special financial requirements pertain as described below, as well as additional qualifications.

8. Compliance with CEQA: Consistent with CEQA, the State's policy to preserve and enhance environmental quality will guide DWR's consideration of transfer proposals (Public Resources Code Section 21000). Identification of the appropriate lead agency will be based on CEQA, the CEQA Guidelines, and applicable case law, including *PCL v. DWR.* CEQA requires the lead agency at a minimum to address the feasible alternatives to the proposed transfer and its potentially significant environmental impacts (1) in the selling contractor's service area; (2) in the buying contractor's service area; (3) on SWP facilities and operations; and (4) on the Delta and areas of origin and other regions as appropriate. Impacts that may occur outside of the transferring SWP contractors' service areas and on fish and wildlife shall be included in the environmental analysis. DWR will not approve a transfer proposal until CEQA compliance is completed. The lead agency shall consult with responsible and trustee agencies and affected cities and counties and, when DWR is not the lead agency, shall provide an administrative draft of the draft EIR or Initial Study/Negative Declaration to DWR prior to the public review period. A descriptive narrative must accompany a checklist, if a checklist is used. The lead agency shall conduct a public hearing on the EIR during the public comment period and notify DWR's State Water Project Analysis Office of the time and place of such hearing in addition to other notice required by law.

9. Place of Use: The purchasing contractor must identify the place and purpose of use of the purchased water, including the reasonable and beneficial use of the water.

Typically, this information would be included in the environmental documentation. If a specific transfer proposal does not fit precisely into any of the alternatives listed below, DWR will use the principles described in these Guidelines to define the process to be followed. The information to be provided under this paragraph is in addition to the CEQA information described in Paragraph 8 of these guidelines.

a. If the place of use is within the contractor's service area, the contractor should disclose the purpose of the transferred water, such as whether the water is being acquired for a specific development project, to enhance overall water supply reliability in the contractor's service area, or some other purpose. If the transferred water is for a municipal purpose, the contractor should state whether the transfer is consistent with its own Urban Water Management Plan or that of its member unit(s) receiving the water.

b. If the place of use is outside the contractor's service area, but within the SWP authorized place of use, and service is to be provided by an existing SWP contractor, then, in addition to Paragraph 9(a) above, the contractor should provide DWR with copies of LAFCO approval and consent of the water agency with authority to serve that area, if any. In some instances, DWR's separate consent is required for annexations in addition to the approval for the transfer.

c. If the place of use is outside the SWP authorized place of use and service is to be provided by an existing SWP contractor, the contractor should provide information in Paragraph 9(a) and 9(b). Prior to approving the transfer, DWR will consider project delivery capability, demands for water supply from the SWP, and the impact, if any, of the proposed transfer on such demand. If DWR approves the transfer, DWR will petition State Water Resources Control Board for approval of expansion of authorized place of use. Water will not be delivered until the place of use has been approved by the SWRCB and will be delivered in compliance with any terms imposed by the SWRCB.

d. If the place of use is outside the SWP authorized place of use and service is not to be provided by an existing SWP contractor, DWR will consider the transfer proposal as a proposal to become a new SWP contractor. Prior to adding a new SWP contractor, DWR will consider project delivery capability, demands for water supply from the SWP, and the impact, if any, of the proposed transfer on such demand. DWR will consult with existing SWP contractors regarding their water supply needs and the proposed transfer. In addition to the information in Paragraph 9(a), 9(b), and 9(c), the new contractor should provide information similar to that provided by the original SWP contractors in the 1960's Bulletin 119 feasibility report addressing hydrology, demand for water supply, population growth, financial feasibility, etc.

DWR will evaluate these issues independently and ordinarily will act as lead agency for CEQA purposes. In addition, issues such as area of origin claims, priorities, environmental impacts and use of water will be addressed. The selling contractor may not be released from financial obligations. The contract will be subject to a CCP 860 validation action initiated by the new contractor. If DWR approves the transfer, DWR will petition the SWRCB for approval of expansion of authorized place of use. Water will not be delivered until the place of use has been approved by the SWRCB and will be delivered in compliance with any terms imposed by the SWRCB.

10. DWR Discretion: Consistent with the long-term water supply contract provisions, CEQA, and other provisions of law, DWR has discretion to approve or deny transfers. DWR's exercise of discretion will incorporate the following principles:

    a. As required by CEQA, DWR as an agency with statewide authority will implement feasible mitigation measures for any significant environmental impacts resulting from a transfer if such impacts and their mitigation are not addressed by other public agencies and are within DWR's jurisdiction.

    b. DWR will invoke "overriding considerations" in approving a transfer only as authorized by law, including but not limited to CEQA, and, to the extent applicable, the public trust doctrine and area of origin laws.

If you have any questions or need further information, please contact Dan Flory, Chief of DWR's State Water Project Analysis Office, at (916) 653-4313 or Nancy Quan of his staff at (916) 653-0190.

STATE OF CALIFORNIA • RESOURCES AGENCY • DEPARTMENT OF WATER RESOURCES

NOTICE TO
STATE WATER PROJECT CONTRACTORS

NUMBER: 03-10

DATE: 7/3/03

SUBJECT: Principles Regarding Public Participation Process in State Water Project Contract Negotiations

FROM: Michael J. Spear

INTERIM DIRECTOR, DEPARTMENT OF WATER RESOURCES

The Department of Water Resources is issuing the following guidelines prepared in connection with the Settlement Agreement, dated May 5, 2003, reached in *Planning and Conservation League et al. v. Department of Water Resources, 83 Cal. App. 4th 892 (2000).* These guidelines are effective upon the superior court's approval of the Settlement Agreement on May 20, 2003.

1. Policy: Given the importance of the State Water Project to the State of California, and the key role that the long-term water supply contracts play in the administration of the SWP, DWR agrees that public review of significant changes to these contracts is beneficial and in the public interest.

2. Types of Activities to be Covered: Project-wide contract amendments (i.e., contracts with substantially similar terms intended to be offered to all long-term SWP Contractors) and contract amendments to transfer Table A amounts between existing SWP contractors will not be offered to the contractors for execution unless DWR has first complied with the public participation process as described in Paragraphs (3), (4), (5), and (6).

3. The Public Participation Process:

   1) Negotiations will be conducted in public.

   2) The public will be provided with advance notice of the time and place of the negotiations.

   3) The public will be provided the opportunity to observe negotiations and comment in each negotiating session.

4. Timing of Public Participation: Public participation ordinarily will precede the formulation of the project description in the California Environmental Quality Act process in order to assure that the public participation is meaningful. When DWR is a responsible agency, (e.g., when existing SWP contractors agree to transfer Table A amounts between themselves), the public participation will be scheduled to facilitate coordination with the lead agency's CEQA process.

5. <u>Activities That Will Not Be Subject to Public Participation</u>: Informal discussions prior to exchange of formal drafts and discussion of topics that are authorized to be kept confidential by law will not be subject to the public participation process.

6. <u>Contract Amendments Resulting From Litigation</u>: If litigation has been formally initiated, and settlement negotiations result in a proposal to adopt project-wide amendments to settle the litigation, all proposed contract amendments shall be subject to the public participation process before they are approved by DWR.

Notices of public negotiations will be put on the DWR website.

If you have any questions or need further information, please contact Dan Flory, Chief of DWR's State Water Project Analysis Office, at (916) 653-4313, or Nancy Quan of his staff at (916) 653-0190.

Appendix 2B
Transparency in Water Contracting: Water from the CVP

Note: All content of this appendix is newly adopted.

Public Law 97-293

Title II, Reclamation Reform Act of 1982

Section 226: Public Participation

SEC. 226: Public Participation

Section 9 of the Reclamation Project Act of 1939 (43 U.S.C. 485h) is amended by adding at the end the following new subsection:

"(f) No less than sixty days before entering into or amending any repayment contract or any contract for the delivery of irrigation water (except any contract for the delivery of surplus or interim irrigation water whose duration is for one year or less) the Secretary shall—

"(1) publish notice of the proposed contract or amendment in newspapers of general circulation in the affected area and shall make reasonable efforts to otherwise notify interested parties which may be affected by such contract or amendment, together with information indicating to whom comments or inquiries concerning the proposed actions can be addressed; and

"(2) provide an opportunity for submission of written data, views and arguments, and shall consider all substantive comments so received."

Title 34, Public Law 102-575

Central Valley Project Improvement Act

Section 3405.

Water Transfers, Improved Water Management and Conservation

The Law

Section 3405. Water Transfers, Improved Water Management & Conservation

(a) Water Transfers.--In order to assist California urban areas, agricultural water users, and others in meeting their future water needs, subject to the conditions and requirements of this subsection, all individuals or districts who receive Central Valley Project water under water service or repayment contracts, water rights settlement contracts or exchange contracts entered into prior to or after the date of enactment of this title are authorized to transfer all or a portion of the water subject to such contract to any other California water user or water agency, State or Federal agency, Indian Tribe, or private non-profit organization for project purposes or any purpose recognized as beneficial under applicable State law. Except as provided herein, the terms of such transfers shall be set by mutual agreement between the transferee and the transferor.

(1) Conditions for Transfers.--All transfers to Central Valley Project water authorized by this subsection shall be subject to review and approval by the Secretary under the conditions specified in this subsection. Transfers involving more than 20 percent of the Central Valley Project water subject to long-term contract within any contracting district or agency shall also be subject to review and approval by such district or agency under the conditions specified in this subsection:

(A) No transfer to combination of transfers authorized by this subsection shall exceed, in any year, the average annual quantity of water under contract actually delivered to the contracting district or agency during the last three years of normal water delivery prior to the date of enactment of this title.

(B) All water under the contract which is transferred under authority of this subsection to any district or agency which is not a Central Valley Project contractor at the time of enactment of this title shall, if used for irrigation purposes, be repaid at the greater of the full-cost or cost of service rates, or, if the water is used for municipal and industrial purposes, at the greater of the cost of service or municipal and industrial rates.

(C) No transfers authorized by this subsection shall be approved unless the transfer is between a willing buyer and a willing seller under such terms and conditions as may be mutually agreed upon.

(D) No transfer authorized by this subsection shall be approved unless the transfer is consistent with State law, including but not limited to provisions of the California Environmental Quality Act.

(E) All transfers authorized by this subsection shall be deemed a beneficial use of water by the transferor for the purposes of section 8 of the Act of June 17, 1902, 32 Stat. 390, 43 U.S.C. 372.

(F) All transfers entered into pursuant to this subsection for uses outside the Central Valley Project service area shall be subject to a right of first refusal on the same terms and conditions by entities within the Central Valley Project service area. The right of first refusal must be exercised within ninety days from the date that notice is provided of the proposed transfer. Should an entity exercise the right of first refusal, it must compensate the transferee who had negotiated the agreement upon which the right of first refusal is being exercised for that entity's total costs associated with the development and negotiation of the transfer.

(G) No transfer authorized by this subsection shall be considered by the Secretary as conferring supplemental or additional benefits on Central Valley Project water contractors as provided in section 203 of Public Law 97-293 (43 U.S.C. 390(cc)).

(H) The Secretary shall not approve a transfer authorized by this subsection unless the Secretary has determined, consistent with paragraph 3405(a) (2) of this title, that the transfer will not violate the provisions of this title or other Federal law and will have no significant adverse effect on the Secretary's ability to deliver water pursuant to the Secretary's Central Valley Project contractual obligations or fish and wildlife obligations under this title because of limitations in conveyance or pumping capacity.

(I) The water subject to any transfer undertaken pursuant to this subsection shall be limited to water that would have been consumptively used or irretrievably lost to beneficial use during the year or years of the transfer.

(J) The Secretary shall not approve a transfer authorized by this subsection unless the Secretary determines, consistent with paragraph 3405(a) (2) of this title, that such transfer will have no significant long-term adverse impact on groundwater conditions in the transferor's service area.

(K) The Secretary shall not approve a transfer unless the Secretary determines, consistent with paragraph 3405(a) (2) of this title, that such transfer will have no unreasonable impact on the water supply, operations, or financial conditions of the transferor's contracting district or agency or its water users.

(L) The Secretary shall not approve a transfer if the Secretary determines, consistent with paragraph 3405(a) (2) of this title, that such transfer would result in a significant reduction in the quantity or decrease in the quality of water supplies currently used for fish and wildlife purposes, unless the Secretary determines pursuant to finding setting forth the basis for such determination that such adverse effects would be more than offset by the benefits of the proposed transfer. In the event of such a determination, the Secretary shall develop and implement alternative measures and mitigation activities as integral and concurrent elements of any such transfer to provide fish and wildlife benefits substantially equivalent to those lost as a consequence of such transfer.

(M) Transfers between Central Valley Project contractors within countries, watersheds, or other areas of origin, as those terms are utilized under California law, shall be deemed to meet the conditions set forth in subparagraphs (A) and (I) of this paragraph.

(2) Review and Approval of Transfers.--All transfers subject to review and approval under this subsection shall be reviewed and approved in a manner consistent with the following:

(A) Decisions on water transfers subject to review by a contracting district or agency or by the Secretary shall be rendered within ninety days of receiving a written transfer proposal from the transferee or transferor. Such written proposal should provide all information reasonably necessary to determine whether the transfer complies with the terms and conditions of this subsection.

(B) All transfers subject to review by a contracting district or agency shall be reviewed in a public process similar to that provided for in section 226 of Pub. L. 97-293.

(C) The contracting district or agency or the Secretary shall approve all transfers subject to review and approval by such entity if such transfers are consistent with the terms and conditions of this subsection. To disapprove a transfer, the contracting district or agency or the Secretary shall inform the transferee and transferor, in writing, why the transfer does not comply with the terms and conditions of this subsection and what alternatives, if any, could be included so that the transfer would reasonably comply with the requirements of this subsection.

(D) If the contracting district or agency or the Secretary fails to approve or disapprove a proposed transfer within ninety days of receiving a complete written proposal from the transferee or transferor, then the transfer shall be deemed approved.

(3) Transfers executed after September 30, 1999 shall only be governed by the provisions of subparagraphs 3405(a) (1) (A) -(C), (E), (G), (H), (I), (L), and (M) of this title, and by State law.

(f) Increased Revenues.--All revenues received by the Secretary as a result of the increased repayment rates applicable to water transferred from irrigation use to municipal and industrial use under subsection 3405(a) of this section, and all increased revenues received by the Secretary as a result of the increased water prices established under subsection 3405(d) of this section, shall be covered to the Restoration Fund.

Section 3407(d)(2)(a). Restoration Fund

(d) Adjustment and Assessment of Mitigation and Restoration Payments.--

(1) In assessing the annual payments to carry out subsection (c) of this section, the Secretary shall, prior to each fiscal year, estimate the amount that could be collected in each fiscal year pursuant to subparagraphs 2(A) and (B) of this subsection. The Secretary shall decrease all such payments on a proportionate basis from amounts contained in the estimate so that an aggregate amount is collected pursuant to the requirements of paragraph (c) (2) of this section.

(2) The Secretary shall assess and collect the following mitigation and restoration payments, to be covered to the Restoration Fund, subject to the requirements of paragraph (1) of this subsection:

(A) The Secretary shall require Central Valley Project water and power contractors to make such additional annual payments as are necessary to yield, together with all other receipts, the amount required under paragraph (c) (2) of this subsection; Provided, That such additional payments shall not exceed $30,000,000 (October 1992 price levels) on a three-year rolling average basis; Provided further, That such additional annual payments shall be allocated so as not to exceed $6.00 per acre-foot (October 1992 price levels) for agricultural water sold and delivered by the Central Valley Project, and $12.00 per acre-foot (October 1992 price levels) for municipal and industrial water sold and delivered by the Central Valley Project;

Provided further, that the charge imposed on agricultural water shall be reduced, if necessary, to an amount within the probable ability of the water users to pay as determined and adjusted by the Secretary no less than every five years, taking into account the benefits resulting from implementation of this title; Provided further, That the Secretary shall impose an additional annual charge of $25.00 per acre-foot (October

1992 price levels) for Central Valley Project water sold or transferred to any State or local agency or other entity which has not previously been a Central Valley Project customer and which contracts with the Secretary or any other individual or district receiving Central Valley Project water to purchase or otherwise transfer any such water for its own use for municipal and industrial purposes, to be deposited in the Restoration Fund; And Provided further, That upon the completion of the fish, wildlife, and habitat mitigation and restoration actions mandated under section 3406 of this title, the Secretary shall reduce the sums described in paragraph (c) (2) of this section to $35,000,000 per year (October 1992 price levels) and shall reduce the annual mitigation and restoration payment ceiling established under this subsection to $15,000,000 (October 1992 price levels) on a three-year rolling average basis. The amount of the mitigation and restoration payment made by Central Valley Project water and power users, taking into account all funds collected under this title, shall, to the greatest degree practicable, be assessed in the same proportion, measured over a ten-year rolling average, as water and power users' respective allocations for repayment of the Central Valley Project.

For additional information, please contact CVPIA Program Manager (916) 978-5190
February 4, 2011

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Appendix 3
Habitat Restoration[*]

Note: All content of this appendix is newly adopted.

[*] The Council adopts this document as part of Section 5006. It therefore has regulatory effect despite the markings on the document indicating it is a 'draft'.

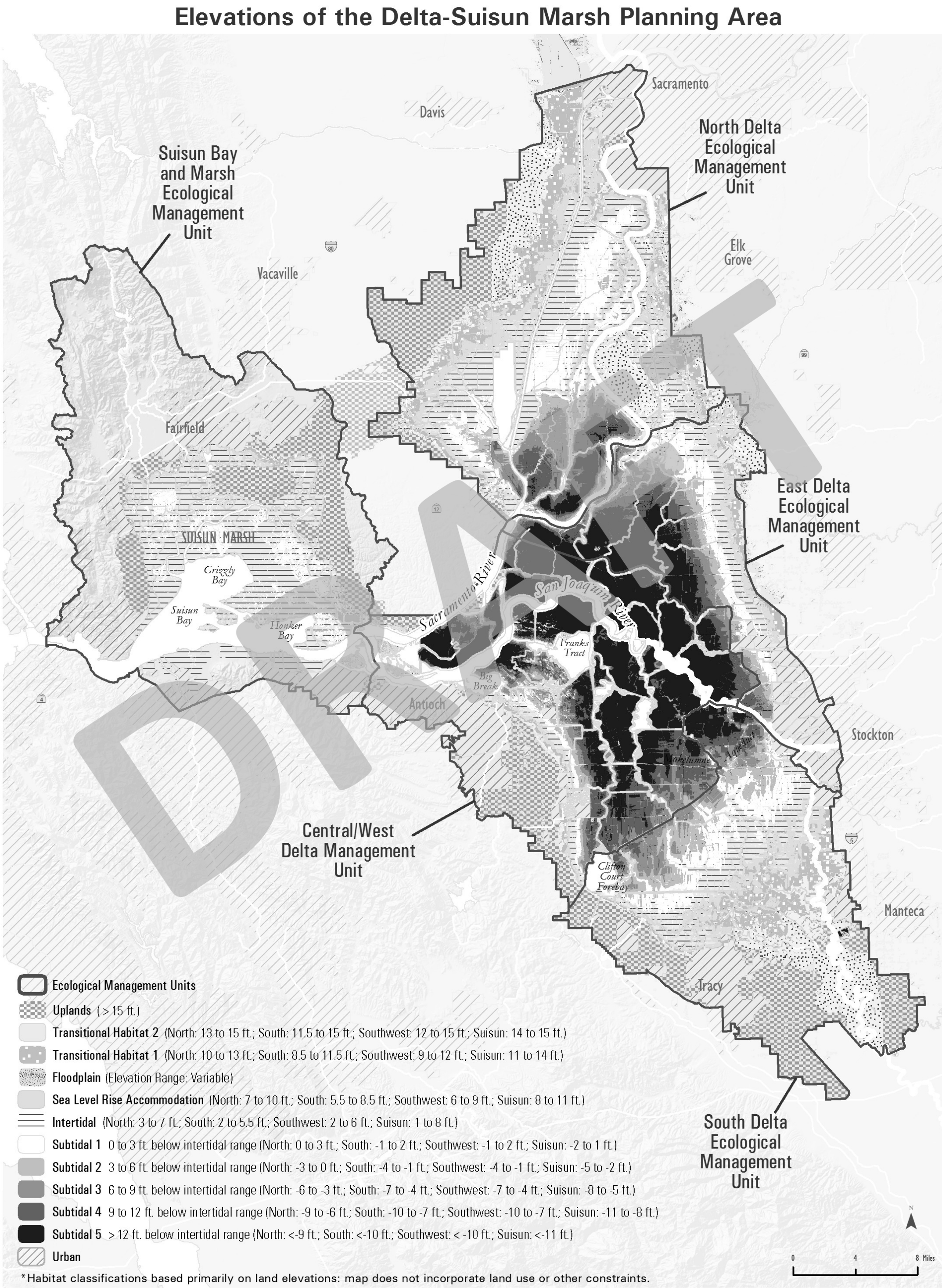
II. Habitats

ERPP Goal 4 (Habitats) is to protect and/or restore functional habitat types in the Bay-Delta estuary and its watershed for ecological and public values such as supporting species and biotic communities, ecological processes, recreation, scientific research, and aesthetics. The ERPP identified a number of key habitat types for which conservation and restoration would be pursued in the Delta. These habitat types are continuing to be reviewed and evaluated as a part of various habitat conservation plans in terms of the natural communities they seek to conserve, and within the ERP. As these evaluations are completed, scientists and managers will have a better understanding of these natural communities, and will be better able to monitor status and trends in these natural communities at a regional scale, as well as build this information into future management plans.

There were two strategies in the Delta Vision Strategic Plan associated with the creation and restoration of habitat: Strategy 3.1, "Restore large areas of interconnected habitats—on the order of 100,000 acres—within the Delta and its watershed by 2100"; and Strategy 3.2, "Establish migratory corridors for fish, birds, and other animals along selected Delta river channels". These two strategies describe actions regarding inundation of floodplain areas, restoration of tidal and riparian habitat, and protection of grasslands and farmlands.

Development of the Delta Conservation Strategy Map. This element in the Conservation Strategy contributes to identification of restoration opportunities within the Delta, primarily based on land elevations with consideration of current urban land use constraints (Figure 4). Existing non-urban land uses, infrastructure, and other constraints at these locations were not considered for this map. These features will be addressed in future analyses of site-specific proposals. Figure 4 presents existing elevations in the Delta, which we consider a starting point for developing priorities for habitat restoration. Several broad habitat types were identified for restoration and have been classified according to three ranges of land elevation: upland areas, intertidal areas, and subsided lands/deep open water areas. Appendix E provides a crosswalk between habitat categories in this Conservation Strategy for the Delta and those in the ERP Plan.

In accordance with the recommendations in the Delta Vision Strategic Plan and in light of expected sea level rise, the areas of the Delta that are of highest priority for restoration include lands that are in the existing intertidal range, floodplain areas that can be seasonally inundated, and transitional and upland habitats. Assuming a rise in sea level of approximately 55 inches over the next 50-100 years (Cayan et al. 2009), these areas would become shallow subtidal, seasonally inundated floodplain, and intertidal and upland habitats respectively. The next highest priority for restoration to tidal marsh would be lands below the intertidal range that are not highly subsided, and are within the range of feasibility for subsidence reversal projects. The lower elevation boundary of subsided lands appropriate for tidal marsh restoration has not been established, and may vary depending on location, configuration, availability of dredge spoils, and other factors that may promote or inhibit soil accretion associated with vegetation establishment. The most subsided lands would be the lowest priority for restoration to tidal marsh because raising elevations to the range appropriate for vegetation establishment is likely to be infeasible. However, these deeply subsided lands may have value as deep water habitat, although the benefits of increasing deep water habitat in the delta ecosystem have not been established.



For the purposes of compliance with OAL printing requirements, this figure has been modified for increased legibility in black and white. This figure has been adapted from the original color Figure 4 on page 32 of the DFW Draft Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions, 2011.

Figure 4: Land elevations in the Delta and Suisun Marsh. Current land elevations will largely determine what habitat types can be accommodated.

Delta Agricultural Lands. It is important to note that a significant portion of the land within the Delta is dedicated to agricultural production, some of which is considered suitable for habitat restoration. Despite this, it is projected that much of this land will remain dedicated to agriculture into the future. Expected reductions in the availability of freshwater for all beneficial uses, due to changing precipitation patterns and extended droughts, means that sea level rise will increase salinity in some areas of the Delta, particularly the western and central Delta, even absent any natural perturbations such as an earthquake-induced levee breach of a major Delta island. There simply will not be enough freshwater in the future to continue maintaining all parts of the Delta as a freshwater pool year-round. It is therefore probable that Delta agriculture will adapt naturally over time to these expected changes in the Delta, through a combination of planting more drought- and salt-tolerant crops as agricultural biotechnology becomes more widely available; growing crops that can be used to produce ethanol or other biofuels; seeking more opportunities for cultural/economic diversification (e.g., ecotourism); and managing for wetlands and associated plants for wildlife benefits rather than agriculture and/or toward development of a carbon emissions offset trading market. Some U.S. Department of Agriculture programs already exist that provide financial incentives for landowners to manage natural areas on their properties, including but not limited to the Wildlife Habitat Incentives Program, the Environmental Quality Incentives Program, and the Conservation Reserve Program. While largely successful in other States, funding for implementation of these programs in California must be augmented to make participation more attractive to landowners who face higher capital and production costs. ERP will continue to fund projects on agricultural lands which benefit wildlife and help ensure that agricultural properties are conserved.

ERPP Vision for Agricultural Lands: Improve associated wildlife habitat values to support special-status wildlife populations and other wildlife dependent on the Bay-Delta. Protecting and enhancing agricultural lands for wildlife would focus on encouraging production of crop types that provide high wildlife habitat value, agricultural land and water management practices that increase wildlife habitat value, and discouraging development of ecologically important agricultural lands for urban or industrial uses in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay Ecological Management Zones.

ERPP volume 1, July 2000

ERPP Vision for Tidal Perennial Aquatic Habitats: Increase the area and improve the quality of existing connecting waters associated with tidal emergent wetlands and their supporting ecosystem processes. Achieving this vision will assist in the recovery of special-status fish, wildlife, and plant populations and provide high-quality aquatic habitat for other fish, wildlife, and plant communities dependent on the Bay-Delta. Restoring tidal perennial aquatic habitat would also result in higher water quality and increase the amount of shallow-water and mudflat habitats; foraging and resting habitats and escape cover for water birds; and rearing and foraging habitats, and escape cover for fish.

ERPP volume 1, July 2000

Delta Upland Areas. Connectivity of existing habitat to higher elevation areas will be critical for Delta habitats and species with rising sea level, global warming, and regional climate change. As the sea level rises, existing intertidal habitat will become subtidal, and adjacent uplands will become intertidal. Additionally, adjacent higher elevation habitat will be critical for wildlife to escape flooding. Changes in regional climate are expected to result in precipitation patterns of more rain and less snow, shifting tributary peak runoff from spring to winter, making extreme winter runoff events more frequent and intense, and bringing about longer dry periods in summer. In light of these expected changes, and ongoing conversion of open space lands to urban uses, some of these higher elevation areas will be expected to accommodate additional flood flows in new or expanded floodplain areas.

Upland areas in the Delta are best characterized as lands well above current sea level (i.e., greater than five feet in elevation, depending on location). Aquatic habitats in this category include seasonally-inundated floodplain, seasonal wetlands (including vernal pools), and ponds, while terrestrial habitats in this category include riparian areas, perennial grasslands, and inland dune scrub, as well as agricultural lands. Protecting and creating a mosaic of different upland habitat types that are well distributed, and connected to other natural communities is important for maintaining genetic diversity of the numerous species which use these areas for all or part of their life cycles. The aquatic and terrestrial habitat types that comprise upland areas often co-occur (e.g., agricultural lands that are seasonally inundated to benefit waterfowl, and perennial grasslands that support vernal pools). Thus, this habitat category highlights the importance of preserving and enhancing a diversity of habitats in support of numerous species and ecological processes, as well as allowing the system to respond to drivers of change such as sea level rise.

Stage 2 Actions for Upland Areas:

Action 1: Acquire land and easement interests from willing sellers in the East and South Delta that will accommodate seasonal floodplain areas, and shifts in tidal and shallow subtidal habitats due to future sea level rise.

Action 2: Conduct research to determine scale and balance of flow, sediment, and organic material inputs needed to restore riverine ecosystem function.

Action 3: Develop a better understanding of species-habitat interactions, species-species interactions, and species responses to variable ecosystem conditions in order to better determine natural versus human-induced responses of upland habitat restoration.

Action 4: Determine contaminant and runoff impacts of agriculture and urban areas, and develop predictions of effects on the ecosystem from future expansion of these land uses.

Action 5: Restore large-scale riparian vegetation along waterways wherever feasible, including opportunities for setback levees.

The rationales for protection and enhancement of seasonal wetlands, vernal pools, riparian areas, perennial grasslands, and inland dune scrub are contained in the ERPP, and the reader is encouraged to refer to these volumes for more information (CALFED 2000b). For the purposes of this Conservation Strategy, the discussion on restoring upland habitats will be focused on seasonally-inundated floodplains and protection of agricultural and open space lands for wildlife-compatible uses.

With increasing sea level, global warming, and regional climate change, uplands adjacent to Delta tidal fresh and brackish wetlands will be important for future uphill colonization of these wetlands. In light of these expected changes, protection of uplands from ongoing conversion to urban uses should be a high priority to allow adaptation to climate change and maintain sustainable natural aquatic communities into the future.

Much has been learned since 2000 about creating habitats in upland areas, particularly with respect to seasonally-inundated floodplains and their importance to many of the Delta's aquatic species. As knowledge has increased, the risk and uncertainty associated with restoring this habitat is decreasing. Thus, restoration of seasonally-inundated floodplains is a very high priority for the Delta in the near term.

Delta Floodplain. A natural floodplain is an important component of rivers and estuaries that allows many essential ecological functions to occur. Healthy floodplains are morphologically complex. They include backwaters, wetlands, sloughs, and distributaries that carry and store floodwater. Floodplain areas can constitute islands of biodiversity within semi-arid landscapes, especially during dry seasons and extended droughts. The term *floodplain* as used here means the generally flat area adjoining rivers and sloughs that are inundated every 1.5 to 2 years when flows exceed the capacity of the channel (bank full discharge). Peak flows in winter and spring that occur every 1.5 to 2 years are considered by river geomorphologists to be the "dominant discharge" that contributes the most to defining the shape and size of the channel and the distribution of sediment, bar, and bed materials. Larger flood events can cause major changes to occur, but they do not happen often enough to be the decisive factor in river geomorphology.

Floodplain areas have the potential to support highly productive habitats, as they represent a heterogeneous mosaic of habitats including riparian habitat, freshwater tidal marsh, seasonal wetlands, perennial aquatic, and perennial grassland habitats, in addition to agricultural lands. During inundation floodplains are used by numerous native fish for spawning and early growth (Moyle 2002). There has been extensive research on the Yolo Bypass and lower Cosumnes River, in addition to some research in the Sutter Bypass, indicating that native resident and migratory fish show a positive physiological response (i.e., enhanced growth and fitness) when they have access to floodplain habitats (Moyle et al. 2004, Ribeiro et al. 2004, Moyle et al. 2007), which likely benefits them as they complete subsequent stages of their respective life cycles. Inundated floodplain areas provide important spawning and rearing habitat for splittail and rearing habitat for juvenile Chinook salmon (Sommer et al. 2001, Sommer et al. 2002, Moyle et al. 2007). Splittail need about 30 consecutive days of floodplain inundation to produce good survival through the larval stage and survival improves with longer durations (Moyle et al. 2004). Without access to adequate floodplain spawning habitat, splittail reproduction declines drastically as seen during the late 1980s and early-1990s.

Managing the frequency and duration of floodplain inundation during the winter and spring, followed by complete drainage by the end of the flooding season, could favor native fish over non-natives (Moyle et al. 2007, Grimaldo et al. 2004) and reduce nuisance insect problems. Frequency, timing, and duration of inundation are important factors that influence ecological benefits of floodplains. To favor splittail recruitment and benefit salmon fry and smolt growth, DFG recommends during above normal and wet years, once 10 days of floodplain inundation have been achieved based on runoff and discharge from upstream reservoirs between January 1 and May 30, then reservoir discharges should be continued to maintain uninterrupted inundation for at least 30 days in the Yolo Bypass and at suitable locations in the Sacramento River or the San Joaquin River (DFG 2010b).

Studies on the Cosumnes and Sacramento Rivers indicate that dynamic processes are needed to support complex dynamic riparian habitats and upland systems which form the floodplain habitat (Moyle et al. 2007). Native plants and animals have adapted to the random brief floodplain events that are characteristic of California's hydrology. Riparian habitats would be a component of these future restoration actions. Extant riparian habitats exist along levees and at the higher elevations in intertidal habitats, and in floodplain habitats – usually on fluvial soils or where levees are created with a mineral soil. The voluntary recruitment of this habitat type on Prospect Island and the higher elevation areas of Liberty Island and Little Holland Tract underscore the proclivity of natural restoration when proper soil conditions and elevation occur.

Stage 2 Actions for Floodplains:

Action 1: Continue coordination with Yolo Basin Foundation and other local groups to identify, study, and implement projects on public or private land with willing participants, to create regionally significant improvements in habitat and fish passage.

Action 2: Continue implementing projects at the Cosumnes River Preserve, such as restoring active and regular flooding regimes and flood riparian forest habitat; measuring flora and fauna response to restoration; and monitoring surface and groundwater hydrology and geomorphic changes in restored areas.

Action 3: Pursue opportunities for land and easement acquisitions in the Yolo Bypass and along the lower Cosumnes and San Joaquin Rivers, which could be utilized as floodplain inundation areas in the near term or in the future.

Research on the Cosumnes River also shows the many ecosystem benefits that floodplains provide. The Cosumnes River is the only remaining unregulated river on the western slope of the Sierra Nevada. The Cosumnes River Preserve comprises 46,000 acres. The free-flowing nature of the river allows frequent and regular winter and spring overbank flooding that fosters the growth of native vegetation and the wildlife dependent on those habitats. In addition to the value of floodplain habitat to the Delta's native species, floodplains are believed to enhance the estuarine food web, as they support high levels of primary and secondary productivity by increasing residence time and nutrient inputs into the Delta (Sommer et al. 2004). Ahearn et al. (2006) found that floodplains that are wetted and dried in pulses can act as a productivity pump for the lower estuary. With this type of management, the floodplain exports large amounts of Chlorophyll *a* to the river. Floodplain habitat on the Cosumnes River Preserve has been shown to provide many benefits to native fish (Swenson et al. 2003, Ribeiro et al. 2004, Grosholz and Gallo 2006, Moyle et al. 2007).

Because floodplain areas are inundated only seasonally, many other habitat types that occur in upland areas can be accommodated on floodplains when high winter and early spring flows are not present. The Department of Water Resources Flood Protection Corridor Program provides grant funding to local agencies and nonprofit organizations for nonstructural flood management projects that include wildlife habitat enhancement and/or agricultural land preservation, and acquisition of flood easements. Such easements provide a way to bring floodplain benefits to species seasonally, while also accommodating agricultural production in summer, fall, and early winter. Delta crops such as rice, grains, corn, and alfalfa provide food for waterfowl and other terrestrial species, and, with appropriately timed plowing and harvest, may serve as surrogate habitat in the absence of historical habitat such as tidal marsh. From Highway 99 west to the Cosumnes River Preserve is a good example of an area that provides a wildlife-friendly agriculture mix. It is the largest conservation easement acquisition funded by ERP during Stage 1. The ERP also provided funding for planning activities or property acquisitions and restoration of wildlife friendly agriculture in the Yolo Bypass, along the Cosumnes River, and along the San Joaquin River near Mossdale Crossing.

Although the benefits of floodplains have been demonstrated, there are several cautions related to restoring seasonal floodplains:

- Restoration must incorporate as much natural connection with the river as possible, to reduce potential stranding of native fish. Large-scale flooding events also help reduce stranding by creating channels on the landscape which allow for natural drainage, and multiple pulse flows help ensure fish receive the migratory cues they need. Deep drainage canals or other unnatural scour holes deeper than a couple feet should be removed. Such areas remain too cool during drainage and don't provide the emigration cues needed for most fishes.
- The periodic wetting and drying of floodplain areas make these areas especially prone to methylmercury production and transport. Within the context of the Delta Total Maximum Daily Load (TMDL) for methylmercury that is currently being developed, floodplain restoration activities should include the investigation and implementation of Best Management Practices (BMPs) to control methylmercury production and/or transport.

Delta-Upland Transitional Corridor. The establishment of a corridor of protected agricultural and natural lands is needed to protect valuable habitats and to facilitate the movement of wildlife between the the Delta's Cache Slough area and the Denverton Slough in Suisun Marsh, this area currently contains a mosaic of perennial grasslands and vernal pool areas, and has been identified by local planners as having great potential for ecological benefits from restoration.

Dune Scrub Habitat. Two ERP grants have been used to fund surveys to locate potential habitat restoration sites capable of supporting Antioch dunes evening primrose, Contra Costa wallflower, and Lange's metalmark butterfly. Potential areas were located and are being assessed for enhancement, but no enhancement has been funded nor have funds for annual monitoring and reporting been identified. Continued evaluation and enhancement of dune scrub habitat is needed during Stage 2 implementation.

Delta and Suisun Marsh Intertidal Areas. Tidal marshes across North America have been shown to play a critical role for native fish by providing improved foraging opportunities, increased growth, and refuge from predators (Boesch and Turner 1984, Baltz et al. 1993, Kneib 1997, Madon et al. 2001). The tidal marshes of the Delta have received relatively little study; however, research conducted in the San Francisco Estuary and elsewhere along the Pacific coast has shown tidal marsh benefits to native fish, especially salmonids (Simenstad 1982, West and Zedler 2000, Bottom et al. 2005, Maier and Simenstad 2009).

Intertidal areas in the Delta are best characterized as lands between one and seven feet above sea level, depending on location (Figure 4). All lands in the intertidal range are assumed to have the ability to support some tidal marsh habitats (either brackish or freshwater) with associated mudflats, sloughs, channels, and other open water features. Some areas are capable of supporting large areas of contiguous habitat, and others may support only small patches (e.g., mid-channel islands and shoals). Properly functioning tidal marsh habitats have subtidal open water channels with systems of dendritic and progressively lower-order intertidal channels that dissect the marsh plain. These diverse habitats provide structure and processes that benefit both aquatic and terrestrial species.

ERPP Vision for Saline Emergent Wetland: Increase the area and protect the quality of existing saline emergent wetlands from degradation or loss. Wetland habitat will be increased to assist in the recovery of special-status plant, fish, and wildlife populations. Restoration will provide high-quality habitat for other fish and wildlife dependent on the Bay-Delta.

ERPP Vision for Fresh Emergent Wetland: Increase the area and improve the quality of existing fresh emergent wetlands from degradation or loss and increase wetland habitat. Achieving this vision will assist in the recovery of special-status plant, fish, and wildlife populations, and provide high-quality habitat for other fish and wildlife dependent on the Bay-Delta.

ERPP volume 1, July 2000

The rationales for protection and enhancement of fresh and brackish tidal marsh areas are contained in the ERPP, and the reader is encouraged to refer to these volumes for more information (CALFED 2000a). For the purposes of this Conservation Strategy, the discussion on restoring habitats in intertidal areas will focus on what has been learned about the importance of these areas since 2000, particularly as it relates to various species' use of tidal marsh areas and the role of these areas in enhancing the aquatic food web.

Studies of species' use of tidal marsh habitat in the Delta are limited, but ERP and other programs have conducted several studies since the ROD that continue to augment knowledge regarding the role of intertidal habitats for desirable aquatic species. The largest effort to study tidal marsh habitat in the Delta and its benefits to native fish was a series of projects known as the BREACH studies (Simenstad et al 2000), which investigated geomorphology, sedimentation, and vegetation at four reference sites and six restored tidal marsh sites in the Delta. Of the one reference and three restored sites sampled for fish and invertebrates, relative density of both native and introduced fish species was higher at the reference marsh (Simenstad et al. 2000). Although all of the sites were dominated by the introduced fish, the abundance of native fish was highest in winter and spring (Grimaldo et al. 2004). In stomach content analyses, all life stages of chironomids (midges) were shown to be a very important food source for fish, both adjacent to tidal marsh habitats and in open water areas. Chironomid association with marsh vegetation indicates the importance of this habitat to the aquatic food web.

Overall abundance of fish larvae was highest in marsh edge habitat when compared to shallow open water and river channels (Grimaldo et al. 2004). Unfortunately, the BREACH study sites are not representative of the Delta's large historical marshes. Most sites are small and severely degraded areas located along the edge of levees or on small channel islands.

An example of an ongoing study of species use of tidal marsh within intertidal land elevations is the ongoing monitoring associated with restoration of Liberty Island, a 5,209-acre island in the northern Delta that breached naturally nearly ten years ago. The Liberty Island project provides a good example of passive restoration of various habitat types, including some deeper, open water, subtidal, areas at the southern end and freshwater emergent tidal marsh and sloughs with riparian habitat at the higher elevations at the northern end. Liberty Island's sloughs are populated with otters, beavers, muskrats, and numerous species of ducks and geese. Native fish species using the area include Chinook salmon, splittail, Longfin and delta smelt, tule perch, Sacramento pike minnow, and starry flounder. In some areas, native species account for up to 21 percent of the fish collected; for reference, native species only account for approximately 2 to 10 percent elsewhere (Malamud-Roam et al. 2004). Ongoing monitoring at Liberty Island for almost eight years is showing that fish species assemblages at this restored area increasingly resemble assemblages at reference marsh sites. The ERP hopes to build upon the success of this restoration project by increasing the size of the project and developing a dendritic channel system on its interior (DFG 2008b).

In many estuaries of the Pacific Northwest, including the Columbia and Fraser river estuaries, Chinook salmon fry usually occupy shallow, near shore habitats including tidal marsh, where they feed and grow and adapt to salt water (Healey 1982; Levy and Northcote 1982; Simenstad et al. 1982). They often move far up into tidal wetlands on high tides, and may return to the same channels on several tidal cycles (Levy and Northcote 1982). In estuaries throughout Washington, subyearlings and fry occur mainly in marshes when these habitats are available (Simenstad et al. 1982). Tidal marsh restoration has been shown to result in recovery of life history diversity in the Salmon River estuary of Oregon. Tidal marsh habitat in this estuary had largely been lost due to diking by the early 1960s (Gray et al. 2002). In surveys conducted in the mid-1970s, Chinook salmon juveniles were found to rear in the estuary only to a limited extent during the spring and early summer months (Bottom et al. 2005b). Three sites in the estuary were restored to tidal action between 1978 and 1996 and by the early 2000s juvenile salmon were making extensive use of restored marsh habitats for rearing, with estuarine resident times up to several months (Bottom et al. 2005b). Tidal marsh restoration expanded life history variation in the salmon population; the amount of time spent rearing in the estuary was variable and juveniles moved into the ocean over a broad range of time and at a broad range of sizes (Bottom et al. 2005b). Chinook salmon show remarkable phenotypic plasticity in their ability to adapt to new locations and form multiple life history types from a single introduction of fish (Williams 2006); with restoration of tidal marsh in the Delta, Chinook salmon in the Sacramento and San Joaquin rivers may be able to regain varied life history types over time.

A number of additional studies are demonstrating that regardless of species actual use of tidal marsh areas, these habitats could be extremely important for their possible role in augmenting the Delta's aquatic food web, particularly in the saline portion of the estuary.

- Tagging and stomach content studies show that Chinook salmon fry may use intertidal habitat. According to Williams (2006), tagged hatchery fry remain in the Delta up to 64 days and tend to occupy shallow habitats, including tidal marsh. Stomach contents of salmon rearing in the Delta are dominated by chironomids and amphipods, suggesting that juvenile salmon are associated with marsh food production. Juvenile salmon in the Delta also undergo substantial growth (Kjelson et al. 1982, Williams 2006). These findings coincide with studies elsewhere in the Pacific Northwest (Healey 1982, Levy and Northcote 1982, Simenstad et al. 1982), which found that Chinook salmon fry usually occupy shallow, near-shore habitats including tidal marshes, creeks, and flats, where they feed and grow and adapt to salt water (Healey 1982; Levy and Northcote 1982; Simenstad et al. 1982), and that they often move into tidal wetlands on high tides and return to the same channels on several tidal cycles (Levy and Northcote 1982). Also, in estuaries throughout Washington, subyearlings and fry occur mainly in marshes when these habitats are available (Simenstad et al. 1982). In fact, Healey (1982) identified freshwater tidal marshes as the most important habitat to juvenile salmon in the Pacific Northwest. More recently, in the Columbia River estuary, emergent tidal marsh has been shown to support the greatest abundance of insects and highest stomach fullness scores for juvenile salmon, with chironomids again being the dominant prey type (Lott 2004).
- In a study of carbon types and bioavailability, tidal marsh sloughs in Suisun Bay had the highest levels of dissolved, particulate, and phytoplankton-derived carbon (Sobczak et al. 2002). Chlorophyll *a* concentration, used as a measure of standing crop of phytoplankton, was highest in tidal sloughs and supports the greatest zooplankton growth rate (Mueller-Solger et al. 2002) when compared to other habitat types, such as floodplains and river channels. High levels of primary production (as measured by Chlorophyll *a*) seen in several regions in the interior of Suisun Marsh are likely due to high residence time of water, nutrient availability, and absence of non-native clams (DFG 2008b).
- Modeling (Jassby et al. 1993 and Cloern 2007) and empirical studies (Lopez et al. 2006) show that productivity from high-producing areas, such as marsh sloughs, is exported to other connected habitats. Phytoplankton biomass location is only weakly correlated with phytoplankton growth rates across several aquatic habitats. Therefore other processes, including mixing and transport, are important in determining phytoplankton distribution in the Delta. The data shows that Suisun Marsh plays a significant role in estuarine productivity by providing an abundant source of primary production and pelagic invertebrates, both of which are significantly depleted in bay and river channel areas (DFG 2008b).

Tidal marsh may also help improve the pelagic food web by reducing the concentration of ammonium in the water. Ammonium has been shown to inhibit phytoplankton blooms in Suisun Bay and possibly other open-water habitats in the Delta by inhibiting the uptake of nitrate by diatoms (Wilkerson et al. 2006, Dugdale et al. 2007). In a nutrient-rich estuary in Belgium, tidal freshwater marsh was shown to transform or retain up to 40 percent of ammonium entering the marsh during a single flood tide (Gribsholt et al. 2005). Nitrification (the conversion of ammonium to nitrate) accounted for a large portion of the transformation (30 percent). Nitrification rate in the marsh system was measured at 4 to 9 times that which occurs in the adjacent water column (Gribsholt et al. 2005). Increased tidal marsh habitat may, therefore, improve the base of the aquatic food web in the Delta by increasing primary production within the marshes, and by increasing the ratio of nitrate to ammonia in the estuary.

At the outset of ERP, restoration of intertidal and shallow subtidal areas (at that time, termed “shallow water habitat”, defined as water less than two meters in depth at mean lower low water) was a very high priority, and based on what has been learned since 2000, continues to be a very high priority for the Delta. However, the extensive spread of non-native submerged aquatic vegetation (SAV) in intertidal and shallow subtidal areas renders them less suitable for native fish (Nobriga et al. 2005, Brown and Michniuk 2007, Nobriga and Feyrer 2007). Brown and Michniuk (2007) reported a long-term decline in native fish abundance relative to non-native fish. This decline in native fish abundance occurred coincident with the range expansion of non-native SAV (principally *Egeria densa*) and non-native black bass (centrarchids), both of which are discussed further in the Stressors section below. Predation by largemouth bass is one mechanism hypothesized to result in low native fish abundance where SAV cover is high (Brown 2003, Nobriga et al. 2005). Largemouth bass have a higher per-capita predatory influence than all other piscivores in SAV-dominated intertidal zones (Nobriga and Feyrer 2007). Restoration of Delta intertidal habitats must, therefore, be designed and managed to discourage non-native SAV, or native fish may not benefit from them (Grimaldo et al. 2004, Nobriga and Feyrer 2007).

In summary, restoration of tidal marsh areas in the Delta remains a very high priority for the ERP; however, several cautions must be kept in mind. A major concern is that restored tidal marsh would be colonized by non-native species, which would in turn limit the benefits to native species. Another potential constraint facing the restoration of intertidal habitats is the methylation of mercury in sediments. Therefore, restoration of tidal marsh within intertidal land elevations should be designed as large-scale experiments, and should be rigorously monitored to establish relationships between this habitat and species population abundance. As this information continues to be collected and synthesized, the risk and uncertainty associated with restoring this habitat are expected to decrease.

Subsided Delta Lands and Deep Open Water Areas. Subsided land areas in the Delta are best characterized as land well below current sea level (below approximately six feet in elevation), and include both terrestrial areas (islands that have subsided over time) and deep open water areas (subsided islands that flooded in the past and were never reclaimed). Aquatic habitats in this category include seasonal wetlands and ponds that occur within subsided land areas, in addition to deep open water areas that occur on flooded islands such as Franks Tract and Mildred Island (also called pelagic habitat).

Stage 2 Actions for Subsided Lands/Deep Open Water Areas:

Action 1: Implement wildlife-friendly agriculture and wetland projects.

Action 2: Secure easements and land interests on which subsidence reversal projects can occur.

Action 3: Continue research on the creation and management of deep open water areas (e.g., Liberty Island) to evaluate physical and biological properties and species use.

With increasing sea level, global warming, and regional climate change, the existing configuration of Delta levees and deeply subsided islands are not expected to remain intact over the long term. A forecast rise in sea level of approximately 55 inches over the next 50-100 years (Cayan et al. 2009) is expected to increase pressure on the Delta's levee system. Changes in regional climate and the shift of tributary peak runoff from spring to winter are expected to make extreme winter runoff events more frequent and intense, further compounding pressure on Delta levees seasonally. In light of these expected changes, in addition to human-induced impacts (e.g., increased runoff from continued conversion of open space lands to urban uses), there is a considerably higher likelihood of Delta levee failure and subsequent island flooding in the future. ERP implementation must therefore adapt to these expected pressures, including planning for optimizing the value of newly-flooded deep islands for the aquatic species that may utilize them in the future.

Terrestrial areas in this category include mainly agricultural lands, some of which are not in active agricultural production. Central Valley Joint Venture (2006) recognizes that agricultural easements to maintain waterfowl food supplies and buffer existing wetlands from urban development may become increasingly important in basins where large increases in human populations are predicted. In addition, ongoing rice cultivation may help minimize subsidence. Subsidence reversal, carbon sequestration, and wildlife-friendly agricultural projects are appropriate on these deep islands in the near term, as they are expected to provide benefits to the local economy, wildlife, and waterfowl while protecting lands from uses that may be unsustainable over the longer term.

The rationales for protection and enhancement of seasonal wetlands and wildlife-friendly agriculture are contained in the ERPP, and the reader is encouraged to refer to these volumes for more information (CALFED 2000b). For the purposes of this document, the discussion on restoring habitats on subsided lands will be focused on subsidence reversal and carbon sequestration, and on continuing to research and restore deep open water areas for the Delta's pelagic fish species, as these deep open water habitat types are known to be important, positively or negatively, for individual native pelagic fish species.

Delta Subsidence Reversal. The exposure of the bare peat soils to air causes oxidation and decomposition, which results in subsidence, or a loss of soil elevation, on Delta islands. Flooding these lands and managing them as wetlands reduces their exposure to oxygen, so there is less decomposition of organic matter, which stabilizes land elevations. Wetland vegetation cycles lead to biomass accumulation, which sequesters carbon and helps stop and reverse subsidence (Fujii 2007). As subsidence is reversed, land elevations increase and accommodation space (the space in the Delta that lies below sea level and is filled with neither sediment nor water), on individual islands is reduced (Mount and Twiss 2005). A reduction in accommodation space decreases the potential for drinking water quality impacts from salinity intrusion in the case of one or more levee breaks on deeply subsided Delta islands.

A pilot study on Twitchell Island funded by the ERP in the late 1990s investigated methods for minimizing or reversing subsidence. The study showed that by flooding soils on subsided islands approximately one foot deep, peat soil decomposition is stopped, and conditions are ideal for emergent marsh vegetation to become established. In the Twitchell Island pilot project, researchers saw some initial soil accumulation during the late 1990s and early 2000s, and noted that accretion rates accelerated and land surface elevation began increasing much more rapidly after about seven years, as plant biomass was accumulated over time. Land surface elevation is estimated to be increasing at an annual rate of around four inches, and is expected to continue to increase (Fujii 2007).

The USGS is interested in implementing a subsidence reversal program Delta-wide, given the results of their Twitchell Island pilot study. Such a program would involve offering financial incentives to landowners to create and manage wetland areas on their lands (Fujii 2007). Large-scale, whole-island approaches to reversing subsidence would be beneficial for multiple purposes. Programs that offer incentives for 10- or 20-year studies for subsidence reversal on large tracts of land could help improve Delta levee stability and reduce the risk of catastrophic failure. Assuming that accretion rates continue at about four inches annually, estimates suggest a 50 percent reduction in accommodation space in 50 years if subsidence could be pursued throughout the Delta. This reduction in accommodation space jumps to 99 percent over the next 100 years (Fujii 2007). Some deeply subsided lands could also be used as disposal sites for clean dredged sediments, providing local flood control improvements while helping raise land elevations on subsided islands more quickly. This accommodation space reduction, in addition to helping stabilize levees over the longer term, would create additional areas for restoration of additional tidal marsh habitat.

While the primary objectives of creating wetlands on deep Delta islands would be to reverse subsidence and sequester carbon, there would be significant ancillary benefits to wildlife such as waterfowl. Delta agricultural lands and managed wetland areas provide a vital component to Pacific Flyway habitat for migratory waterfowl by increasing the availability of natural forage, ensuring improved body condition and breeding success (CALFED 2000b).

Deep Open Water Habitat. All permanent aquatic habitats in the Delta are occupied by fish of some type. In planning for restoration of Delta aquatic habitats, it is important to consider which fish will occupy which habitat and when; and what type of benefits fish will gain from the habitat. Fish assemblages in the Delta, each with a distinct set of environmental requirements, include native pelagic species (e.g., delta and longfin smelt), freshwater planktivores, dominated by non-native species such as threadfin shad and inland silverside; anadromous species (e.g., salmon and steelhead), slough-residents associated with beds of SAV (e.g., centrarchide), and freshwater benthic species (e.g., prickly sculpin) (Moyle and Bennett 2008). Habitat diversity is necessary to support multiple fish assemblages in the Delta. Restoration efforts need to focus on creating habitats required by desirable species, while avoiding habitats dominated by undesirable species.

With the increasing threats of levee failure from continuing land subsidence, exacerbated by sea level rise, higher seasonal runoff, and random events such as an earthquake, the Delta is likely to have more large areas of deep, open water in the future (Moyle and Bennett 2008). Important attributes to manage to increase habitat variability and provide improved water quality conditions include salinity, contaminant inputs, and connectivity to surrounding habitats (Moyle and Bennett 2008). Fish assemblages will respond differently to future environmental changes.

New open water habitats may also result from intentional activities on a smaller and more managed scale than whole-island flooding. The intentional removal of levees on islands at the periphery of the Delta in order to create marsh habitat on intertidal land elevations would result in open water below the tidal zone similar to that which is developing at Liberty Island. Exchange of materials between the restored tidal marsh and adjacent open water could result in higher productivity in open water habitat. As mentioned in the discussion on tidal marsh restoration, the potential for SAV dominated by non-native species to establish in new shallow water environments is a concern. On Liberty Island, SAV has not become a dominant component of the open water habitat. This may be a result of tidal flow velocities, wind-induced disturbance and high turbidities, or some other factor. Continuing research and monitoring of the Liberty Island project will improve understanding of the dynamics of a large island breach at the periphery of the Delta, and help plan for future marsh or open water restoration projects.

There are many uncertainties related to future characteristics of flooded island and open water habitats (Moyle and Bennett 2008). These include configuration and location of flooded islands; physical properties such as depth, turbidity, flow, and salinity; biological properties such as productivity of phytoplankton and copepods; and susceptibility to invasion by non-native species such as *Egeria densa*, centrarchids, and invasive non-native clams. Adaptive management, combined with large-scale experimentation on new open water habitat, would help to reduce uncertainties. This could occur through the planned flooding of at least one Delta island, or through an organized study plan that would go into effect in the event of an unplanned levee breach (Moyle and Bennett 2008).

Appendix 4
Elevation Map

Note: All content of this appendix is newly adopted.

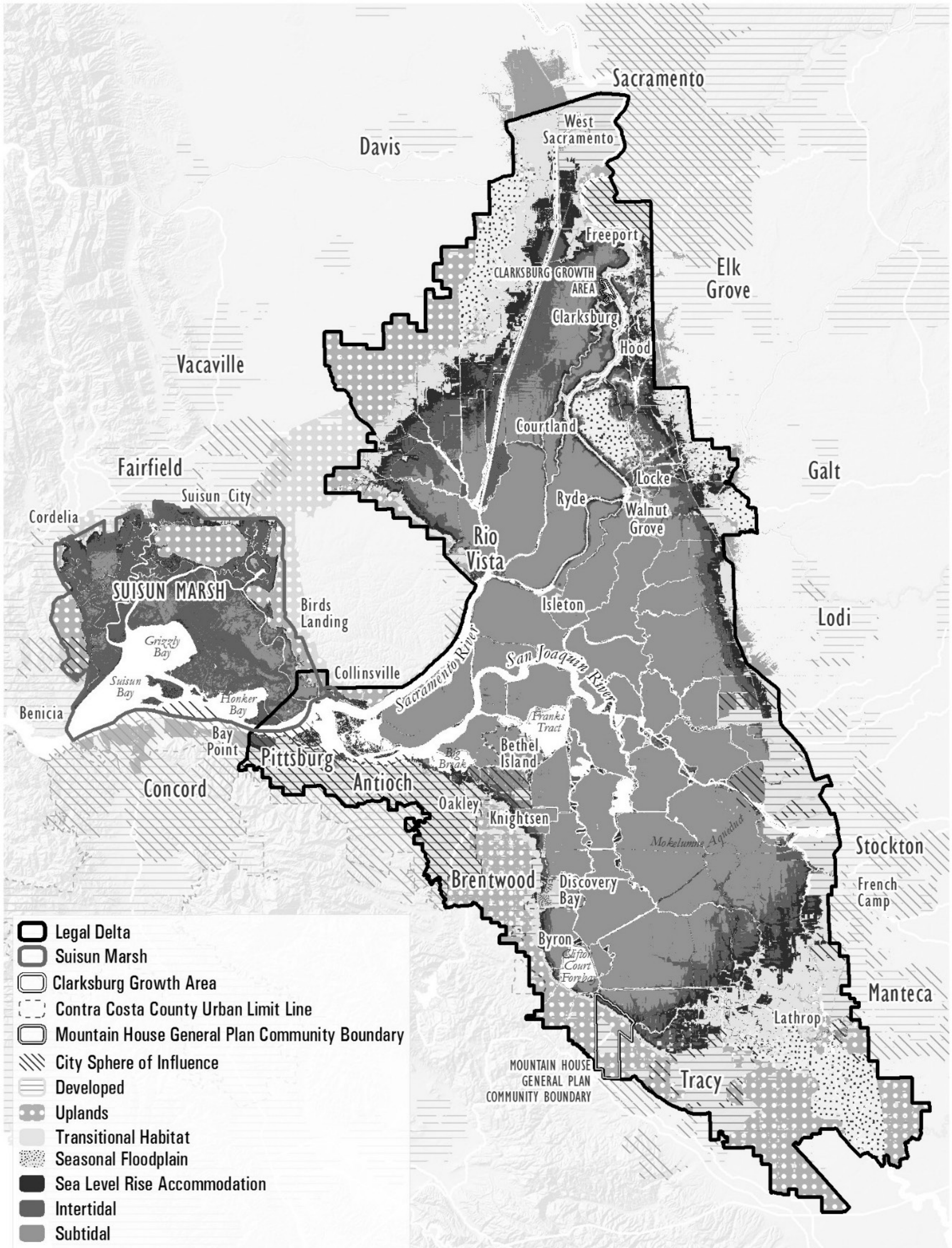


Figure 4-1
Habitat Types Based on Elevation, Shown with Developed Areas in the Delta and Suisun Marsh
Source: Adapted from DFG 2011

Appendix 5
Recommended Areas for Prioritization and Implementation of Habitat Restoration Projects

Note: All content of this appendix is newly adopted.

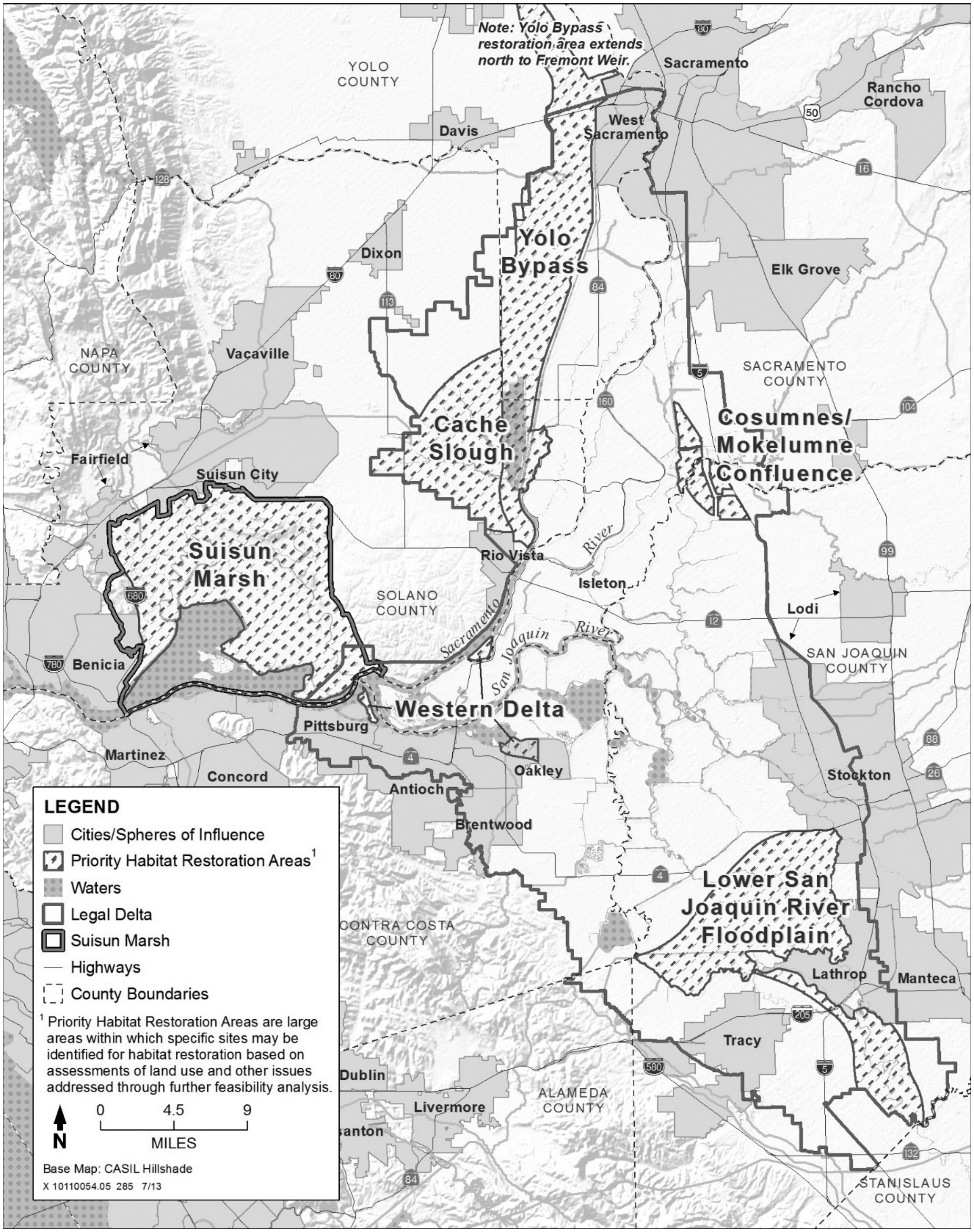


Figure 5-1

Recommended Areas for Prioritization and Implementation of Habitat Restoration Projects

Source: DFG 2011

Appendix 6
Delta Primary and Secondary Zones and Suisun Marsh

Note: All content of this appendix is newly adopted.

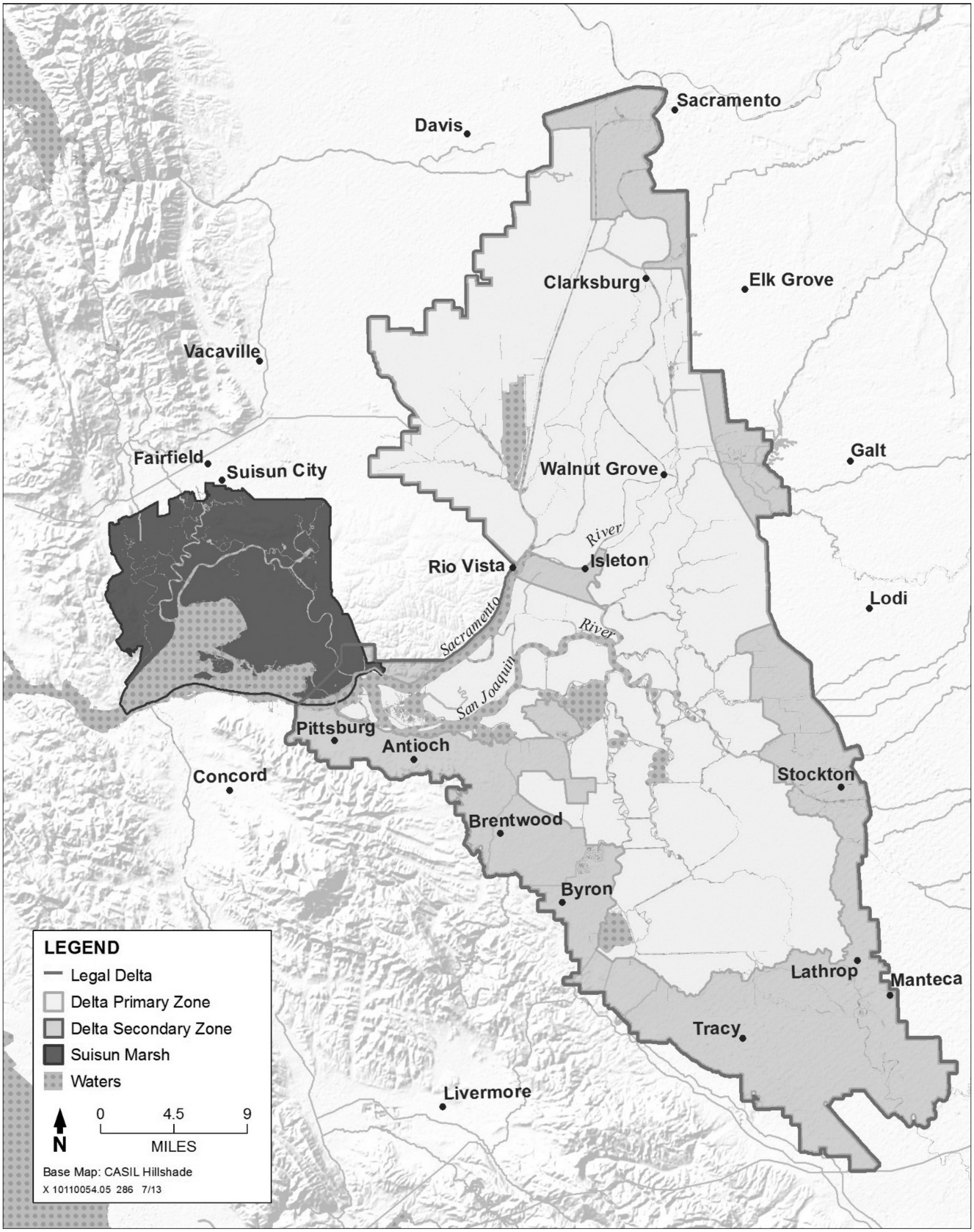


Figure 6-1
Delta Primary and Secondary Zones and Suisun Marsh

Appendix 7
Delta Communities

Note: All content of this appendix is newly adopted.

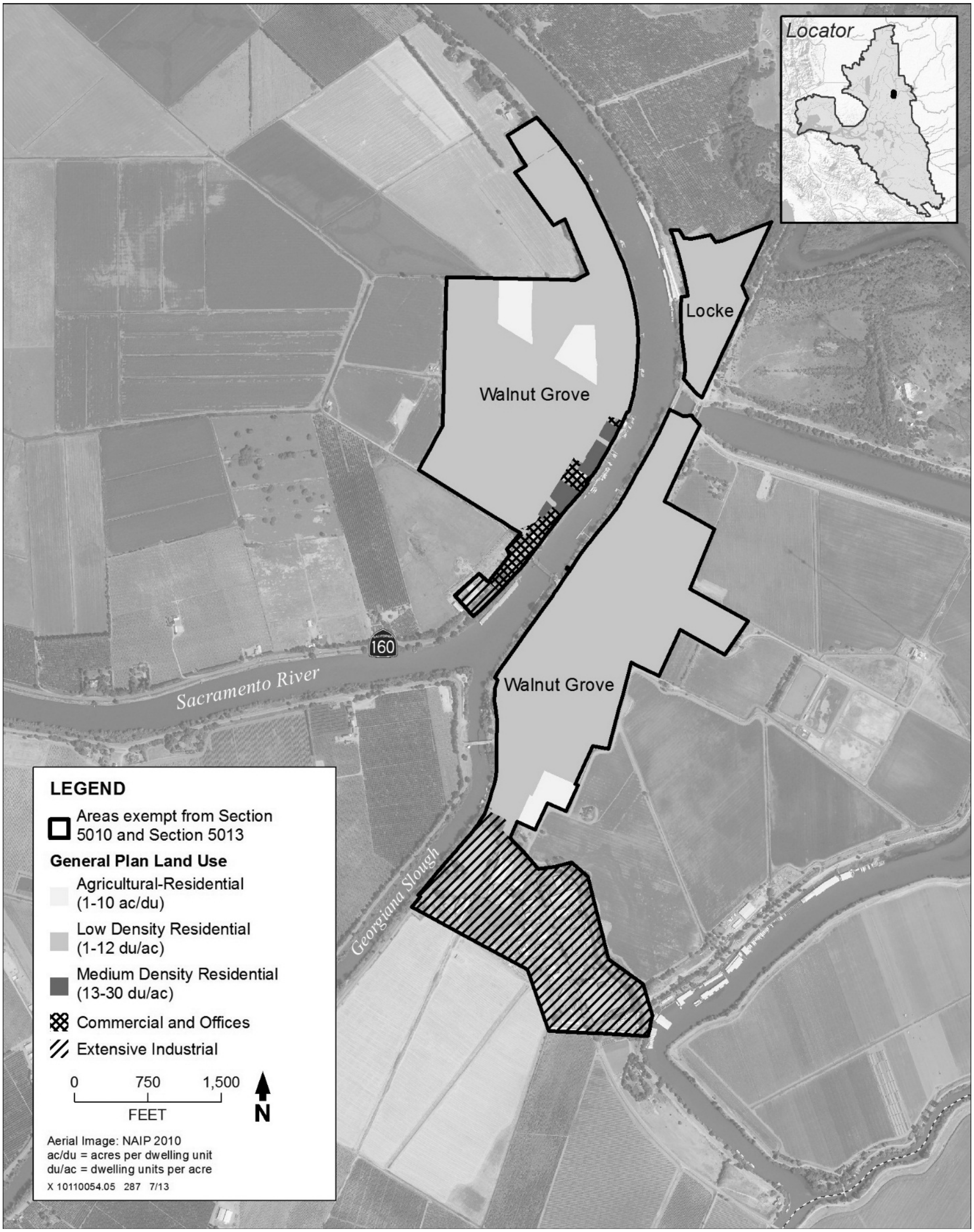


Figure 7-1
Towns of Locke and Walnut Grove
Source: Sacramento County 2011

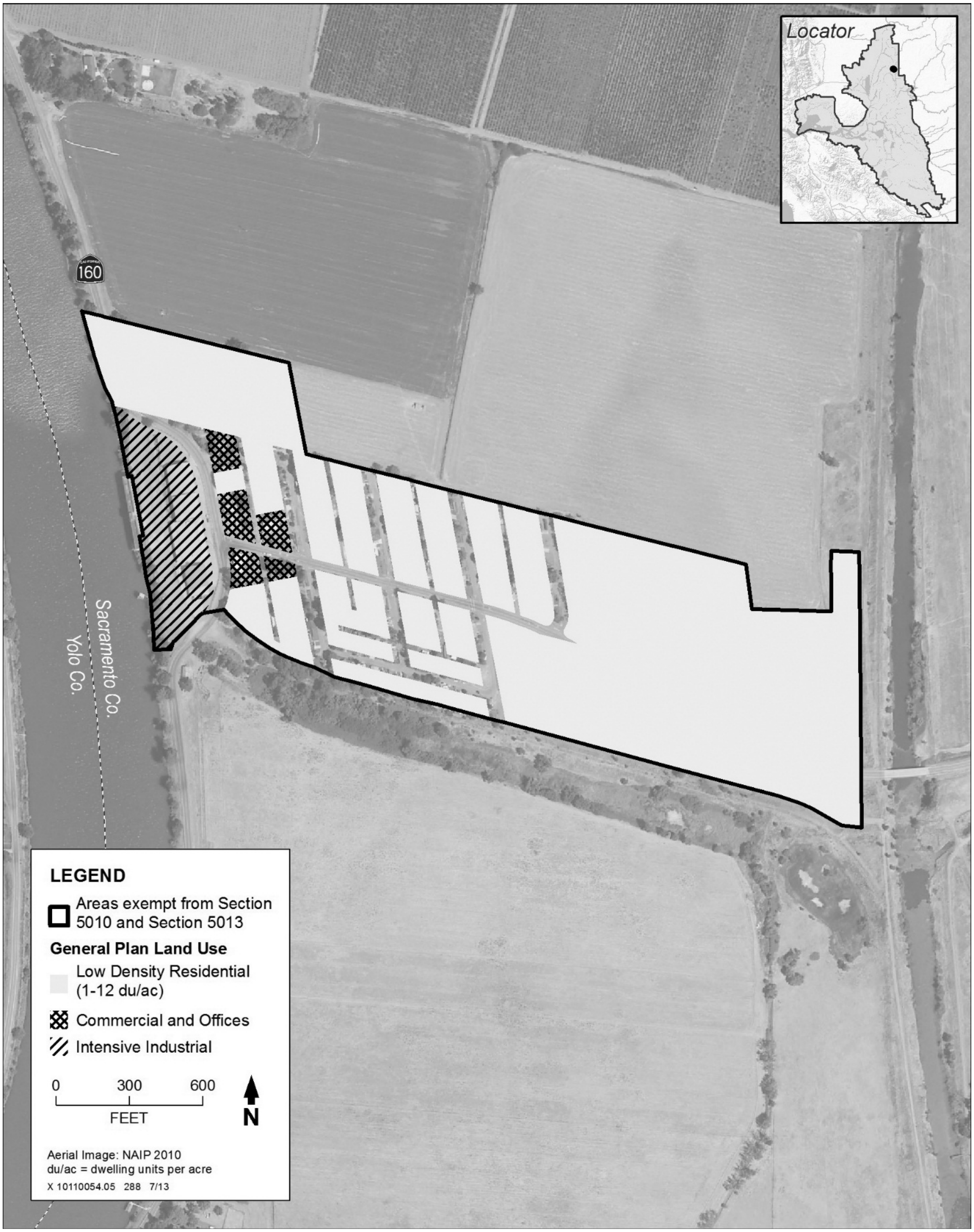


Figure 7-2
Town of Hood
Source: Sacramento County 2011, Sacramento County 2012, Sacramento County 2013

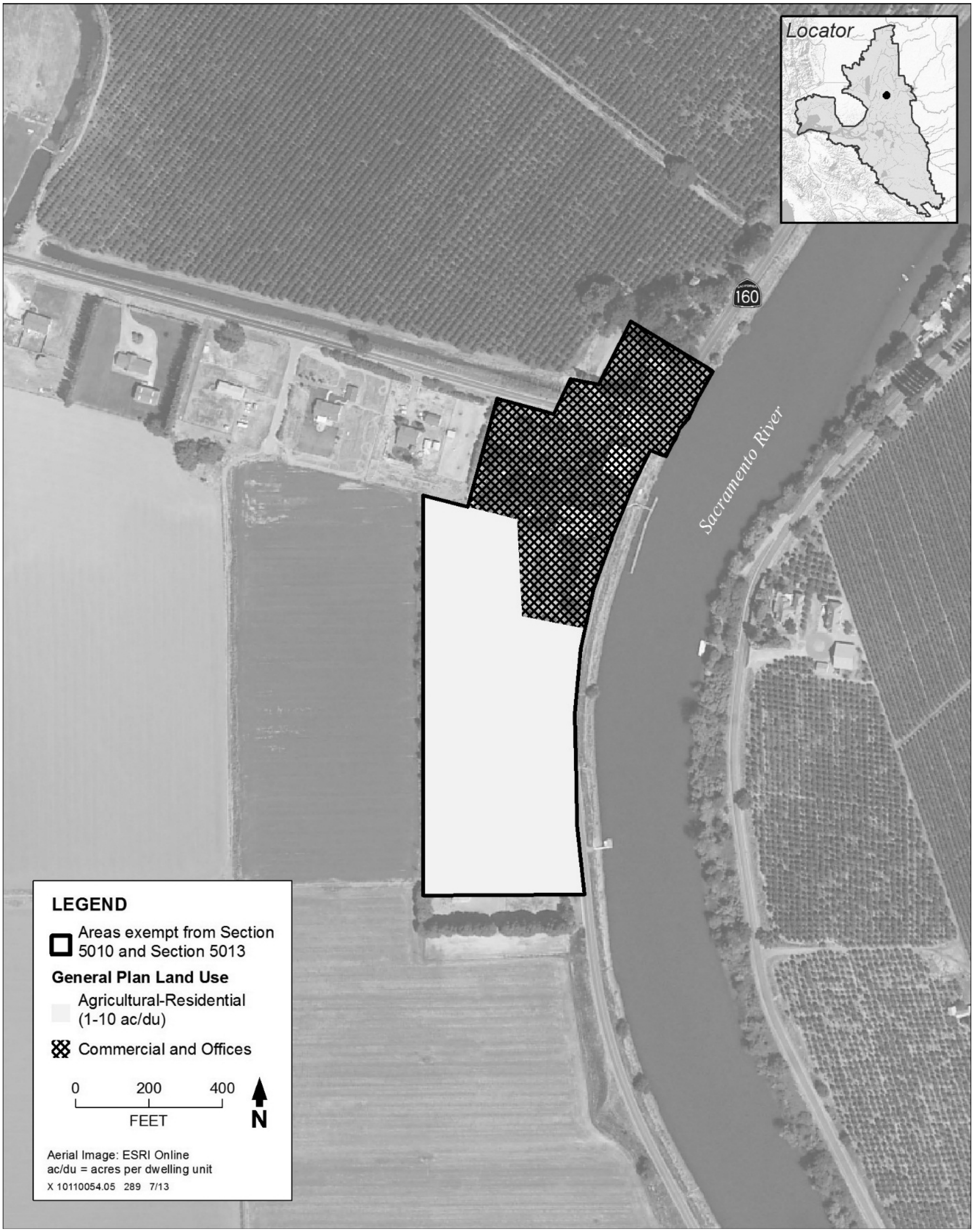


Figure 7-3
Town of Ryde
Source: Sacramento County 2011

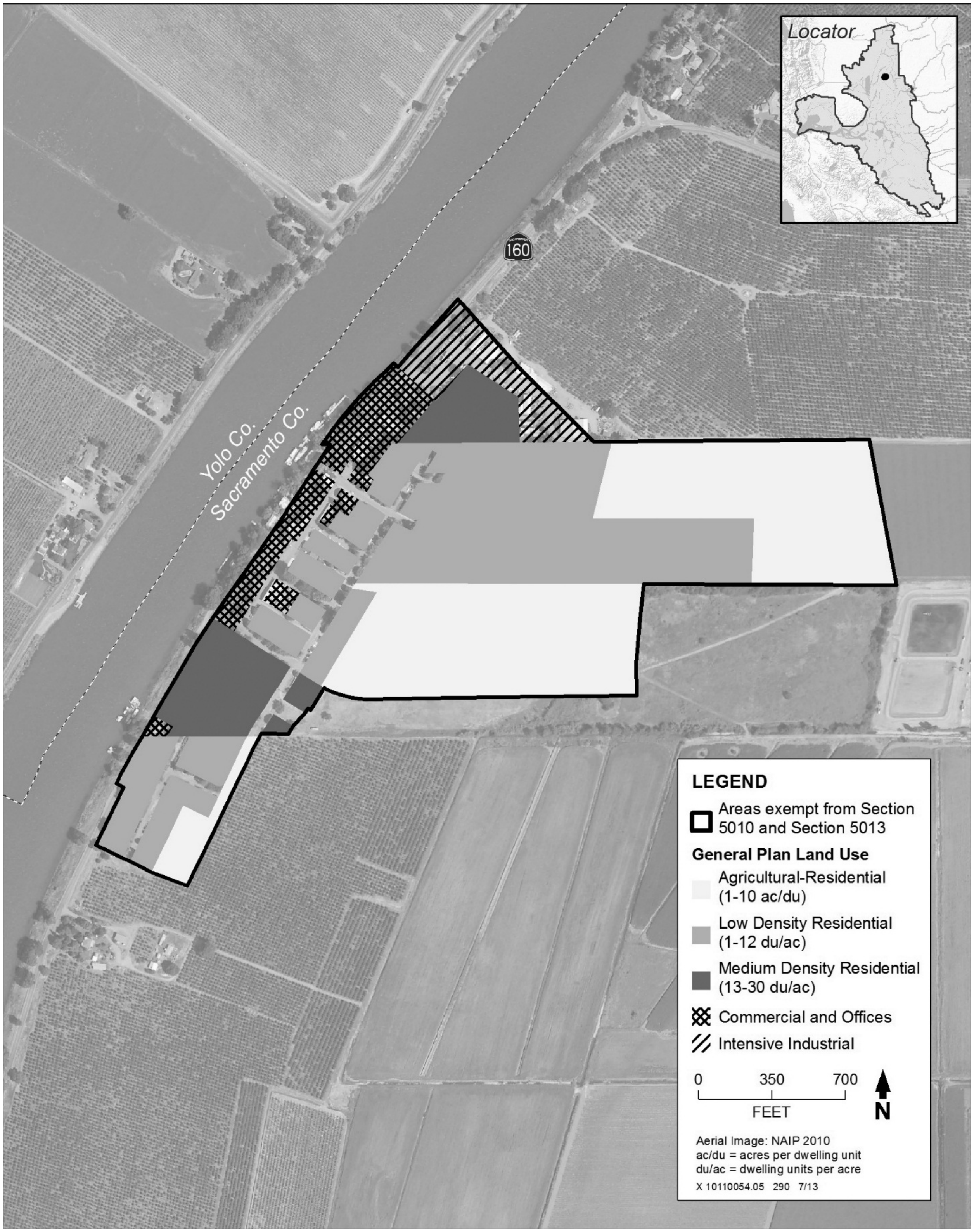


Figure 7-4
Town of Courtland
Source: Sacramento County 2011

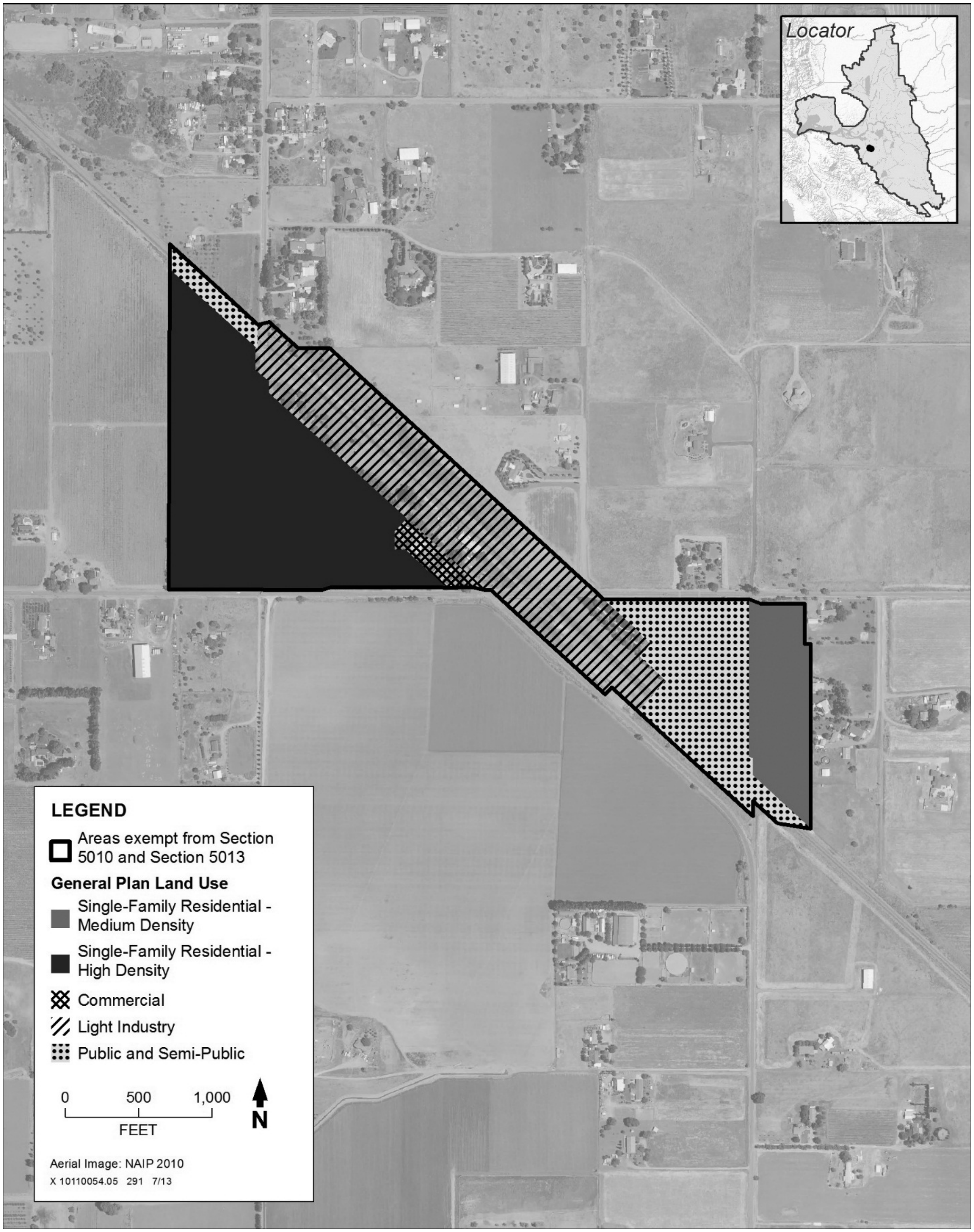


Figure 7-5
Town of Knightsen
Source: Contra Costa County 2011

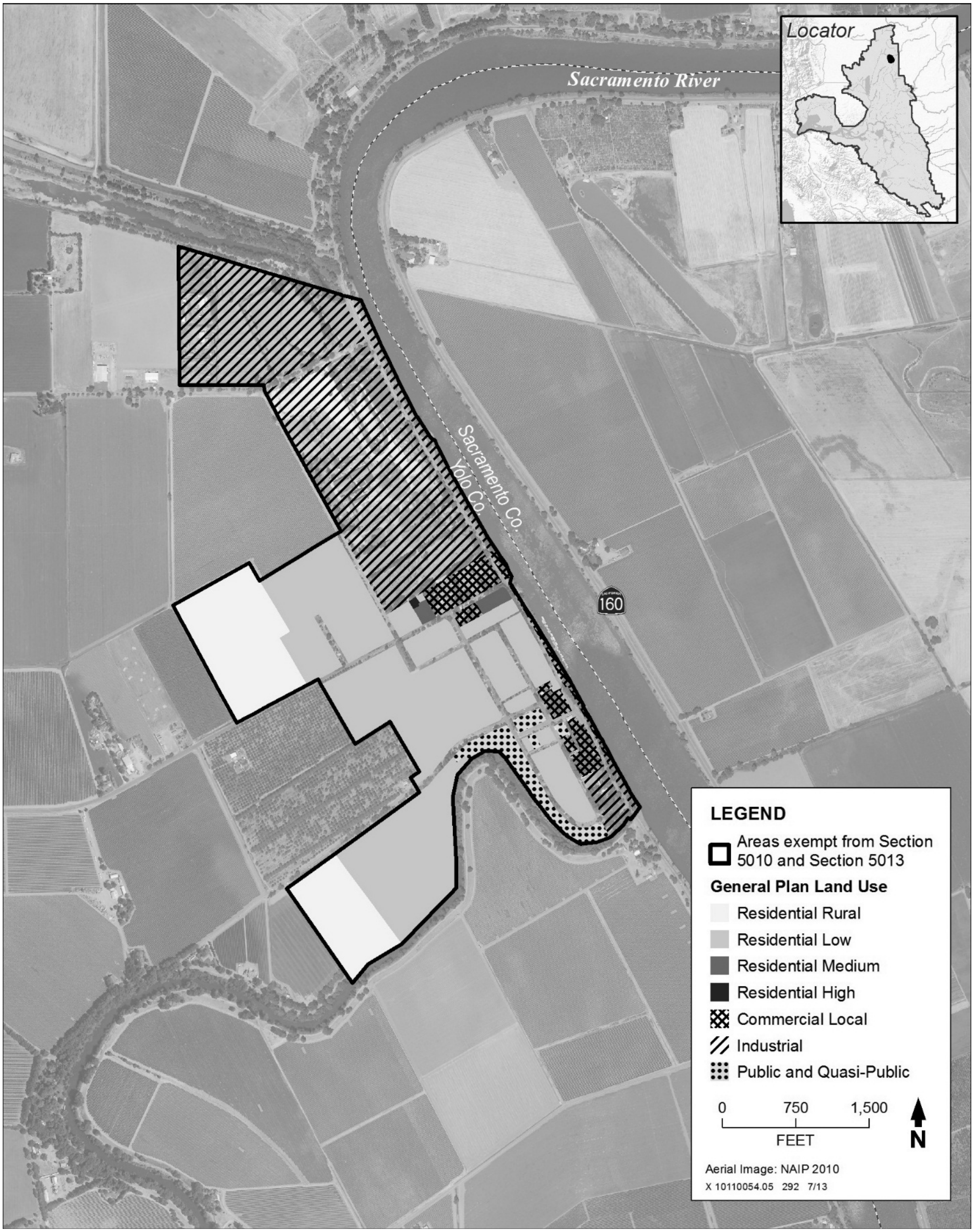


Figure 7-6
Town of Clarksburg
Source: Yolo County 2010

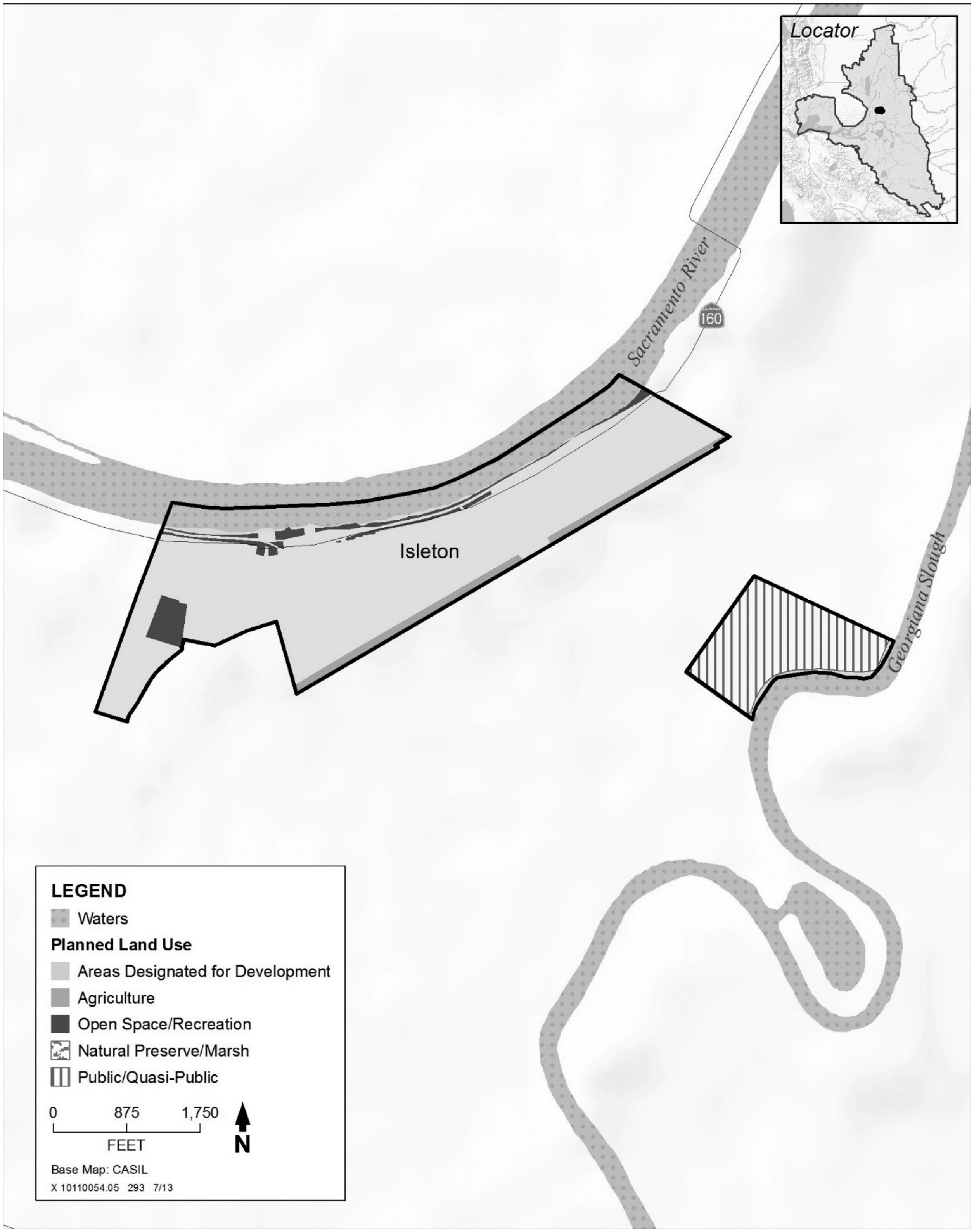


Figure 7-7
City of Isleton
Source: City of Isleton 2000

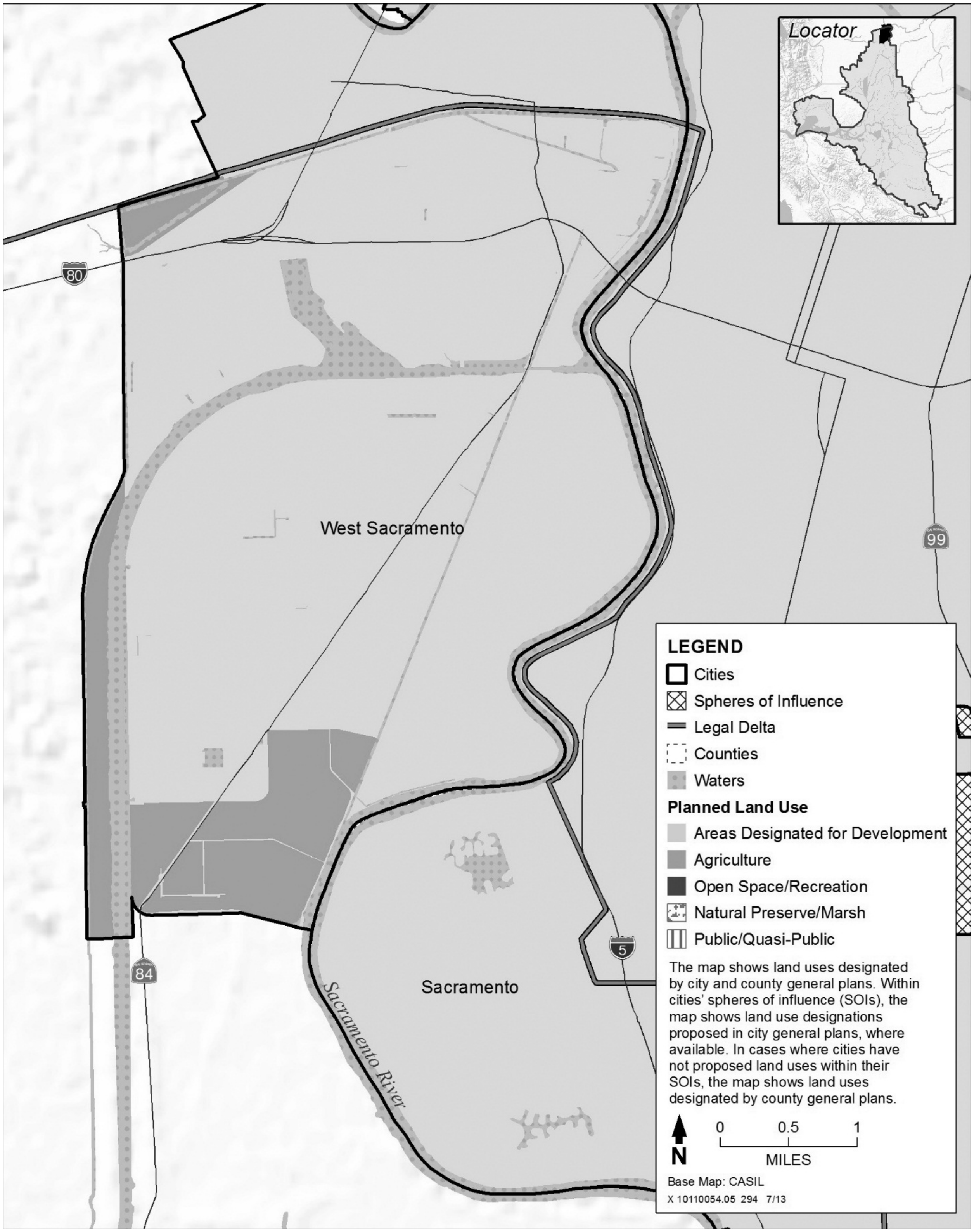


Figure 7-8
City of West Sacramento
Sources: City of Sacramento 2008, Sacramento County 2011, City of West Sacramento 2010

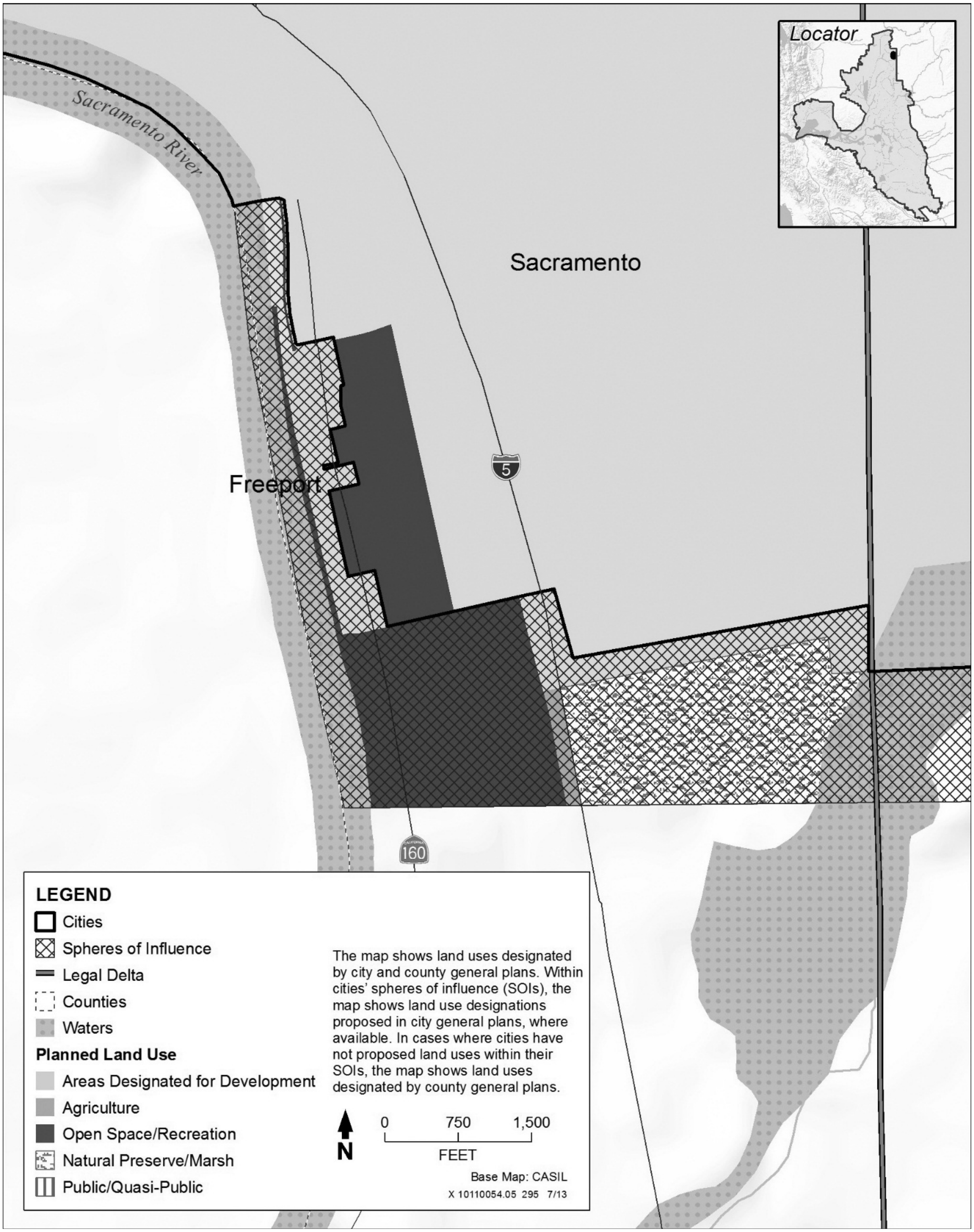


Figure 7-9
Town of Freeport and the City of Sacramento's Sphere of Influence
Sources: City of Sacramento 2008, Sacramento County 2012

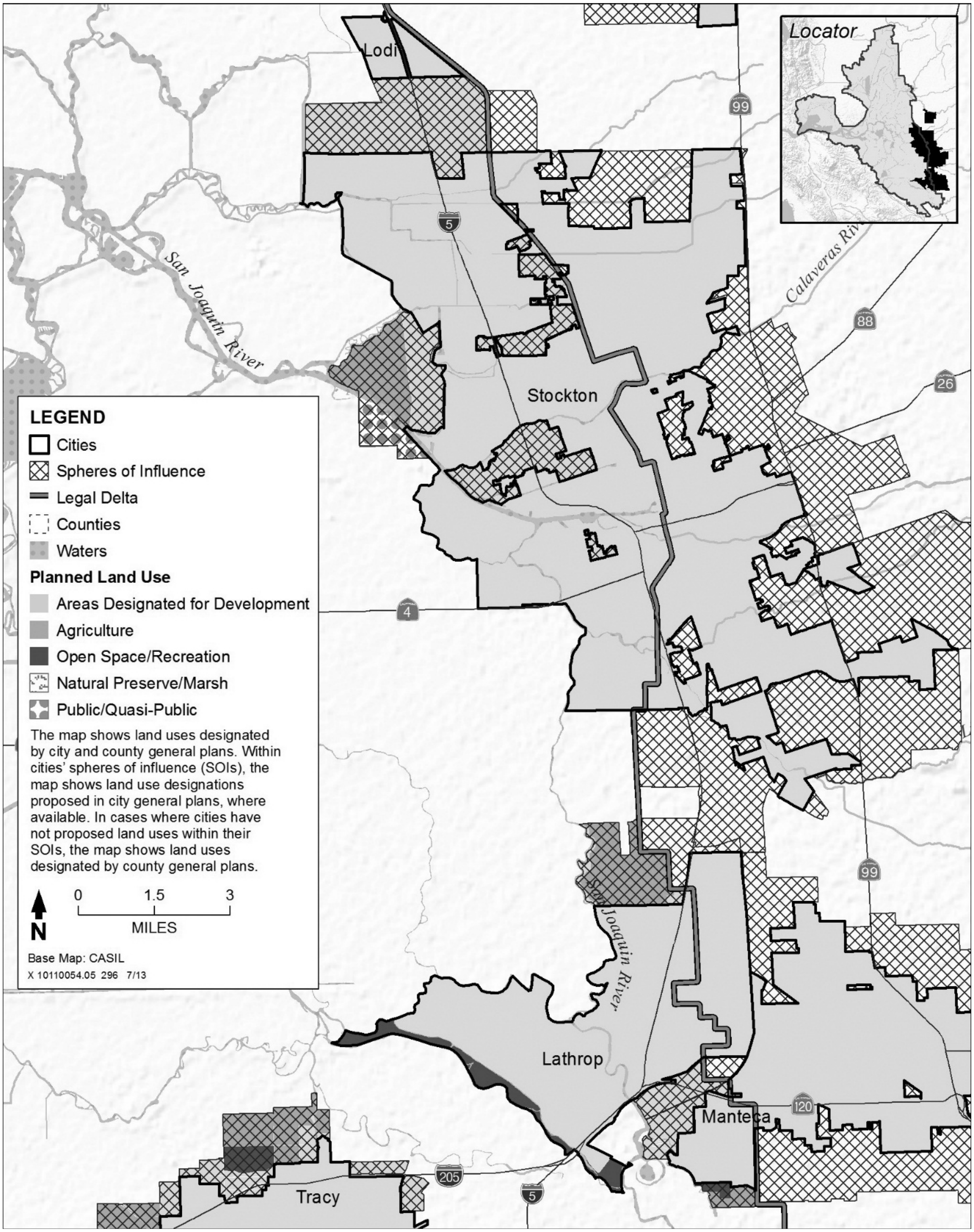


Figure 7-10
Cities of Stockton, Lodi, Lathrop, and Manteca and their Spheres of Influence
Sources: San Joaquin County 2008, City of Stockton 2011, City of Manteca 2012, City of Lathrop 2012

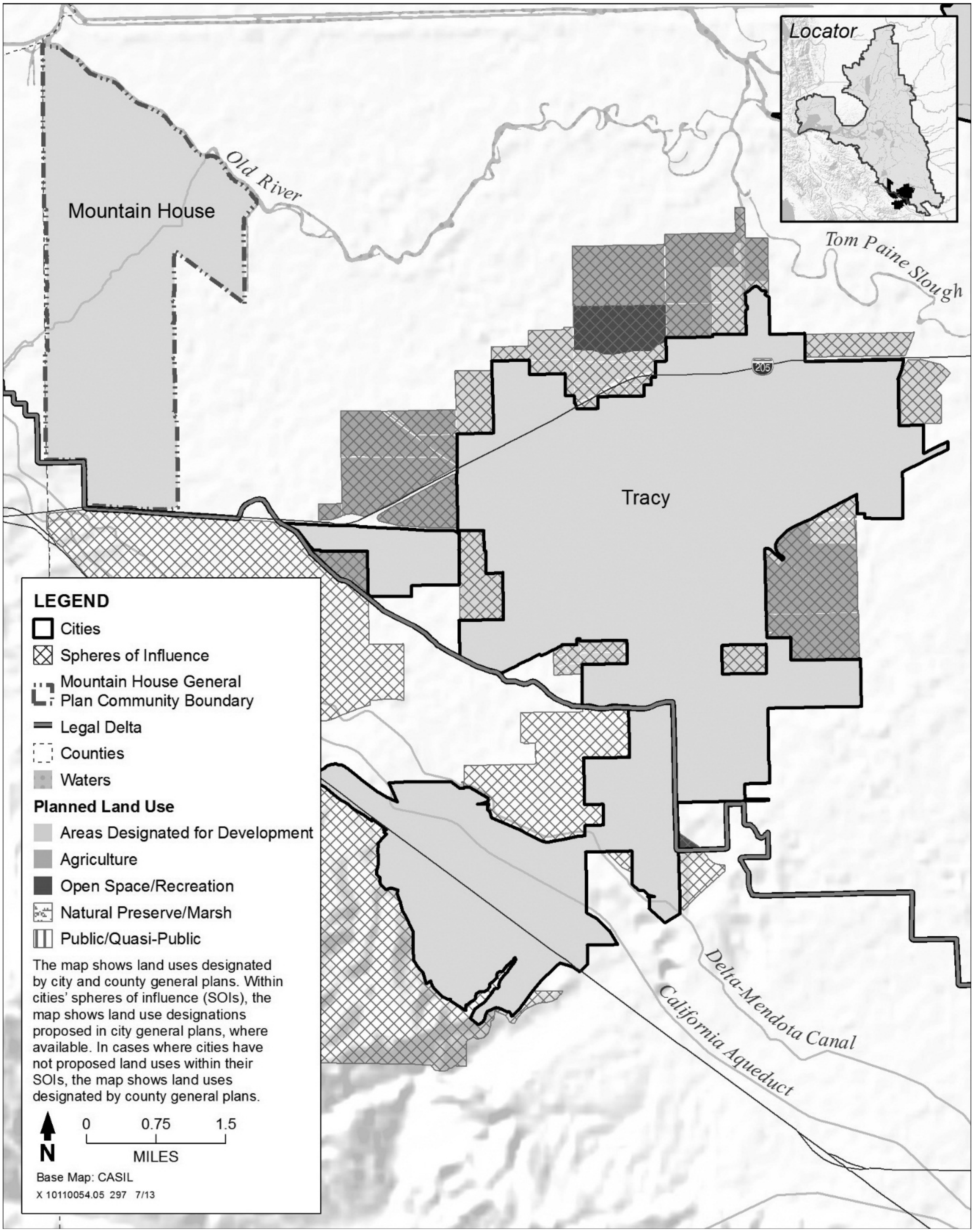


Figure 7-11

City of Tracy and its Sphere of Influence, and the Community of Mountain House

Sources: City of Tracy 2011, Mountain House Community Services District 2008, San Joaquin County 2008

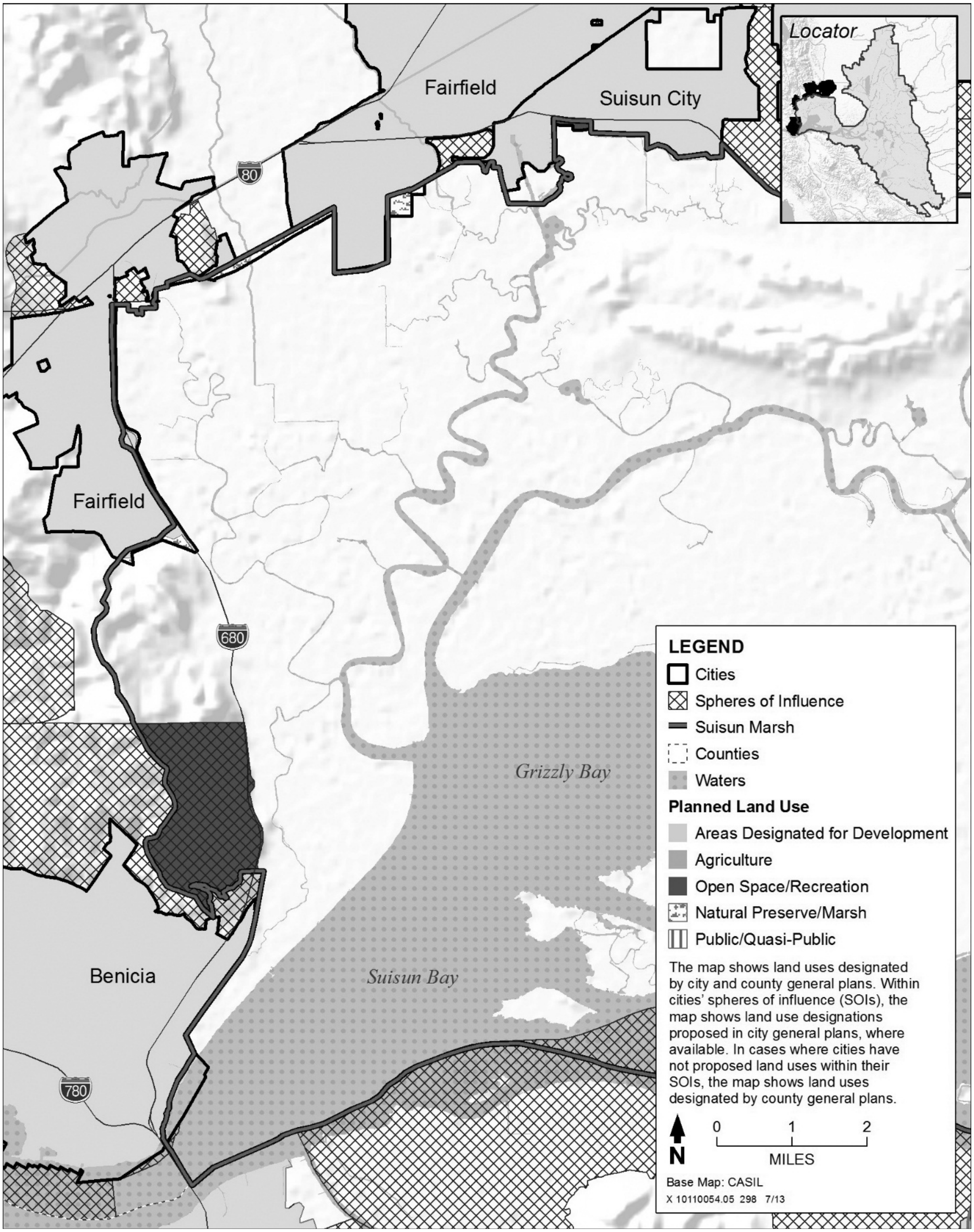


Figure 7-12

Cities of Fairfield, Suisun City, and Benicia and their Spheres of Influence

Sources: City of Benicia 2003, City of Fairfield 2008, City of Suisun City 2011

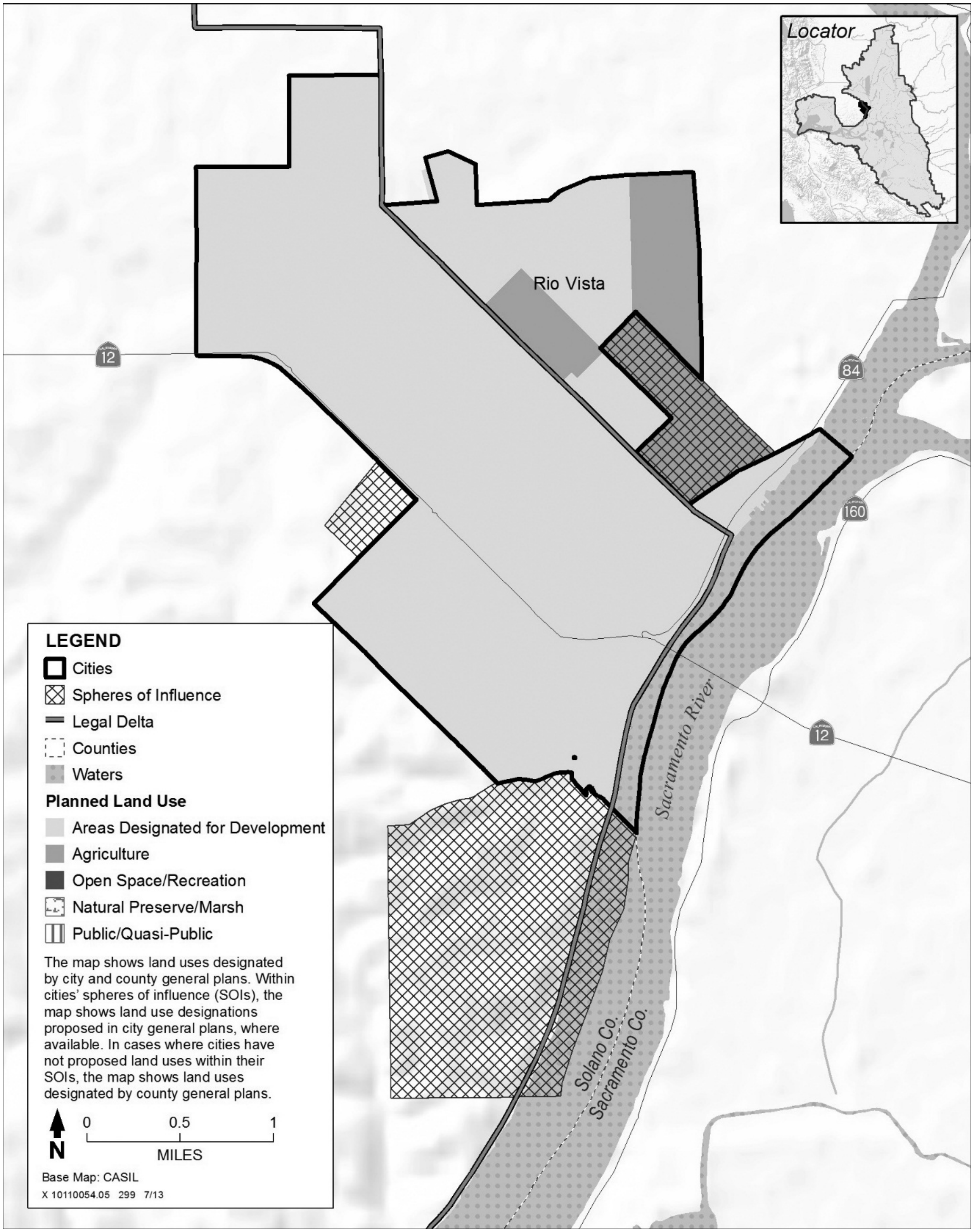


Figure 7-13
City of Rio Vista and its Sphere of Influence
Source: City of Rio Vista 2001

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Appendix 8
Setback Levee Evaluation Areas

Note: All content of this appendix is newly adopted.

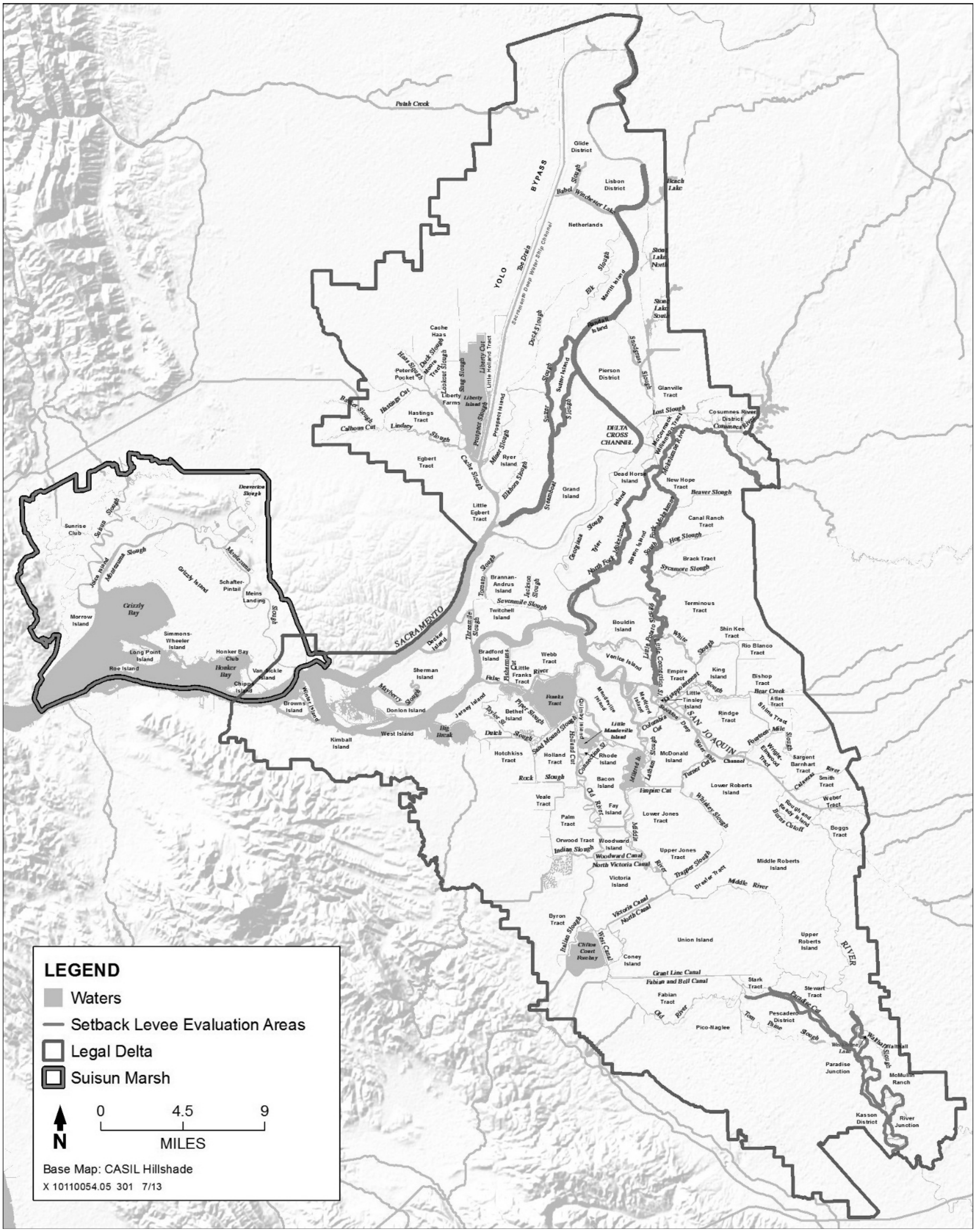

Figure 8-1
Setback Levee Evaluation Areas

Appendix C
Adaptive Management and the Delta Plan

The Sacramento-San Joaquin Delta Reform Act of 2009 seeks to provide a strong science foundation to inform decisions of the Delta Stewardship Council, seen in both provisions for a science program and an independent science board (Water Code section 85280):

> *85280 (a) The Delta Independent Science Board is hereby established in state government*
>
> *85280 (a)(3) The Delta Independent Science Board shall provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta through periodic reviews of each of those programs that shall be scheduled to ensure that all Delta scientific research, monitoring, and assessment programs are reviewed at least once every four years.*
>
> *85280 (b)(4) The mission of the Delta Science Program shall be to provide the best possible unbiased scientific information to inform water and environmental decisionmaking in the Delta. That mission shall be carried out through funding research, synthesizing and communicating scientific information to policymakers and decisionmakers, promoting independent scientific peer review, and coordinating with Delta agencies to promote science-based adaptive management. The Delta Science Program shall assist with development and periodic updates of the Delta Plan's adaptive management program.*

The Delta Reform Act requires the inclusion of science-based adaptive management in the Delta Plan as defined and stated in Water Code sections 85308(f) and 85052:

> *85308(f) Include a science-based, transparent, and formal adaptive management strategy for ongoing ecosystem restoration and water management decisions.*
>
> *85052 "Adaptive management" means a framework and flexible decisionmaking process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives.*

The Delta Reform Act also requires that the Delta Plan is based upon and implemented using the best available science:

> *85308 The Delta Plan shall meet all of the following requirements:*
>
> > *(a) Be based on the best available scientific information and the independent science advice provided by the Delta Independent Science Board.*
> >
> > *(e) Where appropriate, recommend integration of scientific and monitoring results into ongoing Delta water management.*
>
> *85302(g) In carrying out this section, the council shall make use of the best available science.*

Appendix C
Adaptive Management and the Delta Plan

The Sacramento-San Joaquin Delta Reform Act of 2009 (Delta Reform Act) requires a strong science foundation to inform Delta Stewardship Council (Council) decisions. This includes providing scientific expertise to support the Council and other agencies through the Delta Science Program and Delta Independent Science Board (Water Code section 85280). The Delta Reform Act also requires that the Delta Plan be based on and implemented using the best available science (Water Code sections 85308(a) and (e) and 85302(g)), and requires the use of science-based, transparent, and formal adaptive management strategies for ongoing ecosystem restoration and water management decisions (Water Code section 85308(f)).

Best Available Science

The Delta Reform Act requires the Council to make use of the best available science in implementing the Delta Plan. Best available science is specific to the decision being made and the timeframe available for making that decision. Best available science is developed and presented in a transparent manner consistent with the scientific process (Sullivan et al. 2006), including clear statements of assumptions, the use of conceptual models, description of methods used, and presentation of summary conclusions. Sources of data used are cited, and analytical tools used in analyses and syntheses are identified. Best available science changes over time, and decisions may need to be revisited as new scientific information becomes available. Ultimately, best available science requires scientists to use the best information and data to assist management and policy decisions. The processes and information used should be clearly documented and effectively communicated to foster improved understanding and decision making.

Steps for Achieving the Best Science

Science consistent with the scientific process includes the following elements:

- Well-stated objectives
- A clear conceptual or mathematical model
- A good experimental design with standardized methods for data collection
- Statistical rigor and sound logic for analysis and interpretation
- Clear documentation of methods, results, and conclusions

The best science is understandable; it clearly outlines assumptions and limitations. The best science is also reputable; it has undergone peer review conducted by active experts in the applicable field(s) of study. Scientific peer review addresses the validity of the methods used, the adequacy of the methods and study design in addressing study objectives, the adequacy of the interpretation of results, whether the conclusions are supported by the results, and whether the findings advance scientific knowledge (Sullivan et al. 2006).

There are several sources of scientific information and tradeoffs associated with each (Sullivan et al. 2006, Ryder et al. 2010). The primary sources of scientific information, in a generalized ranking of most to least scientific credibility for informing management decisions, include the following:

- Independently peer-reviewed publications including scientific journal publications and books (most desirable)
- Other scientific reports and publications
- Science expert opinion
- Traditional knowledge

Each of these sources of scientific information may be the best available at a given time and contain varying levels of understanding and uncertainty. These limitations should be clearly documented when scientific information is used as the basis for decisions.

Guidelines and Criteria

There have been several efforts to develop criteria for defining and assessing best available science. In 2004, the National Research Council Committee on Defining the Best Scientific Information Available for Fisheries Management prepared a report (National Research Council Report) that concluded guidelines and criteria must be defined in order to apply best available science in natural resource management (NRC 2004). Major findings and recommendations included establishing procedural and implementation guidelines to govern the production and use of scientific information. The guidelines were based on six broad criteria: relevance, inclusiveness, objectivity, transparency and openness, timeliness, and peer review.

Best available science for proposed covered actions and for use in the Delta Plan should be consistent with the guidelines and criteria in Table C-1. These criteria were adapted from criteria developed by the National Research Council. Proponents of covered actions should document their scientific rationale for applying the criteria in Table C-1 (i.e., the format used in a scientific grant proposal).

Table C-1
Criteria for Best Available Science

Criteria	Description
Relevance	Scientific information used should be germane to the Sacramento-San Joaquin Delta (Delta) ecosystem and/or biological and physical components (and/or process) affected by the proposed decisions. Analogous information from a different region but applicable to the Delta ecosystem and/or biological and physical components may be the most relevant when Delta-specific scientific information is nonexistent or insufficient. The quality and relevance of the data and information used shall be clearly addressed.
Inclusiveness	Scientific information used shall incorporate a thorough review of relevant information and analyses across relevant disciplines. Many analysis tools are available to the scientific community (e.g., search engines and citation indices).[a]
Objectivity	Data collection and analyses considered shall meet the standards of the scientific method and be void of nonscientific influences and considerations.[b]
Transparency and openness	The sources and methods used for analyzing the science (including scientific and engineering models) used shall be clearly identified. The opportunity for public comment on the use of science in proposed covered actions is recommended. Limitations of research used shall be clearly identified and explained. If a range of uncertainty is associated with the data and information used, a mechanism for communicating uncertainty shall be employed.

Table C-1
Criteria for Best Available Science

Criteria	Description
Timeliness	Timeliness has two main elements: (1) data collection shall occur in a manner sufficient for adequate analyses before a management decision is needed, and (2) scientific information used shall be applicable to current situations. Timeliness also means that results from scientific studies and monitoring may be brought forward before the study is complete to address management needs.[c] In these instances, it is necessary that the uncertainties, limitations, and risks associated with preliminary results are clearly documented.
Peer review	The quality of the science used will be measured by the extent and quality of the review process. Independent external scientific review of the science is most important because it ensures scientific objectivity and validity.[d] The following criteria represent a desirable peer review process.[e] Coordination of Peer Review. Independent peer review shall be coordinated by entities and/or individuals that (1) are not a member of the independent external review team/panel and (2) have had no direct involvement in the particular actions under review. Independent External Reviewers. A qualified independent external reviewer embodies the following qualities: (1) has no conflict of interest with the outcome of the decision being made, (2) can perform the review free of persuasion by others, (3) has demonstrable competence in the subject as evidenced by formal training or experience, (4) is willing to utilize his or her scientific expertise to reach objective conclusions that may be incongruent with his or her personal biases, and (5) is willing to identify the costs and benefits of ecological and social alternative decisions. When to Conduct Peer Review. Independent scientific peer review shall be applied formally to proposed projects and initial draft plans, in writing after official draft plans or policies are released to the public, and to final released plans. Formal peer review should also be applied to outcomes and products of projects as appropriate.

a. McGarvey 2007
b. National Research Council 2004, Sullivan et al. 2006
c. National Research Council 2004
d. Meffe et al. 1998
e. Adapted from Meffe et al. 1998

It is recognized that differences exist among the accepted standards of peer review for various fields of study and professional communities. When applying the criteria for best available science in Table C-1, the Council recognizes that the level of peer review for supporting materials and technical information (such as scientific studies, model results, and documents) included in the documentation for a proposed covered action is variable and relative to the scale, scope, and nature of the proposed covered action. The Council understands that varying levels of peer review may be commonly accepted in various fields of study and professional communities.

Adaptive Management

Adaptive management is defined in the Delta Reform Act as "a framework and flexible decisionmaking process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives" (Water Code section 85052). Adaptive management can be applied at a program, plan or project level.

Adaptive management is a strategy that provides for making management decisions under uncertain conditions using the best available science rather than repeatedly delaying action until more information is available. Adaptive management allows for continuous learning resulting in management decisions based on what was learned, rather than adopting a management strategy and implementing it without regard for scientific feedback or monitoring. Adaptive management is an approach to resources management that increases the likelihood of success in obtaining goals in a manner that is both economical and effective because it provides flexibility and feedback to manage natural resources in the face of often considerable uncertainty.

BARRIERS TO ADAPTIVE MANAGEMENT

Although there have been several attempts to develop and implement adaptive management strategies in the Bay-Delta system and elsewhere, most have been unsuccessfully implemented. Adaptive management is not easy, quick, or inexpensive (NRC 2010). An adaptive management strategy for the CALFED Ecosystem Restoration Program (ERP) was developed in 2000 (CALFED Bay-Delta Program 2000), but implementation of the program's adaptive management elements was never achieved (Healey et al. 2008). Healey (2008) identified several barriers to implementing CALFED's adaptive management strategies. One such barrier was the struggle to change the traditional agency approach to managing problems, which limited the ability to take essential steps outside of normal agency operations, such as pre-project modeling and identification of specific outcomes, along with post-project monitoring and evaluation. Other barriers to implementing adaptive management under CALFED's ERP included a lack of secure funding and mechanisms for implementing large-scale adaptive management experiments, lack of stakeholder buy-in in the form of landowner assurances (e.g., economic viability and compensation for land use changes), changes in support for the projects under administration changes, and high implementation costs.

Additionally, the CALFED-funded Adaptive Management Forum Scientific and Technical Panel (Panel) (2004) identified both the regulatory environment along with human resources and communication as barriers to implementing adaptive management. They found that current permitting requirements for threatened and endangered species, water quality, flows and flow regimes, and floodway management and conveyance do not allow the design flexibility and speed of response required for adaptive management. To overcome this constraint, the Panel recommended that regulatory exemptions or special status need to be negotiated for innovative and creative approaches to adaptive management. The Panel also identified the need for specialized staff to design and implement adaptive management experiments, analyze and share the results of monitoring programs, and effectively communicate lessons learned. The Panel recommended recruiting specialized staff for these purposes as a means for overcoming this barrier.

CALFED's struggle to implement its adaptive management strategies is not uncommon. Walters (2007) concluded that nearly all 100 adaptive management efforts examined worldwide failed to implement adaptive management. Three main factors contributing to the widespread implementation difficulties in adaptive management programs were identified: (1) failure of decision makers to understand why adaptive management programs are needed, (2) lack of leadership for the complex process of implementing an adaptive approach, and (3) inadequate funding for the increased ecological (and often economic) monitoring needed to successfully compare the outcomes of alternative polices (Walters 2007). To overcome each of these barriers, Walters (2007) recommends identifying and nurturing adaptive management leaders dedicated to successful implementation, creatively investing in innovative monitoring programs, and forcing decision makers to confront uncertainty and think carefully about how to reduce risks in decision making under conditions of uncertainty.

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To be effective, governance to support and implement adaptive management in the Sacramento-San Joaquin Delta (Delta) must be flexible and have the capability to make timely changes to policies and practices in response to what is learned over time (e.g., the Delta Plan adaptive management approach described in Chapter 2). Governance for adaptive management should provide a decision-making structure that fosters communication among scientific experts, independent scientific reviewers, and the relevant decision-making authorities (e.g., State and federal fisheries agencies on issues related to aquatic ecosystem restoration), and provide a balanced approach to the involvement of interested stakeholders.

A Three-phase and Nine-step Adaptive Management Framework

The Council will use the three-phase and nine-step adaptive management framework on Figure C-1 that is described in detail below. The Council will use this framework to evaluate the usefulness of adaptive management for reviewing proposed covered actions involving ecosystem restoration and water management along with developing, implementing, and updating the Delta Plan (see Chapter 2). Ecosystem restoration and water management covered actions should include an adaptive management plan that considers all nine steps of this framework; however, they need not be rigidly included and implemented in the order described here and should not be used as a means to prevent action, but rather as a tool to enhance decision making. The intent is to build logical and clear information exchange and decision points into management actions that increase options and improve outcomes. In developing an adaptive management plan, the best available science should be used to inform the various steps of the adaptive management process.

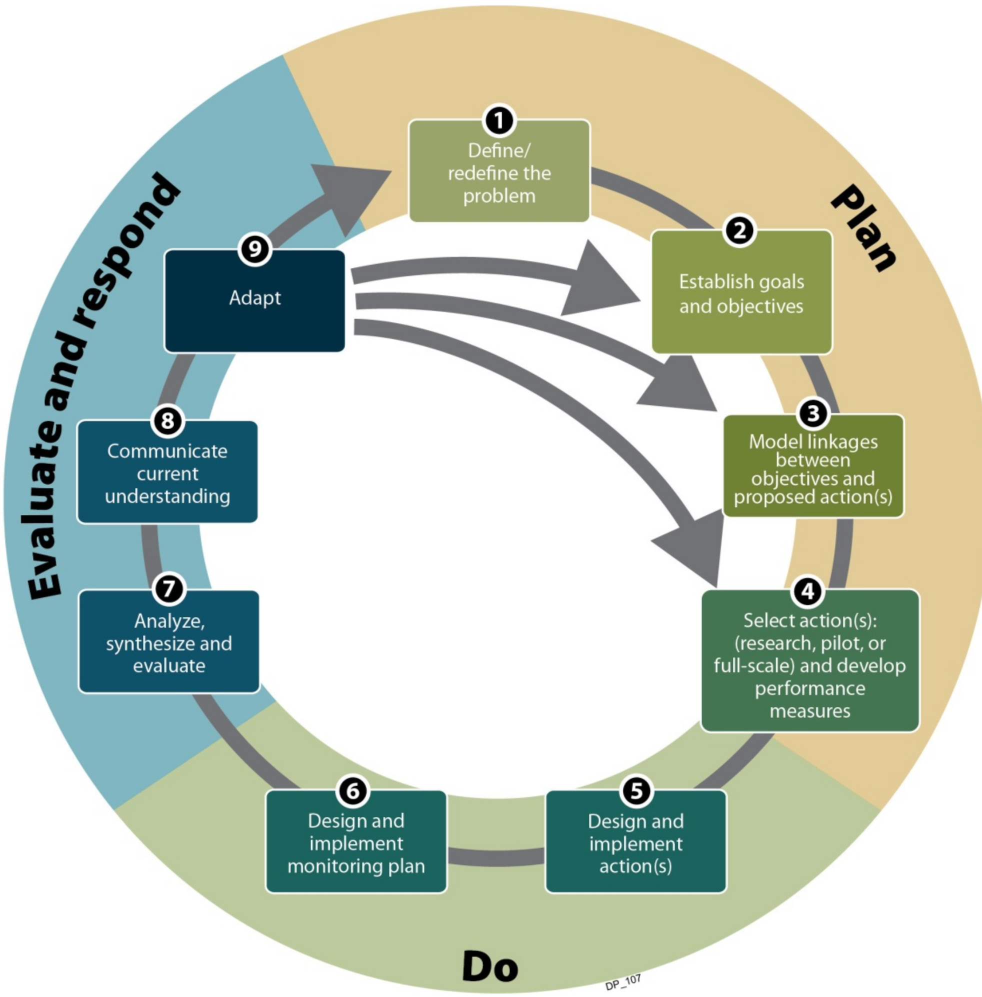


Figure C-1
A Nine-step Adaptive Management Framework
The shading represents the three broad phases of adaptive management (Plan, Do, and Evaluate and Respond), and the boxes represent the nine steps within the adaptive management framework. The circular arrow represents the general sequence of steps. The additional arrows indicate possible next steps for adapting (e.g., revising the selected action based on what has been learned). This framework and the description of each step are largely derived from Stanford and Poole (1996), CALFED Bay-Delta Program (2000), Abal et al. (2005), and the Bay Delta Conservation Plan Independent Science Advisors on Adaptive Management (2009).

Plan

The *Plan* phase of the adaptive management framework is presented as four steps.

1. Define/Redefine the Problem

The first step of effective adaptive management is to clearly define the problems that will be addressed in the form of a problem statement. The problem statement should clearly link to program goals and to specific objectives, which should be developed by proponents in an open manner. The boundaries of the problem (e.g., its geographic and temporal scales) should be defined in the problem statement.

2. Establish Goals and Objectives

Clear goals and objectives must be established by proponents of proposed covered actions for ecosystem restoration and water management, and be based on the best available science (see G P1 in Chapter 2). Goals are broad statements that propose general solutions. Objectives are more specific than goals, and are often quantitative, specific, narrative statements of desired outcomes, allowing evaluation of how well the objectives are being achieved.

3. Model Linkages between Objectives and Proposed Action(s)

Models formalize and apply current scientific understanding, develop expectations, assess the likelihood of success, and identify tradeoffs associated with different management actions. Models can be conceptual, statistical, physical, decision support, or simulation. Models link the objectives to the proposed actions and clarify why an intended action is expected to result in meeting its objectives. Models provide a road map for testing hypotheses through statements that describe the expected outcome of an action.

Both qualitative (conceptual) and quantitative models can effectively link objectives and proposed actions by illuminating if and how different actions meet specific objectives. Conceptual models are particularly useful for decision makers, scientists, and the public because they illustrate the most critical cause-and-effect pathways. Conceptual models provide an articulation of the hypotheses being tested and how various actions might achieve particular objectives. Conceptual models also help to develop performance measures, which are qualitative or quantitative information that tracks status and trends toward meeting objectives. Conceptual models should be used in adaptive management planning because they help explain how other types of models, research, and actions will be used to explore hypotheses and address specific existing and anticipated uncertainties.

Recent conceptual models developed specifically for the Delta include comprehensive models developed as part of the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP). The DRERIP models were designed to aid in the identification and evaluation of ecosystem restoration actions in the Delta, and include both ecosystem models (processes, habitats, and stressors) and species life history models. Another set of conceptual models was developed to plan the Interagency Ecological Program’s Pelagic Organism Decline (POD) investigations and to synthesize the POD results into “stories” about what may have happened to cause the rapid decline of multiple open-water fish species.

4. Select Action(s) (Research, Pilot, or Full-scale) and Develop Performance Measures

The process for selecting an action or several actions to meet objectives includes an evaluation of the best available science represented in the conceptual model. This evaluation should guide development of the action. Consideration should be given to the following:

- Level of the action(s) to be taken (research project, pilot-scale project, or full-scale project)
- Geographical and temporal scale of the action(s)
- Degree of confidence in the benefits
- Consequences of being wrong

The scale of the action selected should be informed by the certainty of the relevant scientific information, consider the reversibility of the action, and account for the potential cost of delaying larger-scale actions. For example, when the best available science cannot predict the outcome of an action with a reasonable degree of certainty, and irreversible consequences exist for incorrectly predicting the outcomes of an action, further research or a pilot-scale action is likely more appropriate than a full-scale action, unless the cost of delaying a larger-scale action is very high (e.g., a species of concern goes extinct or urban water supplies are cut off). In some instances, choosing to take no action could be the best selection (when no foreseen benefit would result from a research, pilot-scale, or full-scale action). Where possible, the action(s) selected should test cause-and-effect relationships in the conceptual model so that the model can be adapted using the information learned from implementing the action(s).

Performance measures derive from goals and objectives, and help to address the status and trends of progress toward achieving the goals and objectives. Performance measures can be placed in three general classes:

- Administrative: performance measures that describe decisions made by policy makers and managers to finalize plans or approve resources (funds, personnel, projects) for implementation of a program or group of related programs
- Output (also known as driver): performance measures that evaluate factors that may be influencing outcomes and include on-the-ground implementation and management actions
- Outcome: performance measures that evaluate ecosystem responses to management actions or natural outputs

The distinction between performance measure types is not rigid. In some cases, an outcome performance measure for one purpose may become an output performance measure for another purpose.

Development of informative performance measures is a challenging task. Performance measures must be designed to capture important trends and to address whether specific actions are producing expected results. Performance measures are selected based on the conceptual model. In addition, the monitoring plan should be designed so that the information collected supports performance measure analysis and reporting.

Efforts to develop performance measures in complex and large-scale systems with many ecosystem types like the Delta are commonly multiyear endeavors; however, initial performance measures provide value for initial assessments of progress made in the interim. The process for developing performance measures should address the rationale for each performance measure, metrics, method for analysis, baseline and reference conditions, expected outcomes, timeline for evaluation, and a communication/visualization element. The development of performance measures should be informed by the best available science and involve key stakeholders.

Do

The *Do* phase of adaptive management includes two steps that occur in parallel.

5. Design and Implement Action(s)

The design and implementation of action(s) include clearly describing specific activities that will occur under the selected action(s) and how they will link to the monitoring plan. Design includes creating a plan for implementing the action(s) and monitoring responses resulting from the action(s). The design of the action(s) should be informed by existing uncertainties, and should be directly linked to meeting the goals and objectives.

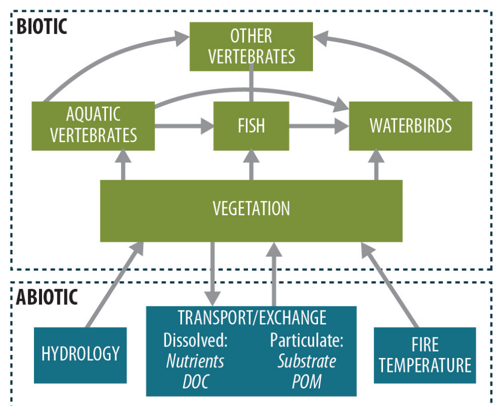
KISSIMMEE RIVER RESTORATION PROJECT

The Kissimmee River Restoration Project uses an adaptive management process that provides a positive example of adaptive management in practice. The project thoughtfully modeled linkages between objectives and proposed action(s), and successfully designed and implemented a comprehensive monitoring plan with clear and quantifiable expectations. As a result, the intended goals of the restoration effort are being met and documented. South Florida Water Management District Executive Director Melissa Meeker, who oversees the restoration project, has reported that, "The abundant wildlife now seen along the Kissimmee is a powerful indicator of the benefits of long-term investments in restoration. The District's documentation of these improvements provides us and our restoration partners—as well as the public—with critical insights into the ecosystem's ongoing recovery."[1]

Environmental monitoring conducted since completing phase one of restoration construction (backfilling the canal and reconnecting and recarving river channels) in 2001 has resulted in the following indicators of success as of February 2012:

- The number of wading birds observed increased by 64 percent. Three species long absent from the river are now documented regularly.
- Shorebird species commonly observed jumped from 2 to 11.
- Waterfowl sightings increased dramatically—by 29 times compared to pre-restoration sightings.
- Wetland vegetation, which once covered only 37 percent of the phase one restoration area prior to construction, has fully achieved the restoration target of 80 percent coverage.

February 9, 2001, photo of implemented phase one Kissimmee River Restoration Project showing the backfilled canal, degraded soil area, remnant river channel, the connector channel, and wetland areas.



General conceptual model of ecosystem structure and interactions for the Kissimmee River and floodplain (Dahm et al. 1995)

These results suggest that after construction is complete in 2014, and hydrologic conditions are fully restored in 2015, the region is on track to achieve its goal of restored ecological integrity in the Kissimmee River and its floodplain. In the 1960s, the Kissimmee River, located in south-central Florida, was channelized for flood-control purposes (Toth et al. 1998). In the 1990s, planning began for a 15-year restoration project. The restoration design included 70 kilometers of river channel and 104 square kilometers of floodplain—the largest attempted river restoration project in the world (Dahm et al. 1995). Adaptive research, monitoring, and evaluation programs were developed to provide a scientific foundation for fine-tuning each phase of the restoration effort (Toth et al. 1998). To "model linkages between objectives and proposed action(s)," conceptual models were developed to anticipate the restored Kissimmee River ecosystem, predict patterns of response for abiotic and biotic variables, and consider methods and performance measures for evaluating progress toward restoration in the river basin (Dahm et al. 1995).

The Kissimmee River Restoration Evaluation Program (KRREP) provides a practical example of the "design and implementation of a monitoring plan" step used in adaptive management. The KRREP is a comprehensive monitoring program designed to evaluate ecosystem responses to the restoration project through comprehensive monitoring and assessment of data collected before and after major construction phases (South Florida Water Management District 2011). If the KRREP determines that changes in the river and floodplain ecosystems after construction are not achieving expected results, adaptive management strategies are considered for implementation. More information about the Kissimmee River Restoration Project is available on the program website:
http://my.sfwmd.gov/portal/page/portal/xweb%20protecting%20and%20restoring/kissimmee%20river.

[1] http://www.sfwmd.gov/portal/pls/portal/docs/16721677.PDF (Accessed 03/02/2012)

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6. Design and Implement Monitoring Plan

A well-designed monitoring plan includes a data management plan. A data management plan describes the process for organizing and clearly documenting observations, including how data are collected; the methods, quality assurance, and calculations used; the time and space scales of the variables; and accurate site locations and characteristics. Data management is critical for analyses, syntheses, and evaluations.

A well-designed monitoring plan goes beyond data collection and data management. A monitoring plan often includes targeted research to answer why certain results are observed and others are not. A monitoring plan also includes clear communication of the information gathered and current understanding drawn from this information. A complete monitoring plan includes:

- Compliance monitoring (required by permits)
- Performance monitoring with pre-project monitoring (measuring achievement of targets)
- Mechanistic monitoring with concurrent targeted research (testing the understanding of linkages in the conceptual model)
- System-level monitoring (holistic, integrative, and long term)

These types of monitoring can measure and communicate various types of information, including administrative/inputs (such as dollars awarded and spent or projects funded), compliance/outputs (such as tons of gravel added or acres exposed to tidal action), and effectiveness/outcomes (such as actual outcome expected from implementing an action at the local scale, suites of actions at the systemwide scales, and status and trends assessments). The monitoring plan design must include the development of monitoring metrics that can be integrated and summarized to inform decision makers and the public as described in step eight, *Communicate Current Understanding*.

Monitoring plan design requires making tradeoffs between resources spent on monitoring and resources spent on actions and analyses. To aid in this evaluation of tradeoffs, a rigorous pre-analysis using simulation models can show the information value of different variables that might be monitored. These values assessments can then be used to compare the benefits from monitoring certain variables against the benefit of using resources for other actions.

Implementation of actions and monitoring should be closely coordinated. Before an action is implemented, initial conditions should be clearly documented to the extent practical so that a baseline is established. Baseline data include characterization of natural variation observed in the examined system over space and time. For many ecological and hydrological variables, an extensive set of baseline data is available because of the efforts of the Interagency Ecological Program and repositories of information such as those available from the U.S. Geological Survey and the California Department of Water Resources. The implementation of action(s) and monitoring should be clearly executed and communicated to the public. Status and trends metrics that compare conditions before and after action implementation are often good assessment and communication tools.

Evaluate and Respond

The *Evaluate and respond* phase of adaptive management includes three key steps.

7. Analyze, Synthesize, and Evaluate

Analysis, synthesis, and evaluation of the action(s) and monitoring are critical for improving current understanding. Analysis and synthesis should incorporate information on how conditions have changed, expectedly and unexpectedly, as a result of implementing the action(s). Because measurable change might not occur on short timescales, evaluations should also examine whether actions prevented further deteriorating conditions that would have occurred if no actions were taken. The evaluation should examine whether performance measures indicate that one or more of the objectives have been met as a result of the implemented action(s), and if so, why. If an objective is not met, the potential reasons why it was not met should be clearly identified and communicated. Analyses should be cumulative. As each year's data become available, analyses should assess whether the probability of the desired outcome has changed and, if so, how this affects decisions about the action. The results of the analysis, synthesis, and evaluation step could be published in technical peer-reviewed papers and reports for the purpose of external review, disclosure, and accessibility where results warrant this level of communication. Scientists and technical experts will be critical for carrying out this step.

8. Communicate Current Understanding

Communication of current understanding gained through analysis, synthesis, and evaluation of implemented action(s) and monitoring is a key step for informing and equipping policy makers, managers, stakeholders, and the public to appropriately respond and adapt. This step spans the *Do* and the *Evaluate and respond* phase of adaptive management because the communication of current understanding and related recommendations for change requires both policy and technical expertise. The information communicated should be technically sound, well synthesized, and translated into formats conducive to informing a nontechnical audience (e.g., a report card format or a general science outlet such as a newsletter). The information should then be disseminated to those directly involved in the adaptive management process for the plan, program, or project and to those interested in the outcome of the action.

Technical staff and decision makers should be regularly involved in the exchange of information as data are analyzed and synthesized. Communication should be ongoing and occur at appropriate intervals at which an improved understanding could help refine other steps of the adaptive management framework.

The key to successful communication is a skilled and dedicated interdisciplinary person or team who understands the technical information learned, the functional needs of the decision makers, and how to best transmit this information. Communication should utilize various media (e.g., web-based materials, social media, outreach opportunities, public forums, etc.) and strive to meet the goals of transparency and clarity.

9. Adapt

Proponents of covered actions for ecosystem restoration and water management should be engaged and prepared to adapt to changes in current understanding and changes in current conditions (e.g., environmental or socioeconomic). Informed and equipped with new results and understanding, decision makers should re-examine the other steps of the adaptive management framework and revise these steps where current understanding suggests doing so. Possible next steps could include redefining the problem statement, amending goals and objectives, altering the conceptual model, or selecting an alternative action for design and implementation. Also, decisions to adapt might be needed at various time intervals for the same adaptive management experiment. For example, decisions might need to be made daily (e.g., Delta water operations), yearly (e.g., implementation of landscape-scale restoration), or decadal (adaptive management of landscape-scaled restoration design).

Knowing when to adapt is not always obvious. Adaptive management actions should have a planned timeframe that includes when to adapt (based on understandings of the system and its uncertainties), and that timeframe should be abandoned only if the results show that the action is doing more harm than good or the anticipated benefit is not noted within a reasonable timeframe beyond what was expected. In general, one year's results, however anomalous, are seldom enough to demonstrate that the action should be subject to adaptive measures. Furthermore, when the analysis, synthesis, and evaluation of information learned from implementing an action indicates that no benefit results from the undertaken action, resources should no longer be spent on that action no matter how popular the action might be.

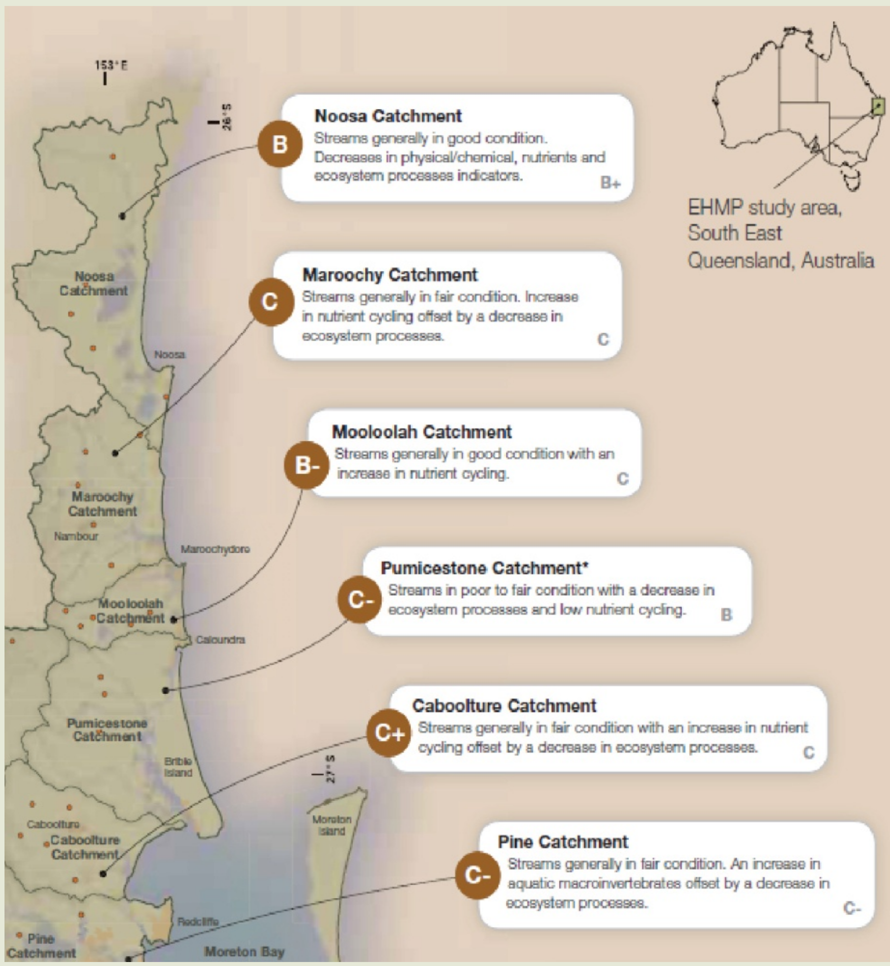
HEALTHY WATERWAYS

In South East Queensland, Australia, Healthy Waterways is an organization using an adaptive management process that provides a positive example of adaptive management that might be practiced for the Delta. Healthy Waterways has excelled at two specific steps of adaptive management: “communicate current understanding” and “adapt.” Achievements of the Healthy Waterways Partnership to date include an extensive public awareness and education program, urban stormwater or catchment management plans for all major catchments in South East Queensland, and local and state government investment in upgrading 25 wastewater treatment plants leading to about a 40 percent reduction in nitrogen load to waterways.

Healthy Waterways has collaborative partnerships and works to improve the health of waterways, catchment, and ecosystems that support the livelihoods and lifestyles of the region’s people. An adaptive management framework developed by Healthy Waterways’ partners has served as the operating philosophy and cornerstone of program implementation for over a decade. Healthy Waterways’ practice of adaptive management has led to improved understanding about how to deal with resource management issues and the flexibility necessary for changing socioeconomic and socioecological relationships occurring in South East Queensland (Abal et al. 2005).

Healthy Waterways’ communication of current understanding is facilitated through a commitment to public education and outreach; annual public report cards; and the use of leading technology to analyze, interpret, and communicate information through the health-e-waterways dynamic report cards (http://www.health-e-waterways.org/). These communication efforts have led to adapting management actions based on current ecosystem understanding; these actions are subsequently evaluated in annual report cards.

Details about Healthy Waterways and its adaptive management elements are available at www.healthywaterways.org.



Healthy Waterways 2010 Annual Report Card Sample
(2010 grades are brown, 2009 grades are gray)

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Decisions made within the adaptive management process for ecosystem restoration and water management actions should be made by decision makers for the entity responsible for implementing adaptive management. Adaptive management decisions relevant to revising and updating the Delta Plan will be made by the Council.

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Appendix D
Administrative Procedures Governing Appeals, Statutory Provisions Requiring Other Consistency Reviews, and Other Forms of Review or Evaluation by the Council

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[ADOPTED 9/23/2010]

DELTA STEWARDSHIP COUNCIL

I. ADMINISTRATIVE PROCEDURES GOVERNING APPEALS
II. STATUTORY PROVISIONS REQUIRING OTHER CONSISTENCY REVIEWS
III. OTHER FORMS OF REVIEW OR EVALUATION BY THE COUNCIL

PART I- ADMINISTRATIVE PROCEDURES GOVERNING APPEALS

Introduction

1. Purpose. These administrative procedures govern how the Delta Stewardship Council considers appeals with regard to:

> a) Adequacy of certifications of consistency with the Delta Plan submitted to the council by a state or local public agency pursuant to Water Code sections 85225.10 and 85225.30; and
>
> b) Determinations by the Department of Fish and Game that the Bay Delta Conservation Plan has met the requirements of Water Code section 85320 for inclusion in the Delta Plan.
>
> NOTE: Authority cited: Water Code sections 85001, 85020(h), 85022, 85057.5, 85200, 85210, 85212, 85225, 85225.5, 85225.10, 85225.15, 85225.20, 85225.25, 85225.30, 85300, 85320(e).

Review of certifications of consistency with Delta Plan

2. Any state or local public agency proposing to undertake a covered action, as defined in Water Code section 85057.5 is encouraged to consult with the council at the earliest possible opportunity, preferably no later than 30 days before submitting its certification to the council pursuant to Water Code section 85225, to ensure that the project will be consistent with the Delta Plan. The council's staff will meet with the agency's staff to review the consistency of the proposed action and to make recommendations, as appropriate. During this early consultation, the agency's staff may also seek clarification on whether the proposed project is a "covered action"; provided that the ultimate determination on whether it is a covered action shall be made by the agency, subject to judicial review.

> NOTE: Authority cited: Water Code sections 85212, 85225, 85225.5, 85225.30.

3. At least 10 days prior to its submission of a certification to the council, a state or local public agency that is not subject to open meeting laws (that is, the Bagley-Keene Open Meeting Act [Gov.Code sec.11120 et seq.] or the Brown Act [Gov.Code sec.54950 et seq.]) with regard to its certification, shall post, for public review and comment, its draft certification conspicuously on its website and in its office, mail it to all persons requesting notice, and include any public comments received in the record submitted to the council in the case of an appeal. A state or local public agency that is subject to open meeting laws with regard to its certification is encouraged to take those actions.

NOTE: Authority cited: Water Code sections 85225, 85225.30.

4. a) Any certification of consistency filed by a state or local agency pursuant to Water Code section 85225 shall set forth detailed findings that the covered action is consistent with the Delta Plan. The council shall prepare a checklist that agencies may use to assist them in preparing the certification and making the required findings.

b) A state or local agency shall submit to the council, no later than 10 days after receiving notice of an appeal pursuant to Paragraph 8, the record that was before the state or local agency at the time it made its certification, including a table of contents of documents contained therein and a brief chronology of events and actions relevant to the covered action. The record shall be certified by the state or local agency as being "full and complete." Given the tight, statutory deadlines for hearing and deciding appeals, a state or local agency is nevertheless strongly encouraged to submit the record at the time it files its certification of consistency, to ensure the opportunity for thorough review by the council in the event of an appeal.

c) The failure by a state or local agency to submit the record to the council on a timely basis as required by subparagraph (b), shall be grounds for the council to affirm the appeal on the basis that there was not substantial evidence presented to support the certification of consistency.

d) Any filings required by this Paragraph (4) shall be submitted in electronic form to facilitate availability and public access, and shall be public records.

NOTE: Authority cited: Water Code sections 85225, 85225.30.

5. Any person, including any member of the council or its executive officer, who claims that a proposed covered action is inconsistent with the Delta Plan and, as a result of that inconsistency, that action will have a significant adverse impact on the achievement of one or both of the goals of the Act or implementation of government sponsored flood control programs to reduce risks to people and property in the Delta, may file an appeal with regard to a certification of consistency submitted to the council no later than 30 calendar days after that submittal.

NOTE: Authority cited: Water Code sections 85225.10 (a), 85225.15, 85225.30.

6. The appeal shall clearly and specifically set forth the basis for the claim that the covered action is inconsistent with the Delta Plan. The appeal shall be in writing and set forth the following information:

a) Appellant's name and address;

b) The name and address of the party, if any, whose proposal is the subject of the appeal;

c) A description of the covered action that is the subject of the state or local public agency certification;

d) The identity of the state or local government body whose certification is being appealed;

e) The specific grounds for appeal; and

f) A detailed statement of facts on which the appeal is based.

The appeal shall be filed in electronic form.

NOTE: Authority cited: Water Code sections 85225.10 (b), 85225.30.

7. The appeal shall be considered "filed" with the council when the appellant's appeal is received, determined by staff to contain all of the information listed in Paragraph 6, and a hard-copy is printed and stamped "Filed" by the council staff with the date of filing indicated.

NOTE: Authority cited: Water Code sections 85225.10, 85225.20, 85225.30.

8. Within five working days of the filing of an appeal with the council, the executive officer shall:

a) Post a notice and brief description of the appeal and its effective date in a conspicuous location in the council's office and on its website;

b) Mail to the affected state or local public agency and to any third party whose proposal is the subject of the certification, a copy of the notice and a brief description, with a copy of the appeal documents filed with the council;

c) Mail copies of the appeal to each member of the council, and to the Delta Protection Commission for informational purposes consistent with Public Resources Code section 29773; and

d) Mail notice to the appellant that the appeal has been filed and stating the effective date of filing.

NOTE: Authority cited: Water Code sections 85225.30.

9. The council or its executive officer may request from the appellant further information necessary to clarify, amplify, correct, or otherwise supplement the information submitted with the appeal, within a reasonable period. The council or by delegation its executive officer may dismiss the appeal for failure of the appellant to provide information requested within the period provided, if the information requested is in the possession of or under the control of the appellant.

NOTE: Authority cited: Water Code sections 85225.10, 85225.20, 85225.25, 85225.30.

10. The council or its executive officer may supplement the record submitted by the state or local agency if the council or its executive officer determines that additional information was part of the record before the agency, but was not included in the agency's submission to the council.

NOTE: Authority cited: Water Code sections 85225.10, 85225.20, 85225.25, 85225.30.

11. The appellant, the state or local agency, the Delta Protection Commission, or any other person may testify before the council regarding an appeal. Presentations may be oral or in writing, shall address only whether the record supports the certification of consistency, and shall be as brief as possible. Written submissions should be provided to the council at least 10 days prior to the hearing to ensure that they, or in appropriate cases, summaries, may be circulated to council members for their review ahead of the hearing. The council's presiding officer may establish reasonable time limits for presentations.

NOTE: Authority cited: Water Code sections 85225.10, 85225.20, 85225.25, 85225.30.

12. All written submissions to the council may be in electronic form.

NOTE: Authority cited: Water Code section 85225.30.

13. The council shall hear all appeals of certifications of consistency filed pursuant to Water Code section 85225 within 60 days of filing unless:

a) The parties agree to a reasonable extension approved by the executive officer, taking into account the circumstances of the matter subject to appeal and the council's hearing schedule and associated workload, or

b) The council, or by delegation its executive officer, determines that the issue raised on appeal is not within the council's jurisdiction or does not raise an appealable issue.

NOTE: Authority cited: Water Code sections 85225, 85225.20, 85225.30.

14. The council shall make its decision on the appeal within 60 days of hearing the appeal, and shall make specific written findings defining the covered action under review and either denying the appeal or remanding the matter to the state or local public agency for reconsideration of the covered action based on the finding that the certification of consistency is not supported by substantial evidence in the record before the state or local public agency that filed the certification.

NOTE: Authority cited: Water Code sections 85225.20, 85225.25, 85225.30.

15. No covered action which is the subject of an appeal shall be implemented unless one of the following conditions has been met:

a) The council has denied the appeal;

b) The public agency has pursuant to Water Code section 85225.5 decided to proceed with the action as proposed or modified and has filed with the council a revised certification of consistency addressing each of the findings made by the council, 30 days has elapsed and no person has appealed the revised certification; or

c) The council or its executive officer has dismissed the appeal for one or both of the following reasons:

1. The appellant has failed to provide information in her possession or under her control within the time requested or
2. The issue raised is not within the council's jurisdiction or fails to raise an appealable issue.

NOTE: Authority cited: Water Code sections 85225.5, 85225.25, 85225.30.

Review of Bay Delta Conservation Plan

16. If the Department of Fish and Game (department) determines that the Bay Delta Conservation Plan (BDCP) referred to in Water Code section 85053 meets all of the requirements of Water Code section 85320 for inclusion in the Delta Plan, it shall file the BDCP and its determination with the council.

NOTE: Authority cited: Water Code sections 85053, 85225.30, 85320.

17. Upon receipt of the department's determination, the executive officer of the council shall:

a) Post a notice and brief description of the BDCP, the department's determination, the date of filing and the right of any person to appeal that determination on its website and in a conspicuous location in the council's office;

b) Mail a notice and brief description of the BDCP, the department's determination and the right of appeal to any person requesting notice; and

c) Mail copies of the determination to each member of the council.

NOTE: Authority cited: Water Code sections 85225.30, 85320 (e).

18. Any person, including any member of the council or its executive officer, may appeal to the council the determination of the department that the BDCP meets all of the requirements of Water Code section 85320 for inclusion in the Delta Plan.

NOTE: Authority cited: Water Code sections 85225.30, 85320 (e).

19. a) Any appeal to the council made pursuant to Paragraph 18 shall be made within 30 days of the later of the following:

1. the filing with the council of the department's determination that the BDCP meets all the requirements of Water Code section 85320 for inclusion in the Delta Plan, or
2. the conclusion of the council's hearing or hearings held pursuant to Water Code section 85320(d).

b) The appeal shall be in writing and filed in electronic form. It shall clearly set forth the specific grounds for the appeal and the specific facts upon which it is based. These shall include a list of each specific requirement of Water Code section 85320 that the BDCP allegedly fails to meet. The appeal shall be considered filed with the council when the appellant's appeal is received, determined by staff to contain all the information required in this paragraph, and a hard-copy is printed and stamped "Filed" by the council staff with the date of filing indicated.

c) If an appeal is filed before the council publicly notices a hearing to be held pursuant to Water Code section 85320(d), the council, in its discretion, may combine the hearing on appeal and the hearing pursuant to Water Code section 85320(d).

NOTE: Authority cited: Water Code sections 85225.30, 85320.

20. Within five working days of the filing of an appeal pursuant to Paragraph 18, the executive director shall:

a) Post a notice and brief description of the appeal on its website and in a conspicuous location in the council's office;

b) Mail a notice and brief description of the appeal to any person requesting copies of such appeals; and

c) Mail copies of the appeal and a brief description of the appeal to each member of the council.

NOTE: Authority cited: Water Code sections 85225.30, 85320 (e).

21. The council or its executive officer may request from the appellant or the department additional information necessary to clarify, amplify, correct, or supplement the information submitted with the appeal within a reasonable period.

NOTE: Authority cited: Water Code sections 85225.30, 85320 (e).

22. Any appeal made pursuant to Paragraph 18 may be dismissed if the council or its executive officer determines that it does not raise an appealable issue or if the appellant has failed to provide requested information to support her charge within a reasonable time, if that information is in the possession of or under the control of the appellant.

NOTE: Authority cited: Water Code sections 85225.30, 85320 (e).

23. The council shall determine, based upon a preponderance of the evidence, whether the department correctly determined that the BDCP meets all of the requirements of Water Code section 85320 for inclusion in the Delta Plan. In reaching its decision, the council shall give weight to the reasoning and factual findings of the department. The council may seek clarification from the department of its reasoning and factual findings prior to the council making its final determination.

NOTE: Authority cited: Water Code section 85225.30, 85320(b), (e).

23.5 a) The council shall conduct any hearing on an appeal made pursuant to Paragraph 18 in a manner deemed most suitable to ensure fundamental fairness to all parties concerned, and with a view toward securing all relevant information and material necessary to render a decision without unreasonable delay.

b) The hearing need not be conducted according to technical rules relating to evidence and witnesses. Any relevant evidence shall be considered if it is the sort of evidence on which responsible persons are accustomed to rely in the conduct of serious affairs, regardless of the existence of any common law or statutory rule which might make improper the admission of such evidence over objection in a court proceeding.

Unduly repetitious or irrelevant evidence shall be excluded upon order of the council or its chairperson.

c) Subject to Paragraph 23, evidence before the council includes, but is not limited to, the record before the department. The record will not include a transcript of any proceedings before the department unless provided by a party to the proceedings or requested by the council.

d) Any interested person may testify before the council regarding an appeal concerning the BDCP. Speakers' presentations shall be to the point and shall be as brief as possible. Visual and other materials may be used as appropriate. The council may establish reasonable time limits for presentations; such time limits shall be made known to all affected persons prior to any hearing. Where speakers use or submit to the council visual or other materials, such materials shall become part of the hearing record and shall be identified and maintained as such. Speakers may substitute reproductions of models or other large materials but shall agree to make the originals available upon request of the executive director.

e) Council members may ask questions of the appellant, the department's representative(s), any third party appearing at the hearing or staff. Questioning of speakers at the hearing by other persons shall not be permitted except by permission of the Chairperson.

f) Interested persons may submit written comments concerning an appeal. Any such comments will be considered by the council if they are received by the council at or before the hearing on the appeal; provided that those written comments should be submitted to the council at least 10 days prior to the hearing to ensure that they, or in appropriate cases, summaries, may be circulated to council members for their review ahead of the hearing.

g) The council may continue the hearing where it determines that a continuance would be appropriate.

NOTE: Authority cited: Water Code sections 85225.30, 85320(e).

24. The council's decision shall include specific written findings. The council shall post its decision on its website and mail copies to the department and all parties requesting notice.

NOTE: Authority cited: Water Code sections 85225.30, 85320(e).

25. If the council decides that the department incorrectly determined that the BDCP meets all of the requirements of section 85320 for inclusion in the Delta Plan, and consequently grants the appeal, the department may revise its determination to meet the issues raised by the council, or may respond to the council's findings in detail, setting forth reasons why it has concluded that the BDCP meets all of the requirements of

section 85320 for inclusion in the Delta Plan. Unless the council decides that the department's determination, as submitted or revised, correctly concludes that the BDCP meets all of the requirements of section 85320 for inclusion in the Delta Plan, the BDCP shall not be incorporated in the Delta Plan and the public benefits associated with the BDCP shall not be eligible for state funding.

NOTE: Authority cited: Water Code sections 85225.30, 85320 (a), (b), (e).

Ex Parte Contact Restrictions Applicable to All Appeals

26. Hearings on appeals are subject to the ex parte communication restrictions of California Administrative Procedures Act (Gov. Code § 11430.10 et seq.). Under that Act, an ex parte communication is a "communication, direct or indirect, regarding any issue in the proceeding, to the [council or council member] from an employee or representative of an agency that is a party or from an interested person outside the agency, without notice and opportunity for all parties to participate in the communication." (Gov. Code § 11430.10.) The restrictions apply from the date that the appeal is filed to the date that the council reaches a final decision on the appeal.

NOTE: Authority cited: Government Code sections 11430.10, 11430.80, Water Code section 85225.30.

27. To ensure compliance with these provisions, members should avoid ex parte communications while an appeal is pending. If they nevertheless receive one, such as by an individual sending a letter to a member concerning a pending matter, the member should notify the council's legal adviser or executive officer so that appropriate measures can be taken.

NOTE: Authority cited: Government Code sections 11430.10, 11430.80, Water Code section 85225.30.

28. At the first appropriate meeting after an appeal is anticipated or filed, the council's legal adviser will remind the council of this restriction and answer questions about its scope.

NOTE: Authority cited: Government Code sections 11430.10, 11430.80, Water Code section 85225.30.

Official Notice

29. Notwithstanding any provision of these procedures to the contrary, the council may take official notice in any hearing that it conducts, of any generally accepted technical or scientific matter within the council's jurisdiction, and of any fact that may be judicially noticed by the courts of this State.

NOTE: Authority cited: Government Code section 11515, Water Code section 85225.30.

Filings and Mailings

30. All filings and mailings required by sections 1-29 of these procedures may be made electronically.

NOTE: Authority cited: Water Code section 85225.30.

Consolidation of Appeals

31. The council, at its discretion, may consolidate appeals raising similar issues.

NOTE: Authority cited: Water Code section 85225.30.

PART II—STATUTORY PROVISIONS REQUIRING OTHER CONSISTENCY REVIEWS (AFTER ADOPTION OF THE DELTA PLAN)

In several other sections of SB X7 1, the council is directed to review for consistency with the Delta Plan, various plans of specified public agencies. This Part is directed at those reviews, which fall outside the scope of the procedures covered by Part I.

1. Delta Protection Commission's Economic Sustainability Plan.

Public Resources Code section 29759 requires the Delta Protection Commission (DPC), by July 1, 2011, to adopt an economic sustainability plan. That plan must include information and recommendations that inform the council's policies regarding the socioeconomic sustainability of the Delta's region.

Public Resources Code section 29761.5(b) requires the DPC to transmit copies of the plan to the council within 60 days of adoption. The council is required, within 180 days of the adoption of the plan, to review the plan for consistency with the Delta Plan.

2. Local and Regional Planning Documents.

Water Code section 85057.5(b)(3), excepts from the definition of "covered action", regional transportation plans prepared pursuant to Government Code section 65080.

Paragraph (4) of that same section, excepts from the definition of “covered action”, plans, programs, projects or activities within the secondary zone of the Delta that the applicable metropolitan planning organization under Government Code section 65080 has determined is consistent with either a sustainable communities strategy or an alternative planning strategy that would achieve specified greenhouse gas emission reduction targets as determined by the Air Resources Board.

Because they are not “covered actions”, these types of local and regional planning documents are not subject to the statutory provisions governing consistency of state and local public agency actions (Water Code secs. 85225 et seq.), or the council’s Administrative Procedures Governing Appeals (Part I, above), with one exception noted in paragraph (d), below.

However, Water Code section 85212 provides a separate requirement and process for consistency review by the council of these types of local and regional planning documents.

In particular:

(a) The council is required to review and provide timely advice to local and regional planning agencies regarding the consistency of local and regional planning documents, including sustainable communities strategies and alternative planning strategies prepared pursuant to Government Code section 65080, with the Delta Plan.

(b)The council’s input must include, but not be limited to, reviewing the consistency of local and regional planning documents with the ecosystem restoration needs of the Delta and reviewing whether the lands set aside for natural resources protection are sufficient to meet the Delta’s ecosystem needs.

(c) A metropolitan planning organization preparing a regional transportation plan that includes land within the primary or secondary zones of the Delta must consult with the council early in the planning process regarding the issues and policy choices relating to the council’s advice.

(d) No later than 60 days prior to the adoption of a final regional transportation plan, the metropolitan planning organization must provide the council with a draft sustainable communities strategy and an alternative planning strategy, if any. Concurrently, the metropolitan planning organization must provide notice of its submission to the council in the same manner in which agencies file a certificate of consistency with regard to covered actions.

(e) If the council concludes that the draft strategies are inconsistent with the Delta Plan, the council must provide written notice of the claimed inconsistency to the metropolitan planning organization no later than 30 days prior to the adoption of the final regional transportation plan.

(f) If the council provides timely notice of a claimed inconsistency, the metropolitan planning organization's adoption of the final regional transportation plan must include a detailed response to the council's notice.

PART III--OTHER FORMS OF REVIEW OR EVALUATION BY THE COUNCIL

1. Interested parties, including federal, state and local public agencies, are encouraged to confer with the council or its executive officer over the scope and potential impacts of the interim plan developed under Water Code section 85084. Interested parties will be provided an opportunity to comment and provide input on the interim plan as it is developed.

2. Similarly, prior to adoption of the Delta Plan, project proponents are encouraged to consult with the council or its executive officer early in the planning stages of projects that may constitute "covered actions" under Water Code section 85057.5 once the Delta Plan is adopted. Subject to available resources, the council may review and comment on planning documents and environmental review documents regarding potential "covered actions".

3. Subject to available resources, the executive officer or his designee may meet with interested parties, upon their request, to help mediate relevant disputes, including disputes, once the Delta Plan is adopted, over whether a project constitutes a "covered action" under Water Code section 85057.5. The intent of this mediation will be to provide an objective and informal forum for dispute resolution that will serve as a more efficient alternative to costly and time- consuming litigation.

4. Interested parties, including federal, state and local agencies, are encouraged to confer and coordinate with the council or its executive officer with regard to agency plans, studies, strategies, and recommendations required, or otherwise suggested, to be considered by the council for incorporation into the Delta Plan.

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Appendix E
Performance Measures for the Delta Plan

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Appendix E
Performance Measures for the Delta Plan[1]

Performance Measure Types

Delta Plan performance measures have been placed into three general classes:

- **Administrative** performance measures describe decisions made by policy makers and managers to finalize plans or approve resources (funds, personnel, projects) for implementation of a program or group of related programs.
- **Output** (also known as "driver") performance measures evaluate the factors that may be influencing outcomes and include on-the-ground implementation of management actions, such as acres of habitat restored or acre-feet of water released, as well as natural phenomena outside of management control (such as a flood, earthquake, or ocean conditions).
- **Outcome** performance measures evaluate responses to management actions or natural outputs.

Core Output/Outcome Performance Measure Criteria

- **Metrics** define the unit(s) of measure and other characteristics for tracking aspects of performance over time.
- **Baselines** are standards or historical reference conditions for comparing with the current condition.
- **Targets** are the desired future conditions or trends.

Chapter 2: The Delta Plan

Administrative Performance Measures

- ♦ Establishment of the Delta Plan Interagency Implementation Committee by January 31, 2013.
- ♦ Completion of Report on Revisions to Delta Plan Performance Measures by December 31, 2014.
- ♦ The initial Delta Plan and all future revisions and amendments to the Delta Plan by the Council are consistent with an adaptive management approach and are informed by the best available science, where applicable.

[1] The Council authorizes staff to make non-substantive alterations to metrics within these performance measures as follows: (1) such non-substantive alterations must be driven by the availability of new data sources or technological improvements, and (2) such non-substantive alterations must be functionally equivalent to, or better than, the existing metrics or targets. The Council expects that any substantive alterations to metrics will be brought to the Council for review and approval.

- A minimum of every 5 years (beginning 5 years after adoption of the Delta Plan), the Delta Plan is reviewed by the Council and revised if deemed appropriate.
- Governance structure is reviewed and revised (if necessary) to ensure that there is adequate institutional capacity to interact, learn, and adapt in a manner that supports adaptive management.
- The Delta Science Program develops a Delta Science Plan including responding to Delta Independent Science Board review and comments by December 31, 2013.

Chapter 3: A More Reliable Water Supply for California

Strategy 3.1: Increase Water Conservation and Expand Local and Regional Supplies

Strategy 3.2: Improve Groundwater Management

Strategy 3.3: Improve Conveyance and Expand Storage

Strategy 3.4: Improved Water Management Information

Outcome Performance Measures

- Demonstrate a measurable reduction in reliance on the Delta at the regional level based on individual water supplier reports. (Strategy 3.1)

    Metrics:
    - 10-year moving average volume and percent of total water used (percent of total water portfolio) originating in the Delta watershed for all years, and for different water year types.
    - 10-year moving average volume and percent of total water use met from local and regional sources. For the purposes of reporting progress in reducing reliance on the Delta and improving regional self-reliance, water conservation and efficiency measures are considered new sources of water supply.
    - Projected volume and percent of total use met by local and regional sources of supply.

    Baseline:
    - 10-year average volume and percent of total water use met by water originating in the Delta watershed, by hydrologic region, as of Delta Plan adoption (May 2013)for all years, and for different water year types .
    - 10-year average volume and percent of total water use met by local and regional supplies, by hydrologic region, as of Delta Plan adoption (May 2013).

    Target:
    - Decreasing trend in volume of water used from the Delta watershed or percent of total water use met by water from the Delta watershed.
    - Increasing trend in volume or percent of total water use met by local and regional supplies.

- Demonstrate progress towards decreasing the overall rate of groundwater depletion in critically overdrafted basins. (Strategy 3.2)

    Metrics:
    - Change in groundwater in storage.
    - Groundwater elevations.

Baseline:

- Regional groundwater estimates for California's Central Valley using satellite-based gravimetric sensors are available back to October of 2003. The California Department of Water Resources has a network of long-term monitoring wells in the San Joaquin Valley (3,124 wells) and Sacramento Valley (599 wells) that will be used to assess sub-basin groundwater trends.

Target:

- Decreasing rate of groundwater depletion in critically overdrafted basins.

♦ Demonstrate that water available to be exported through the Delta is not disrupted. (Strategy 3.3)

Metric:

- Percent of Central Valley Project/State Water Project final allocations delivered each year.

Baseline:

- Long-term historical average deviation of total deliveries from final allocations.

Target:

- Declining trend in the deviation of total deliveries from final allocations.

Output Performance Measures

♦ Demonstrate California's urban water suppliers' progress toward meeting California's SB X7-7 conservation goal of achieving a 10% reduction in statewide urban per capita water usage by 2015 and a 20% reduction by 2020. (Strategy 3.1)

Metrics:

- Gallons per capita per day of urban water use.
- Percentage change in urban per capita water use from SB X7-7 baseline years.

Baseline:

- 196 gallons per capita per day (population-weighted average of baselines established in 2010 Urban Water Management Plans).

Target:

- 10% reduction by 2015 (176 gallons per capita per day).
- 20% reduction by 2020 (156 gallons per capita per day).

♦ Demonstrate California's progress toward achieving the State Water Resource's Control Board's Recycled Water Policy goal for the increased use of storm water runoff (e.g., capture and reuse, recharge, redirection to constructed wetlands or landscaping) of at least 500,000 acre-feet/year by 2020 and by at least 1 million acre-feet/year by 2030. (Strategy 3.1)

Metric:

- Acre-feet per year of storm water use (e.g. capture and reuse, recharge, redirection to constructed wetlands or landscaping).

Baseline:

- Volume of storm water use reported in 2015 Urban Water Management Plans and Prop 1 Storm Water Resource Plans may be the first widespread reporting of storm water use that could serve as a baseline.

Target:

- Increased use of storm water runoff of at least 500,000 acre-feet/year by 2020 and by at least 1 million acre-feet/year by 2030.

♦ Demonstrate an increase in efficiency in agricultural water use. (Strategy 3.1)

Metrics:

- Water management fraction (ratio of the amount of water needed to be applied for optimal crop growth and the amount of water in recoverable return flow per the total amount of water applied. As efficiency increases, this ratio approaches one.). This metric was defined by Department of Water Resources in Methodology for Quantifying the Efficiency of Agricultural Water Use, 2012.

Baseline:

- 2012 Agricultural Water Management Plans or earliest available data as they are reported by water suppliers.

Target:

- Increase in efficiency.

Administrative Performance Measures

Strategy 3.1: Increase Water Conservation and Expand Local and Regional Supplies

- Identify number of water suppliers that have undertaken covered actions that have (1) completed a current urban or agricultural water management plan that has been reviewed by the DWR for compliance with applicable legal requirements, (2) commenced implementation of identified measures which will reduce reliance on the Delta, and (3) starting in 2015, reported on the expected outcome for measureable reductions in reliance on the Delta and improvement in regional self-reliance as the reduction in the amount of water used, or the percentage of water used, from the Delta watershed.

- Identify number of urban and agricultural water suppliers that certify that they have adopted and are implementing supply planning, conservation, and efficiency measures required by State law by 2015, meeting the standards and deadlines established by code.

- DWR adopts and implements a requirement for SWP contracts and transfer agreements that requires implementation of State water efficiency, water management laws, goals and regulations including compliance with water code section 85021.

- SWRCB adopts a policy that requires evaluation of new water rights or a new or changed point of diversion, place of use, or purpose that result in a new or increased long-term average use of water from the Delta watershed for consistency with reasonable and beneficial use and Water Code sections 85021, 85023, and 85031 and other provisions of California law.

- Identify percentage of urban and agricultural water suppliers that receive water from the Delta watershed that have incorporated an expanded Water Supply Reliability Element in their UWMP and AWMP by December 31, 2015.

- DWR has developed and published guidelines for the preparation of an expanded Water Supply Reliability Element by December 31, 2014.

- DWR and SWRCB have established an advisory group and identified impediments to achievement of statewide water conservation, recycled water and stormwater goals by 2014 and have evaluated and recommended update goals by 2018, including an assessment of how regions are achieving their proportional share of these goals.

- State grant and loan ranking criteria have been revised by December 31, 2013.

- State agencies report to DSC on an annual basis on their actions to demonstrate state leadership, to increase water efficiency, use recycled water, and incorporate stormwater runoff capture and low impact development strategies.

Strategy 3.2: Improve Groundwater Management

- Completion by DWR of the update of Bulletin 118 information (using field data, CASGEM, and best available science) and identification of the state's groundwater basins which are in a critical condition of overdraft by December 31, 2014.
- Information in updated Bulletin 118 is included in the next (2018) California Water Plan Update and the 2020 Urban Water Management Plans and Agricultural Water Management Plans.
- Number of water suppliers in areas that receive water from the Delta watershed that have developed groundwater management plans that are consistent with the required and recommended components of groundwater management plans listed in DWR Bulletin 118-03 by 2014.
- Identify number of groundwater basins identified by DWR as being in a critical condition of overdraft that have groundwater management plans consistent with the required and recommended components of groundwater management plans listed in DWR Bulletin 118-03 by 2014.
- SWRCB report to DSC on proposed action to address groundwater basins in critical overdraft.

Strategy 3.3: Improve Conveyance and Expand Storage

- BDCP is completed and DWR and the Bureau of Reclamation have received required take permits by December 31, 2014.
- DWR completes Surface Water Storages studies by December 31, 2012 with recommendations for projects to be implemented.
- DWR has completed a survey of past grant applicants to identify projects that may implemented within the next 5 to 10 years to expand existing surface and groundwater storage facilities, create new storage, improve Delta conveyance facilities, and improve opportunities for water transfers by December 31, 2012.
- California Water Commission holds hearings and provides recommendation on priority projects by December 31, 2013.
- DWR and SWRCB, in collaboration with the DSC, have established an advisory group and recommended measures to reduce procedural and administrative impediments to water transfers by December 31, 2016.

Strategy 3.4: Improved Water Management Information

- DWR and Bureau of Reclamation contracting processes have been implemented consistent with applicable policies.
- SWRCB has modified its supplemental water diversion and use or progress reports to require additional information on water efficiency, water supply projects, and net (consumptive) use.
- DWR has completed the development and initiated implementation of an integrated statewide system for water use reporting in coordination with other state agencies by 2014.
- DWR has modified the California Water Plan update to include specified categories of information to be tracked.
- Development of appropriate performance measures will be done by DSC in consultation with the agencies. These performance measures will be rolled into the California Water Plan Update.

- DWR has prepared an assessment of the State's water infrastructure.

Chapter 4: Protect, Restore, and Enhance the Delta Ecosystem

Strategy 4.1: Create More Natural Functional Flows

Strategy 4.2: Restore Habitat

Strategy 4.3: Improve Water Quality to Protect the Ecosystem

Strategy 4.4: Prevent Introduction of and Manage Nonnative Species Impacts

Strategy 4.5: Improve Hatcheries and Harvest Management

Outcome Performance Measures

- Progress toward restoring a healthy estuary using more natural functional flows, including in-Delta flows and tributary input flows to support ecological floodplain process, e.g., spring pulse flows along the Sacramento River, and more gradual recession flows at the end of the wet season. (Strategy 4.1)

  Metrics:
  - Frequency of achieving >17,000 acres of inundation for 14 or more consecutive days in the Yolo Bypass.
  - Flows exceeding base flows. A flow, 5 to 10 times greater than the base flow, during the period of spring flows in the Sacramento River.
  - Rate of change in the hydrograph on the receding limb as measured from spring high flows to summer low flows.

  Baseline:
  - Between 1984 and 2007 the Yolo Bypass experienced inundation events of at least 14 consecutive days between December and April, 10 out of 24 years.
  - Long-term historical hydrograph data retrieved from U.S. Geological Survey stations from below Shasta Dam.

  Target:
  - Allow for >17,000 acres of Yolo Bypass inundation for 14 or more consecutive days between December and March in at least two out of three years.
  - At least one spring flow event 5 to 10 times winter base flow each year in the Sacramento River.
  - Not to exceed daily drops in flow >10%.

- Progress toward achieving the State and federal "doubling goal" for wild Central Valley salmon relative to the period of 1967-1991 levels. Trends will be derived from long-term salmon monitoring surveys conducted by the U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, and others. (Strategy 4.2)

  Metrics:
  - Number of naturally spawned wild adult salmon by run type, annually censused for the general population in the Central Valley and selected rivers:
    - Sacramento River:
      - American River
      - Feather River
      - Sacramento River mainstem

- San Joaquin River:
  - Tuolumne River
  - Merced River
  - Stanislaus River
  - Mokelumne River

Baseline:

- Salmon population numbers relative to average levels during the period of 1967-1991.

Target:

- As defined by the Central Valley Project Improvement Act "doubling goal" that "…natural production of anadromous fish in 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."

♦ Progress toward the documented occurrence in and use of protected and restored habitats and migratory corridors by native resident and migratory Delta fish and bird species. Trends in the number of native species in protected and restored habitats and corridors will be derived from monitoring surveys that are conducted as part of adaptive management strategies for the protection and restoration of these areas. (Strategy 4.2)

Metrics:

- Assess native fish:
  - Relative abundance of native fish in and near restoration project sites.
- Assess native birds:
  - Counts of native birds, including waterfowl in the Delta.

Baseline:

- Fish relative abundance as of Delta Plan adoption, May 2013.
- Breeding waterfowl for 2010-2014:
  - Delta counts (5-year average): 7,414
  - Suisun Marsh counts (5-year average): 23,122

Target:

- Upward trend as measured by the metrics above.

♦ Progress toward; 1) increased habitat, connectivity, and functionality; and 2) more favorable spatial distribution of habitat types. (Strategy 4.2)

Metrics:

- Assess the function 'Provides habitat and connectivity for fish'.
  - Spatial-temporal variability of seasonal short-term and long-term flooding and tidal inundation.
  - Marsh to open water ratio.
  - Adjacency of marsh to open water by length and marsh patch size.
  - Ratio of looped to dendritic channels (by length and adjacent habitat type).
- Assess the function 'Provides habitat and connectivity for marsh wildlife'.
  - Marsh area by patch size (patch size distribution).
  - Marsh area by nearest large (>100 ha) neighbor distance.
  - Marsh core area ratio.
  - Marsh fragmentation index.
- Assess the function 'Provides habitat and connectivity for waterbirds'.
  - Wetted area by type in winter.
- Assess the function 'Provides habitat and connectivity for riparian wildlife'.

- Riparian habitat area by patch size.
- Riparian habitat length by width class.

▪ Assess the function ‘Provides habitat and connectivity for marsh- terrestrial transition zone wildlife’.

- Length of marsh-terrestrial transition zone by terrestrial habitat type.

Baseline:

Metric	Baseline (“Modern” Delta)
Spatial-temporal variability of seasonal short-term and long-term flooding and tidal inundation	Tidal Inundation • Dec – Feb: 3,303 ha • Mar – May: 3,303 ha • Jun – Aug: 3,303 ha • Sep –Nov: 3,303 ha Seasonal long-duration flooding • Dec – Feb: 0 ha • Mar – May: 0 ha • Jun – Aug: 0 ha • Sep – Nov: 0 ha Seasonal short-term flooding • Dec – Feb: 18,128 ha • Mar – May: 18,128 ha • Jun – Aug: 0 ha • Sep – Nov: 0 ha
Marsh to Open Water Ratio	Marsh: 4,296 ha Open water: 26,554 ha Marsh to Open Water Ratio: 0.16
Adjacency of marsh to open water by length and marsh patch size	Marsh Patch >100 ha: 31 km Marsh Patch 10 – 100 ha: 236 km
Ratio of looped to dendritic channels	Dendritic channels adjacent to marsh: 84 km Dendritic channels not adjacent to marsh: 255 km Looped Channels: 768 km Fluvial or Detached: 298 km
Marsh area by patch size	<=10 ha: 1,427 ha 10 – 100 ha: 1,757 ha 100 – 1,000 ha: 1,154 ha 1,000 – 10,000 ha: 0 ha >10,000 ha: 0 ha

Metric	Baseline (“Modern” Delta)
Marsh area by nearest neighbor distance	<=10 m: 1,161 ha 10 – 100 m: 143 ha 100 – 1,000 m: 87 ha 1,000 – 10,000 m: 630 ha >10,000 m: 2,317 ha
Marsh core area ratio	Core Habitat: 815 ha Edge Habitat: 3,522 ha Core to Edge Ratio: 0.23
Marsh fragmentation index	Areas of marsh core habitat within large marsh patch (>100 ha) or within small patches < 1km from large patch: 491 ha
Wetted area by type in winter	Ponds, Lakes, Channels and Flooded Islands: 26,530 ha Tidal Inundation: 3,303 ha Seasonal long-duration flooding: 0 ha Seasonal short-term flooding: 18,128 ha

Riparian habitat area by patch size	<=20 ha: 1,991 ha 20 – 80 ha: 1,364 ha 80 – 320 ha: 1,470 ha 320 – 1,280 ha: 2,066 ha >1,280 ha: 0 ha	Riparian habitat length by width class	0 – 100m: 626 km 100 – 500m: 87 km >500 m: 11 km
Length of marsh-terrestrial transition zone by terrestrial habitat type	Willow Riparian Scrub or Shrub: 370 km Valley Foothill Riparian: 116 km Oak Woodland and Oak Savannah: 0 km Alkali Seasonal Wetland Complex: 19 km Wet Meadow and Seasonal Wetland: 30 km	Stabilized Interior Dune Vegetation: 0 km Grassland: 103 km Willow Thicket: 59 km Vernal Pool Complex: 4 km	

Target:

- Increasing extent of flooding by different inundation types throughout the year, including seasonal shallow short-term flooding, seasonal deeper long-duration flooding, and tidal inundation.
- Increasing proportion of marsh to open water habitat.
- Increasing proportion and extent of marsh-open water edge that occurs along large marsh patches (>100 ha). Decreasing proportion of marsh-open water edge that occurs along small marsh patches.
- Decreasing proportion of looped to dendritic channels.
- Increasing extent and proportion of marsh habitat that are in large size classes (>100 ha).
- Decreasing proportion of marsh that occurs in small size classes.
- Increasing proportion of marsh habitat that occurs in close proximity to a large marsh patch (>100 ha).
- Increasing proportion and extent of marsh habitat that occurs in “core” habitat (at least 50 m from outside edge of marsh).
- Increasing proportion and extent of marsh habitat that occurs either in core habitat of large marsh patches or in smaller patches less than 1 km from nearest large patch.
- Increased extent of different types of inundation for types wintering waterfowl.
- Increasing proportion and extent of riparian habitat that occur in larger patches. Decreasing proportion of riparian habitat that occurs in smaller patches.
- Increasing proportion and extent of riparian habitat length that occurs in wider width size classes. Decreasing proportion of riparian habitat length that occurs in narrow width size classes.
- Increasing length of marsh-terrestrial transition zone.

♦ Progress toward managing aquatic and terrestrial invasive nonnative species in the Delta over the next decade. Long-term animal and plant monitoring surveys will be conducted by the Interagency Ecological Program agencies, the California Department of Boating and Waterways, the U.S. Department of Agriculture, the San Francisco Estuary Institute, and others. (Strategy 4.4)

Metrics:

- Assess progress toward managing nonnative fish:
  - Number of newly identified nonnative fish species.
  - Relative abundance of individual native fish and individual nonnative fish in the Delta.
- Assess progress toward managing invasive nonnative vegetation:

- Number of newly identified invasive nonnative plant species reported in the Delta.
- Coverage, in acres, of invasive nonnative plant species (e.g., *Arundo donax* and *Phragmites australis*) in the Delta.

Baseline:

- Number of new invasive nonnative species set at zero.
- Abundance or coverage of existing specific nonnative species set at the adoption of the Delta Plan May 2013.

Target:

- Trends for:
  - Decreasing relative abundance of nonnative/introduced fish.
  - Decreasing the number of newly identified nonnative fish species.
  - Decreasing the number of newly identified invasive nonnative plant species.
  - Decreasing coverage of invasive nonnative plant species.

Output Performance Measures

♦ Progress toward higher acreage of the following types: floodplain, tidal and subtidal, emergent wetland, shaded riverine aquatic and upland and riparian forest habitats. Tidal wetland and floodplain restoration projects should occur in the priority habitat restoration areas described in ER R2. (Strategy 4.2)

Metrics:

- Number of acres of restoration projects constructed by habitat type, including progress toward the biological opinions' targets of restoring 8,000 acres of tidal wetlands and 17,000-20,000 acres of floodplain habitat in the Priority Restoration Habitat Areas.

Baseline:

- Set at zero, the number of acres restored as of the Delta Plan's adoption date (May 2013) to capture all the restoration actions that have been implemented after the plan was completed.

Target:

- 8,000 acres of tidal wetlands and 17,000-20,000 acres of floodplain habitat projects contructed in the Priority Restoration Habitat Areas as described in the 2008 and 2009 Biological Opinions for the state and federal water projects.

♦ All hatchery anadromous salmonids marked and tagged. (Strategy 4.5)

Metrics:

- Percent marked and tagged, as reported by National Marine Fisheries Service and California Department of Fish and Wildlife.

Baseline:

- As of May 2013 (Delta Plan adoption date):
  - 100% marked and tagged for Chinook salmon winter-run, spring-run and late-fall run.
  - 25% marked and tagged for Chinook salmon fall-run.
  - 0% tagged and 100% marked for steelhead.

Target:

- 100% of hatchery fish are marked and tagged.

Administrative Performance Measures

Strategy 4.1: Create More Natural Functional Flows

- Prior to the establishment of revised flow objectives identified above, 100% of proposed actions that could significantly affect flow in the Delta are consistent with the existing Bay Delta Water Quality Control Plan objectives.
- The SWRCB adopts Delta flow objectives that are necessary to achieve the coequal goals by June 2, 2014.
- The SWRCB adopts flow objectives that are necessary to achieve the coequal goals for the major tributary rivers to the Delta by June 2, 2018.

Strategy 4.2: Restore Habitat

- 100% of proposed actions that include habitat restoration in the Delta meet one of the following standards: 1) are consistent with the text of Appendix H, based on the *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011); or 2) are not consistent with the elevation map (Figure 4-6), but the deviation is supported by a rationale based on best available science.
- 100% of all proposed actions other than habitat restoration have clearly demonstrated that significant adverse impacts to the opportunity for habitat restoration as described in ER P2 were avoided or mitigated.
- 100% of proposed actions to construct new levees or substantially rehabilitate or reconstruct existing levees in the opportunity areas defined in Appendix 8, demonstrate that they have evaluated alternatives (including use of setback levees), and where feasible, have incorporated such alternatives into levee projects to increase the extent of floodplain and riparian habitat.
- BDCP implementers, DFW, DWR, and/or the Delta Conservancy identify number of projects and amount of funding for priority habitat restoration projects.
- The preponderance of proposed habitat restoration projects is within the six priority areas and considers landscape elements and improvement in water quality.
- 100% of proponents of habitat restoration projects consult the California Department of Public Health's *Best Management Practices for Mosquito Control in California*.
- The Delta Conservancy develops and adopts criteria for prioritization and integration of large-scale ecosystem restoration in the Delta and Suisun Marsh, with sustainability and use of best available science as foundational principles.
- The Delta Conservancy develops and adopts processes for ownership and long-term operations and management of land in the Delta and Suisun Marsh acquired for conservation or restoration.
- The Delta Conservancy develops and adopts a formal mutual agreement with the Department of Water Resources, Department of Fish and Wildlife, federal interests, and other State and local agencies on implementation of ecosystem restoration in the Delta and Suisun Marsh.
- The Delta Conservancy develops a plan and protocol for acquiring the land necessary to achieve ecosystem restoration consistent with the coequal goals and the Ecosystem Restoration Program's Delta Conservation Strategy.
- The Delta Conservancy leads an effort to investigate how to better use habitat credit agreements.

- The Delta Conservancy, in conjunction with DFW and USFWS, develop rules for voluntary Safe Harbor Agreements with property owners in the Delta.
- The U.S. Army Corps of Engineers develops an agreed-upon variance process to exempt Delta levees from the U.S. Army Corps of Engineers' levee vegetation policy where appropriate.
- BCDC updates the Suisun Marsh Protection Plan to address adaptation to sea-level rise and ensure consistency with the Suisun Marsh Preservation Act, the Delta Reform Act and the Delta Plan.
- BCDC submits amendments of the Suisun Marsh Protection Plan to the Council for review for consistency.
- BCDC submits amendments of components of the Suisun Marsh Local Protection Program to the Council for review for consistency.
- BCDC adopts the updated Suisun Marsh Protection Plan and the Suisun Marsh Local Protection Program.

Strategy 4.3: Improve Water Quality to Protect the Ecosystem

See Chapter 6: Water Quality.

Strategy 4.4: Prevent Introduction of and Manage Nonnative Species Impacts

- 100% of all proposed actions that have the reasonable probability of introducing, or improving the habitat conditions for, nonnative invasive species have demonstrated that the potential for new introductions of and/or improved habitat conditions for nonnative invasive species have been fully considered and avoided or mitigated in a way that appropriately protects the ecosystem.
- The Department of Fish and Wildlife develops for consideration by the Fish and Game Commission proposals for new or revised fishing regulations designed to increase populations of listed fish species through reduced predation by introduced sport fish.
- The Department of Fish and Wildlife and other appropriate agencies prioritize the list of "Stage 2 Actions for Nonnative Invasive Species."
- The Department of Fish and Wildlife and other appropriate agencies fully implement the 2014 Ecosystem Restoration Program "Conservation Strategy" list for Strategic Goal 5.

Strategy 4.5: Improve Hatcheries and Harvest Management

- Hatcheries develop scientifically sound Hatchery and Genetic Management Plans (HGMPs).
- The Department of Fish and Wildlife provides annual updates to the Council on the status of HGMPs within its jurisdiction.
- The Department of Fish and Wildlife, in cooperation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service revises and begins implementing its program for marking and tagging hatchery salmon and steelhead to improve management of hatchery and wild stocks by December 2014.

Chapter 5: Protect and Enhance the Unique Cultural, Recreational, Natural Resource, and Agricultural Values of the California Delta as an Evolving Place

Strategy 5.1: Designate the Delta as a Special Place

Strategy 5.2: Plan to Protect the Delta's Lands and Communities

Strategy 5.3: Maintain Delta Agriculture

Strategy 5.4: Encourage Recreation and Tourism

Strategy 5.5: Sustain a Vital Delta Economy

Outcome Performance Measures

- The Department of Water Resources and others increase the extent of their subsidence reversal and carbon sequestration projects to 5,000 acres by January 1, 2017. (Strategy 5.2)

  Metrics:
  - Acres of subsidence reversal and carbon sequestration projects.

  Baseline:
  - Set at zero as of 2008.

  Target:
  - 5,000 acres by January 1, 2017 (905 acres were converted in 2008-2011 and will be included towards meeting the target).

- Prevent further Delta rural farmland loss to urban development in areas designated for agricultural use in Delta Plan regulations. Track conversions of farmland to habitat restoration areas. (Strategy 5.2)

  Metrics:
  - Acres of farmland lost to urban development.
  - Acres of farmland lost to urban development within areas designated for agricultural use in the Delta Plan regulations.
  - Acres of farmland converted to habitat restoration.

  Baseline:
  - Number of acres of Delta rural farmland designated for agriculture in Delta Plan regulations at the time of Delta Plan adoption in May of 2013.

  Target:
  - Zero acres of farmland lost to urban development within areas designated for agricultural use in the Delta Plan regulations.

- Value-added crop processing trends. (Strategy 5.3)

  Metrics:
  - Revenues (dollars) associated with value-added crop processing.

  Baseline:
  - Measured as of the date of the Delta Plan's adoption, May 2013.

Target:

- Upward trend as measured by the metric above.

- ♦ Delta recreation and tourism trends. (Strategy 5.4)

  Metrics:
  - Acres of accessible state and federal owned land to the public for recreation and tourism.
  - Length (linear feet) of shoreline accessible for public recreation.
  - Number of fishing licenses bought per year by county.

  Baseline:
  - Measured as of the date of the Delta Plan's adoption, May 2013.

  Target:
  - Upward trend as measured by the metrics above.

- ♦ Delta industrial, agricultural, and recreational economic trends. (Strategy 5.5)

  Metrics:
  - Tonnage of port cargo.
  - Agriculture revenue (dollars).
  - Recreation spending (dollars).

  Baseline:
  - Measured as of the date of the Delta Plan's adoption, May 2013.

  Target:
  - Upward trend as measured by the metrics above.

Output Performance Measures

- ♦ Water management, ecosystem restoration, and flood management projects minimize conflicts with adjoining uses by avoiding, minimizing, or mitigating adverse effects. (Strategy 5.2)

  Metrics:
  - Percent of projects that avoid, minimize, or mitigate adverse effects to less than significant levels.

  Baseline:
  - This performance measure was developed during the adoption of the Delta Plan (May 2013) with the primary purpose of measuring consistency with the Delta Plan, setting the baseline at May 2013.

  Target:
  - 100% consistency with the Delta Plan, measured on an annual basis.

- ♦ Progress toward preparing and implementing plans for the vitality and preservation of for each Delta legacy community. (Strategy 5.2)

  Metrics:
  - Number of projects initiated to achieve legacy community plan objectives.

  Baseline:
  - Set at zero as of the Delta Plan's adoption date, May 2013.

  Target:
  - Upward trend in the number of completed projects that improve community vitality.

- Track the extent to which recreation facilities are included in new ecosystem restoration projects. (Strategy 5.4)

  Metrics:
  - Percent of new ecosystem restoration projects that include recreational facilities.

  Baseline:
  - Measured as of the date of the Delta Plan's adoption, May 2013.

  Target:
  - Increasing trend in the percentage of new ecosystem restoration projects that include recreation facilities.

Administrative Performance Measures

Strategy 5.1: Designate the Delta as a Special Place

- Delta Protection Commission completes application for designation of the Delta and Suisun Marsh as a National Heritage Area.
- The California Department of Transportation prepares a scenic byway plan and pursues National Scenic Byway status for Route 160 by January 1, 2014.
- Congress designates a National Heritage Area that includes the Delta and Suisun Marsh by January 1, 2014.

Strategy 5.2: Plan to Protect the Delta's Lands and Communities

- 100% of proposed actions for urban development meet one of the following standards: 1) are located within areas that current city or county general plans as of the date of the Delta Plan's adoption designate for development in cities or their spheres of influence; areas within Contra Costa County's 2006 voter-approved urban limit line, except Bethel Island; areas within the Mountain House General Plan Community Boundary in San Joaquin County; or the unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde and Walnut Grove; 2) if located on Bethel Island, are consistent with the Contra Costa County general plan effective as of the date of the Delta Plan's adoption; or 3) if located outside the areas described above, are consistent with the land uses designated in county general plans as of the date of the Delta Plan's adoption and are otherwise consistent with Delta Plan policies.
- Water management facilities, ecosystem restoration, and flood management infrastructure are sited to avoid or reduce conflicts with existing or planned uses when feasible, considering comments from local agencies and the Delta Protection Commission. Plans for ecosystem restoration consider sites on existing public lands, when feasible and consistent with a project's purpose, before privately owned sites are purchased.
- Local governments prepare plans for each community that emphasize its distinctive character, encourage historic preservation, identify opportunities to encourage tourism, serve surrounding lands, or develop other appropriate uses, and reduce flood risks.
- Agencies acquiring land for water management facilities, ecosystem restoration, and flood management infrastructure purchase from willing sellers, when feasible, including consideration of whether lands suitable for proposed projects are available at fair prices.
- The California Department of Transportation, local agencies, and utilities develop plans infrastructure, such as roads and highways, to meet needs of development consistent with sustainable community strategies, local plans, Delta Protection Commission's Land Use and Resource Management Plan, and the Delta Plan.

- As part of the prioritization of State levee investments called for in RR P4, the Delta Stewardship Council consults with the California Department of Transportation as provided in Water Code section 85307(c) to consider the effects of flood hazards and sea level rise on state highways in the Delta.
- The Council, in conjunction with the California Air Resources Board (CARB) and the Delta Conservancy, investigates the opportunity for the development of a carbon market whereby Delta farmers could receive credit for growing native marsh and wetland plants.
- The Department of Water Resources has developed a plan, including funding needs, for increasing the extent of their subsidence reversal and carbon sequestration projects to 5,000 acres by January 1, 2017.
- 100% of State agencies have not renewed or entered into agricultural leases on Delta or Suisun Marsh islands if the actions of the lessee promote or contribute to subsidence on the leased land, unless the lessee participates in subsidence reversal or reduction programs.

Strategy 5.3: Maintain Delta Agriculture

- Local governments and economic development organizations take steps to encourage value-added processing of Delta crops in appropriate locations.
- Local governments and economic development organizations take steps to support growth in agritourism, particularly in and around legacy communities.
- The Department of Fish and Wildlife, the Delta Conservancy, and ecosystem restoration agencies take steps to encourage habitat enhancement and wildlife friendly farming systems on agricultural lands to benefit both the environment and agriculture.

Strategy 5.4: Encourage Recreation and Tourism

- Water management and ecosystem restoration agencies provide recreation opportunities, including visitor-serving business opportunities, at new facilities and habitat areas whenever feasible, and protect existing recreation facilities using California State Parks' *Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh* and Delta Protection Commission's *Economic Sustainability Plan* as guides.
- The Delta Protection Commission and Delta Conservancy take steps to encourage partnerships between other state and local agencies, and local landowners and business people to expand recreation, including boating, promote tourism, and minimize adverse impacts to non-recreational landowners.
- Dedicated funding sources are identified to add of improve recreation facilities in the Delta.
- The Department of Fish and Wildlife, in cooperation with other public agencies, should collaborate with nonprofits, private landowners, and business partners to expand wildlife viewing, angling, and hunting opportunities.
- The Department of Boating and Waterways coordinates with the U.S. Coast Guard and State and local agencies on an updated marine patrol strategy for the region.
- Public agencies owning land increase opportunities, where feasible, for bank fishing, hunting, levee top trails, and environmental education.
- Cities, counties, and other local and state agencies work together to protect and enhance visitor serving businesses by planning for recreation uses and facilities in the Delta, providing

infrastructure to support recreation and tourism, and identifying settings for private visitor-serving development and services.

Strategy 5.5: Sustain a Vital Delta Economy

- The ports of Stockton and West Sacramento encourage maintenance and carefully designed and sited development of port facilities.
- The Energy Commission and Public Utilities Commission cooperate with the Delta Stewardship Council as described in Water Code section 85307(d) and identify actions that should be incorporated in the Delta Plan to address the needs of Delta energy development, storage, and distribution by 2017.

Chapter 6: Improve Water Quality to Protect Human Health and the Environment

Strategy 6.1: Require Delta-Specific Water Quality Protection

Strategy 6.2: Protect Beneficial Uses by Managing Salinity

Strategy 6.3: Improve Drinking Water Quality

Strategy 6.4: Improve Environmental Water Quality

Outcome Performance Measures

- Water quality in the Delta and Suisun Marsh meets the San Francisco, Central Valley, and Bay-Delta Water Quality Control Plan objectives. (Strategy 6.1)

  Metrics:
  - The reduction in the number of impaired water bodies on the 303(d) list.

  Baseline:
  - Measured as of the date of the Delta Plan's adoption, May 2013.

  Target:
  - Water quality objectives in the respective Water Quality Control Plans listed are met.
  - TMDLs are being developed and Basin Plan amendments are being implemented for those water bodies not meeting water quality objectives (i.e., those listed under the Clean Water Act 303 (d) list).

- Monitor salinity in the Delta, utilizing extensive existing electrical conductivity and chloride concentration (D-1641) and X2 measurement data that correspond to State Water Resources Control Board objectives. (Strategy 6.2)

  Metrics:
  - Daily electrical conductivity, chloride concentration, and X2.

  Baseline:
  - Average annual salinity levels from 1995 to 2015.

  Target:
  - Meeting State Water Resources Control Board objectives for ecosystem purposes.
  - Meeting all other salinity objectives for urban and agricultural use.

- Progress toward consistently meeting applicable dissolved oxygen (DO) standards in the Delta by 2020 (i.e., Stockton Deep Water Ship Channel, Suisun Marsh, and Old and Middle River). (Strategy 6.4)

  Metrics:
  - Milligrams of DO per liter of water (mg/L).
  - Continuous, real-time DO measurements made at multiple locations throughout the Delta.

  Baseline:
  - Measured as of the date of the Delta Plan's adoption, May 2013.

  Target:
  - Meet water quality objectives for DO in the Stockton Deep Water Ship Channel, Suisun Marsh, and Old and Middle River.
  - Maintain or exceed the minimum DO concentrations of:
    - 5 mg/L at all times everywhere in the Delta.
    - 6 mg/L from September through November only in the San Joaquin River between Turner Cut and Stockton.

- Trends in measurable toxicity from pesticides, including herbicides, insecticides, and fungicides, and other pollutants in Delta water will be downward over the next decade. (Strategy 6.4)

  Metrics:
  - Measurable toxicity testing using fish, invertebrates, and the USEPA approved test methods for algae.

  Baseline:
  - Trends associated with 2008 levels. (The Stream Pollution Trends Monitoring Program monitors trends in toxicity and pollution of California waters and was implemented in 2008.)

  Target:
  - Downward trend of measurable toxicity results for Delta water bodies.

- Trends in the abundance and spatial coverage of harmful algal blooms in the Delta. (Strategy 6.1 and Strategy 6.4)

  Metrics:
  - Aerial distribution estimates of harmful algal blooms (e.g., microcystis), by acres in the Delta.
  - Abundance of harmful algal blooms (e.g., microcystis) in the Delta.

  Baseline:
  - Sighting records with the Department of Water Resources during the period of 1999-2000.

  Target:
  - Downward trend in abundance and spatial coverage of harmful algal blooms over the next decade.

- Trends in the spatial distribution and coverage of nuisance nonnative aquatic plants Delta. (Strategy 6.1 and Strategy 6.4)

  Metrics:
  - Acreage of invasive aquatic plants in the Delta (e.g., water hyacinth and others as data becomes available).

  Baseline:
  - 2000-2004 University of California Davis hyacinth monitoring surveys.

Target:
- Downward trend in water hyacinth acreage over the next decade.

Output Performance Measures

- ♦ The Department of Water Resources begins constructing the North Bay Aqueduct Alternate Intake Project as soon as possible after the environmental impact report is completed. (Strategy 6.3)

  Metrics:
  - Project completed.

  Baseline:
  - The Notice of Preparation for the North Bay Aqueduct Alternate Intake Project Environmental Impact Report was published on November 24, 2009.

  Target:
  - The North Bay Aqueduct Alternate Intake Project's final Environmental Impact Report projected date is September/October 2016.

- ♦ Protect groundwater beneficial uses. Groundwater meets drinking water quality standards in the Central Valley[2] for levels of nitrate (10 ppm NO3-N) and arsenic (10 ppb As). (Strategy 6.3)

  Metrics:
  - Number of groundwater wells used for domestic water supply that exceed arsenic and/or nitrate drinking water limits in the San Joaquin Valley.
  - Percentage of population with access to clean drinking water in the San Joaquin Valley.

  Baseline:
  - Water quality standards in the Central Valley for levels of nitrate (10 ppm NO3-N) and arsenic (10 ppb As).
  - Baseline of population with access to clean drinking water in the Central Valley will be established once this performance measure is adopted.

  Target:
  - Maintain or reduce nitrate and arsenic levels from baseline levels.
  - Increase percent of population with access to clean drinking water in the Central Valley from baseline.

- ♦ TMDLs for critical pesticides (e.g., diazinon, chlorpyrifos, and pyrethroids) in the waters and sediments of the Delta are met by 2020. (Strategy 6.4)

  Metrics:
  - Progress in developing and meeting TMDLs.

  Baseline:
  - December 2004 monitoring baseline data to align with USEPA TMDL report.

  Target:
  - As defined within applicable TMDL and published in the Central Valley Regional Water Quality Control Board amendments to the Water Quality Control Plan for the control of diazinon and chlorpyrifos runoff into the Sacramento-San Joaquin Delta (June 2006). Target date is defined in the Delta Plan as year 2020. Other

[2] This performance measure refers to the San Joaquin Valley because many residents of this region rely on impaired groundwater for drinking water and have limited access to clean surface water that is exported from the Delta watershed.

compliance dates are defined in management plans submitted by dischargers. Following are in micrograms/liter:
- Chlorpyrifos:
  - 0.025, acute, 1-hour average
  - 0.015, chronic, 4-day average
  - Not to be exceeded once in a three year period
- Diazinon:
  - 0.16, acute, 1-hour average
  - 0.10, chronic, 4-day average
  - Not to be exceeded once in a three year period.
- Pyrethroids: Target pending the adoption of the Pyrethroid Control Program into the Water Quality Control Plan for the Sacramento San Joaquin River Basins by 2017.

♦ Progress toward reducing concentrations and/or loads of inorganic nutrients (ammonium, nitrate, and phosphate) in Delta waters over the next decade. (Strategy 6.4)

Metrics:
- Concentration and/or loads of ammonium, nitrate, and phosphate at key Delta water quality monitoring locations.

Baseline:
- Nutrient concentrations, loads, and trends during the period of 2004-2013.

Target:
- Water shall not contain biostimulatory substances which promote aquatic growth in concentrations that cause nuisance or adversely affect beneficial uses.

Administrative Performance Measures

Strategy 6.1: Require Delta-Specific Water Quality Protection

♦ There is no administrative performance measure for this policy at this time.

♦ 100% of covered actions that affect water quality in the Delta identify any significant negative water quality impacts.

♦ SWRCB and RWQCBs evaluate and include appropriate protections in any applicable water quality control plan.

Strategy 6.2: Protect Beneficial Uses by Managing Salinity

See Chapter 4 Strategy 1: Create More Natural Functional Flows

Strategy 6.3: Improve Drinking Water Quality

♦ Central Valley RWQCB completes the Central Valley Drinking Water Policy by July 2013.

♦ The Department of Water Resources completes the North Bay Aqueduct Alternate Intake Project EIR by July 1, 2012.

♦ SWRCB completes development of a Strategic Workplan for protection of groundwater beneficial uses by December 31, 2012.

♦ Central Valley RWQCB and SWRCB adopt policies and regulations necessary to require all relevant water users that are supplied water from the Delta or the Delta Watershed or discharge wastewater to the Delta or the Delta Watershed to participation in CV-SALTS.

Strategy 6.4: Improve Environmental Water Quality

- SWRCB develops a proposed policy for nutrients for Inland Surface Waters of the State of CA by January 1, 2014.
- SWRCB and RWQCBs begin implementation of a study plan for the development of objectives for nutrients in the Delta and Suisun Marsh by January 1, 2013, and complete studies by January 1, 2016.
- SWRCB and RWQCBs adopt objectives for nutrients in the Delta by January 1, 2018.
- TMDLs and Basin Plan Amendments for diazinon and chlorpyrifos are completed by January 1, 2013.
- The Central Valley Pesticide TMDL is completed by January 1, 2016.
- SWRCB and RWQCBS complete TMDLs and Basin Plan Amendments for methylmercury.
- The Central Valley Regional Water Quality Control Board review the methyl mercury control studies by December 31, 2018 and determine control measures for implementation starting in 2020.
- A Delta regional water quality monitoring program is developed.
- A Delta regional monitoring program is implemented within the first 5 years of the Delta Plan.
- The Central Valley Regional Water Quality Control Board requires responsible entities that discharge wastewater treatment plant effluent or urban runoff to Delta waters to evaluate whether all or a portion of the discharge can be recycled, otherwise used, or treated in order to reduce contaminant loads to the Delta by January 1, 2014.
- The State Water Resources Control Board and the Central Valley Regional Water Quality Control Board complete the Phase 2 control plan for the Total Maximum Daily Load and Basin Plan Amendment for dissolved oxygen in the Stockton Ship Channel by January 1, 2015.
- The State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board complete the Total Maximum Daily Load and Basin Plan Amendment for dissolved oxygen in Suisun Marsh Wetlands by January 1, 2014.

Chapter 7: Reduce Risk to People, Property, and State Interests in the Delta

Strategy 7.1: Improve Emergency Preparedness and Response

Strategy 7.2: Finance and Implement Local Flood Management Activities

Strategy 7.3: Prioritize Flood Management Investment

Strategy 7.4: Improve Residential Flood Protection

Strategy 7.5: Protect and Expand Floodways, Floodplains, and Bypasses

Strategy 7.6: Integrate Delta Levees and Ecosystem Function

Strategy 7.7: Limit State Liability

Outcome Performance Measures

- ♦ Trends in loss of life in the Delta as a result of flood emergencies, and economic damages associated with Delta flood emergencies. (Strategy 7.1)

  Metrics:
  - Number of lives lost in the Delta as a result of flood emergencies.
  - Dollars of National Flood Insurance Program (NFIP) claims in the Delta.

  Baseline:
  - Number of lives lost within the Delta in recent history is zero according to the National Oceanic and Atmospheric Administration's Storm Events Database.
  - NFIP claims can date back as far as the initial NFIP Flood Insurance Rate Maps for a given area. Some areas of the Delta have maps dating back as far as 1978.

  Target:
  - Zero lives lost from floods.
  - Reduction in dollars of NFIP claims.

- ♦ Water delivery interruptions by floods or earthquakes in the Delta. (Strategy 7.3)

  Metrics:
  - Number of water delivery interruptions caused by floods or earthquakes in the Delta.
  - Acre-feet of water not delivered due to disruptions caused by floods or earthquakes in the Delta.

  Baseline:
  - N/A because this measure has a prescribed target and is not showing a change from a baseline.

  Target:
  - No water delivery interruptions.

- ♦ Trends in eligibility for federal reimbursement of emergency response and recovery costs. (Strategy 7.3 and Strategy 7.7)

  Metrics:
  - Miles of levee active in U.S. Army Corps of Engineers' Rehabilitation and Inspection Program.

- NFIP market penetration in the Delta.
- Ratings of Delta communities participating in the NFIP Community Rating System.

Baseline:

- Miles of levee active in the Rehabilitation and Inspection Program, NFIP market penetration, and community ratings at the time of Delta Plan adoption, May 2013 or nearest available date.

Target:

- Increasing trend.

Output Performance Measures

- ♦ Responsible local, State, and federal agencies with emergency response authority implement the recommendations of the Sacramento-San Joaquin Delta Multi-Hazard Coordination Task Force (Water Code section 12994.5) by January 1, 2014. (Strategy 7.1)

  Metric:
  - Percent of recommendations implemented.

  Baseline:
  - 0% (0/11) of recommendations implemented.

  Target:
  - 100% (11/11) of recommendations implemented.

- ♦ Level of flood risk reduction provided by Delta levees. (Strategy 7.3)

  Metrics:
  - Percent of urban area in the Delta protected by levees meeting the Federal Emergency Management Agency's (FEMA's) 100-year protection standard.
  - Percent of Delta land protected by levees at or above the PL 84-99 standard.

  Baseline:
  - Percent of urban area in the Delta protected by levees meeting FEMA's 100-year protection standard and percent of Delta land protected by levees at or above the PL 84-99 standard at the time of Delta Plan adoption, May 2013.

  Target:
  - Target pending completion of the Delta Levees Investment Strategy.

- ♦ Consideration of sea level rise in flood protection planning for new residential development. (Strategy 7.4)

  Metric:
  - Number of proposed actions covered by the Delta Plan policy to require flood protection for residential development in rural areas (RR P2).

  Baseline:
  - N/A because this measure has a prescribed target and is not showing a change from a baseline.

  Target:
  - 100% of proposed actions to which RR P2 are applicable meet the requirements of RR P2.

Administrative Performance Measures

Strategy 7.1: Improve Emergency Preparedness and Response

- Responsible local, State, and federal agencies with emergency response authority consider the recommendations of the Delta Multi-Hazard Coordination Task Force (Water Code section 12994.5) by January 1, 2014.
- The Department of Water Resources evaluates the potential of creating stored material sites by "over-reinforcing" west Delta levees by January 1, 2014.
- Local levee maintaining agencies consider developing their own emergency action plans, and stockpiling rock and flood fighting materials by January 1, 2014.
- State and local agencies and regulated utilities that own and/or operate infrastructure in the Delta prepare coordinated emergency response plans to protect the infrastructure from long-term outages resulting from failures of the Delta levees by January 1, 2014.

Strategy 7.2: Finance and Implement Local Flood Management Activities

- The Legislature creates a Delta Flood Risk Management Assessment District with fee assessment authority.
- The Public Utility Commission (PUC) does the following:
  - Holds hearings on the topic of imposing a reasonable fee for flood and disaster prevention on regulated privately owned utilities with facilities located in the Delta.
  - Directs all regulated public utilities in the PUC's jurisdiction to immediately take steps to protect the public utilities' facilities in the Delta from the consequences of catastrophic failure of levees in the Delta.
- The governor issues an executive order directing State agencies with projects or infrastructure in the Delta to set aside funding to pay for flood protection and disaster prevention.

Strategy 7.3: Prioritize Flood Management Investment

- The Delta Stewardship Council facilitates development of funding priorities for State investments in Delta levees by January 1, 2015.
- The Delta Stewardship Council develops funding priorities for State investments in Delta levees by January 1, 2015.

Strategy 7.4: Improve Residential Flood Protection

- 100% of covered actions that involve new residential developments of five or more parcels provide a minimum 200-year level of flood protection when the new developments are located outside specified areas described in the Delta Plan.

Strategy 7.5: Protect and Expand Floodways, Floodplains, and Bypasses

- 100% of covered actions that encroach upon a floodway do not significantly impede the free flow of water or jeopardize public safety.
- 100% of covered actions that encroach upon a floodplain do not significantly affect floodplain values and functions, per stated requirements.
- The Department of Water Resources and the Central Valley Flood Protection Board evaluate a bypass and floodways on the San Joaquin River near Paradise Cut.

- Current efforts to maintain navigable waters in the Sacramento River Deep Water Ship Channel and Stockton Deep Water Ship Channel, led by the U.S. Army Corps of Engineers and described in the Delta Dredged Sediment Long-Term Management Strategy (USACE 2007, Appendix G), are continued in a manner that supports the Delta Plan and the coequal goals. Appropriate dredging throughout other areas in the Delta for maintenance purposes, or that would increase flood conveyance and provide potential material for levee maintenance or subsidence reversal is implemented in a manner that supports the Delta Plan and coequal goals.
- The Central Valley Flood Protection Board evaluates whether additional areas both within and upstream of the Delta should be designated as floodways.

Strategy 7.6: Integrate Delta Levees and Ecosystem Function

- DWR develops criteria to define locations for future setback levees in the Delta and Delta watershed.

Strategy 7.7: Limit State Liability

- The Legislature requires an adequate level of flood insurance for residences, businesses, and industries in flood-prone areas.
- The Legislature considers making changes to State law and/or constitutional changes that address the State's potential flood liability, including giving State agencies the same level of immunity with regard to flood liability as federal agencies have under federal law.

Chapter 8: Funding Principles to Support the Coequal Goals

Administrative Performance Measures

- An inventory of current State and federal spending on programs and projects that contribute to the coequal goals is conducted.
- A Delta Finance Plan has been developed and is funded.
- State and federal funding gaps have been identified that are determined to hinder progress toward meeting the coequal goals.

Appendix F
Statutory Exemptions from Covered Actions

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Appendix F
Statutory Exemptions from Covered Actions

85057.5(a) “Covered action” means a plan, program, or project as defined pursuant to Section 21065 of the Public Resources Code that meets all of the following conditions:

(1) Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh.

(2) Will be carried out, approved, or funded by the state or a local public agency.

(3) Is covered by one or more provisions of the Delta Plan.

(4) Will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and state interests in the Delta.

(b) “Covered action” does not include any of the following:

(1) A regulatory action of a state agency.

(2) Routine maintenance and operation of the State Water Project or the federal Central Valley Project.

(3) Regional transportation plans prepared pursuant to Section 65080 of the Government Code.

(4) A plan, program, project, or activity within the secondary zone of the Delta that the applicable metropolitan planning organization pursuant to Section 65080 of the Government Code has determined is consistent with either a sustainable communities strategy or an alternative planning strategy that the State Air Resources Board has determined would, if implemented, achieve the greenhouse gas emission reduction targets established by that board pursuant to subparagraph (A) of paragraph (2) of subdivision (b) of Section 65080 of the Government Code. For purposes of this paragraph, “consistent with” means consistent with the use designation, density, building intensity, transportation plan, and applicable policies specified for the area in the sustainable communities strategy or the alternative planning strategy, as applicable, and any infrastructure necessary to support the plan, program, project, or activity.

(5) Routine maintenance and operation of a facility located, in whole or in part, in the Delta, that is owned or operated by a local public agency.

(6) A plan, program, project, or activity that occurs, in whole or in part, in the Delta, if both of the following conditions are met:

(A) The plan, program, project, or activity is undertaken by a local public agency that is located, in whole or in part, in the Delta.

(B) Either a notice of determination is filed, pursuant to Section 21152 of the Public Resources Code, for the plan, program, project, or activity by, or the plan, program, project, or activity is fully permitted by, September 30, 2009.

(7) (A) A project within the secondary zone, as defined pursuant to Section 29731 of the Public Resources Code as of January 1, 2009, for which a notice of approval or determination pursuant to Section 21152 of the Public Resources Code has been filed before the date on which the Delta Plan becomes effective.

(B) A project for which a notice of approval or determination is filed on or after the date on which the final Bay Delta Conservation Plan becomes effective, and before the date on which the Delta Plan becomes effective, is not a covered action but shall be consistent with the Bay Delta Conservation Plan.

(C) Subparagraphs (A) and (B) do not apply to either of the following:

(i) A project that is within a Restoration Opportunity Area as shown in Figure 3.1 of Chapter 3: Draft Conservation Strategy of the Bay Delta Conservation Plan, August 3, 2009, or as shown in a final Bay Delta Conservation Plan.

(ii) A project that is within the alignment of a conveyance facility as shown in Figures 1 to 5, inclusive, of the Final Draft Initial Assessment of Dual Delta Water Conveyance Report, April 23, 2008, and in future revisions of this document by the department.

(8) Leases approved by a special district if all of the following apply:

(A) The uses proposed by the lease are authorized by the applicable general plan and zoning ordinances of the city where the special district is located.

(B) The uses proposed by the lease are approved by the city where the special district is located and the city complies with Chapter 3 (commencing with Section 85225) of Part 3, if applicable, prior to approval of the lease by the special district.

(C) The special district complies with the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) prior to approving the lease.

(9) (A) Routine dredging activities that are necessary for maintenance of facilities operated by a special district.

(B) For purposes of this paragraph, “routine dredging activities” are limited to the following:

(i) Dredging to maintain the Stockton Deep Water Ship Channel at a depth of 40 feet in the sediment trap at the confluence of the San Joaquin River, between river mile 39.3 to river mile 40.2, and to maintain the remaining Stockton Deep Water Ship Channel at a depth of 35 feet plus two feet overdredge from river mile 35 to river mile 43.

(ii) Dredging designed to maintain the Sacramento Deep Water Ship Channel at a depth of 30 feet plus 2 feet of overdredge from river mile 0.0 to river mile 30, and at a depth of 35 feet from river mile 35 to river mile 43.

(C) Except as provided by this subdivision, it is the intent of the Legislature that this exemption shall not be interpreted or treated as changing or modifying current substantive and procedural regulations applicable to the decision to approve dredging operations.

(i) For purposes of this section, "special district" means the Port of Stockton or the Port of West Sacramento.

(ii) This section shall not be interpreted to authorize the abrogation of a vested right whether created by statute or by common law.

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Appendix G
Achieving Reduced Reliance on the Delta and Improved Regional Self-Reliance

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Appendix G
Achieving Reduced Reliance on the Delta and Improved Regional Self-Reliance

In 2009, the State of California (State) further defined its water policy priorities, including express recognition that the Sacramento-San Joaquin Delta (Delta) crisis cannot be resolved by actions in the Delta alone.

Given the interconnected nature of the Delta with the water use patterns of large parts of Northern, Central, and Southern California, the new coequal goals of statewide water supply reliability and an improved, protected, and restored Delta ecosystem will fundamentally reshape California water management over the course of this century. Achieving these coequal goals is expected to be done, in significant part, through compliance with the Delta Reform Act's various mandates and goals relating to statewide water conservation, efficiency, and sustainable water use, including the State's new policy to reduce reliance on the Delta and related mandate to improve regional self-reliance.

The Delta Reform Act promotes many statewide strategies to address coequal goals, including water efficiency and conservation, wastewater reclamation and recycling, desalination and advanced water treatment technologies, improved water conveyance, surface and groundwater storage, improved water quality, and implementation of local and regional water supply projects (see Water Code sections 85004(b), 85020(d) and (f), 85021, 85023, 85303, and 85304).

These strategies are consistent with Water Code section 85021, which declares that the State's policy is "to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency." That section also mandates that "(e)ach region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts."

Individual actions by water suppliers throughout the state to increase water efficiency, and develop local and regional water supplies are vital to achieving the coequal goals, and complying with new State policies to reduce Delta reliance and improve regional self-reliance. To promote these actions, the Delta Plan includes a regulatory policy, WR P1, Reduce Reliance on the Delta through Improved Regional Water Self-Reliance, which specifies the measures that must be taken by water suppliers under certain conditions to reduce their reliance on the Delta and improve regional self-reliance. In addition, the Delta Plan recommends that all water suppliers within the Delta watershed voluntarily implement the measures contained in WR P1 to reduce their reliance on the Delta and improve regional self-reliance.

The Delta Plan includes performance measures for assessing the state's progress in achieving the coequal goals and objectives of the Delta Plan. At the statewide level, California's success in achieving reduced reliance on the Delta and improving regional self-reliance will be demonstrated through a significant reduction in the amount of water used or in the percentage of water used from the Delta watershed.

An Example of Achieving Compliance with WR P1, Reduce Reliance on the Delta through Improved Regional Water Self-Reliance

The intent of WR P1, Reduce Reliance on the Delta through Improved Regional Water Self-Reliance, is to ensure that urban and agricultural water suppliers that would receive water from the Delta as a result of a proposed covered action are implementing appropriate measures to contribute to the achievement of the State's policy of reducing reliance on the Delta and the related mandate of improving regional self-reliance. An example for how water suppliers can comply with WR P1 is provided in the sidebar, An Example of Compliance with WR P1, Reduce Reliance on the Delta through Improved Regional Water Self-Reliance.

WR P1 potentially applies to a proposed action to export water from, transfer water through, or use water in the Delta; but the measures required by WR P1 are not triggered unless one or more water suppliers would receive water as a result of the proposed action (see 23 California Code of Regulations [CCR] Section 5003 (b)).

WR P1 specifically states that water shall not be exported from, transferred through, or used in the Delta if all of the following apply (see 23 CCR Section 5003 (b)):

(1) One or more water suppliers that would receive water as a result of the export, transfer or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c) of 23 CCR Section 5003;

(2) That failure has significantly caused the need for the export, transfer or use; and

(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

To comply with WR P1, the regulation specifies that water suppliers have done the following: (see 23 CCR Section 5003 (c)):

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated and commenced implementation, consistent with the implementation schedule set forth in the management Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and,

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code Section 1011(a).

AN EXAMPLE OF COMPLIANCE WITH WR P1, REDUCE RELIANCE ON THE DELTA THROUGH IMPROVED REGIONAL WATER SELF-RELIANCE

The following scenario illustrates how Water Supplier A would comply with WR P1, Reduce Reliance on the Delta through Improved Regional Water Self-Reliance.

In this example, Water Supplier A applies for a multiyear transfer of water through the Delta. Water Supplier A will receive water from the proposed transfer, as will several other water suppliers.

For the proposed water transfer to be inconsistent with WR P1, Water Supplier A would have to make three findings in the certification of consistency form:

- The proposed transfer will have a significant adverse environmental impact on the Delta.
- One or more water suppliers that will receive water from the proposed transfer have failed to complete the three WR P1 compliance requirements that demonstrate how they are contributing to reduce reliance on the Delta.
- The failure of those water suppliers was a significant cause for the need for the proposed transfer.

The steps that Water Supplier A would follow in making these findings are the following:

First: ***Is the proposed water transfer a covered action?***

- If NO, then Water Supplier A is urged to comply with WR P1 voluntarily.
- If YES, then Water Supplier A would need to determine whether the proposed transfer would have a significant adverse environmental impact in the Delta.

Second: ***Will the proposed transfer have a significant adverse environmental impact in the Delta?***

Water Supplier A, as the applicant for the proposed transfer, will make this determination based upon the environmental assessment it prepares for the project.

- If NO, then Water Supplier A provides the necessary documentation in the consistency certification form to substantiate this finding. Although no further action to comply with WR P1 is required, Water Supplier A is urged to implement WR P1 voluntarily.
- If YES, then Water Supplier A would need to address the three compliance requirements listed in WR P1 for all of the water suppliers that would receive water as a result of the proposed transfer.

Third: ***Have one or more urban or agricultural water suppliers (see 23 CCR sections 5001(b), (c)(1) and (2), (hh)(1) and (2), and (ii)) that will receive water as a result of the proposed transfer failed to comply with the three requirements listed in WR P1?***

Water Supplier A will need to provide a finding in the consistency certification form as to whether one or more water suppliers that will receive water as a result of its proposed transfer have failed to comply with the three requirements. The three compliance requirements are:

1. *Comply with specified water management laws*. Each water supplier has a current water management plan that has been reviewed for compliance with applicable laws by the California Department of Water Resources.
2. *Analyze and implement*. Each water supplier has identified, evaluated, and commenced implementation, consistent with the schedule they identify in their plan, of the technically feasible, locally cost-effective programs and projects that will reduce reliance on the Delta.
3. *Report*. Commencing with the 2015 plan, each water supplier has documented in its current plan the expected outcome for measureable reduction in Delta reliance and improvement in regional self-reliance from the implementation of their programs and projects. This shall be reported as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed.

Water Supplier A can gather the information from other water suppliers that will be included in its consistency certification form in a number of ways. The supplier can send out a letter requesting that each additional water supplier that will receive water as a result of the proposed transfer certify the status of their compliance with WR P1. If Water Supplier A is a wholesale agency, it could request its member agencies to be responsible for submitting their own information and for obtaining the information from their sub-agencies (and the sub-agencies would be responsible for their own sub-agencies).

Fourth: ***Has the failure of one or more water suppliers to comply with the three requirements listed in WR P1 significantly caused the need for the proposed transfer?***

Water Supplier A will need to provide a finding in the consistency certification form on whether the failure of one or more water suppliers to comply with the three requirements significantly caused the need for the proposed transfer. Water Supplier A will use the information collected from each of the water suppliers that will receive water as a result of the proposed transfer as the basis for making the determination. Water Supplier A will also have the opportunity in the consistency certification form to describe the region's progress in reducing its reliance on the Delta and improving regional self-reliance, and to report on the regional reduction in the amount of water used, or in the percentage of water used, from the Delta watershed.

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Key Questions Concerning Implementation of WR P1

- Which Urban and Agricultural Water Suppliers May Be Required to Comply with WR P1?

"Water suppliers," as used in WR P1 and in the Delta Plan, refers to both "urban water" suppliers and "agricultural water" suppliers as defined by California law (see 23 CCR Section 5001(b), (c)(1) and (2), (hh)(1) and (2) and (ii)). WR P1 may only apply to water suppliers that receive or use water from the Delta that also meet the following definitions:

> *"Urban water supplier" refers to both "urban retail water suppliers" and "urban wholesale water suppliers." An "urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes. An "Urban wholesale water supplier" means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of potable water annually at wholesale for municipal purposes.*
>
> *"Agricultural water supplier" refers to both "agricultural retail water suppliers" and "agricultural wholesale water suppliers" under the Water Code, but not the Department of Water Resources, the United States Bureau of Reclamation or agricultural water suppliers during the time that they may be exempted by Section 10853 of the Water Code from the requirements of Parts 2.55 and 2.8 of Division 6 of the Water Code. An "agricultural water supplier" includes both of the following:*
>
>> *A water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water; and a water supplier or contractor for water, regardless of the basis of the water right, that distributes or sells water for ultimate resale to customers.*

- What Do Urban and Agricultural Water Suppliers Need to Do to Comply with WR P1?

  There are three core compliance requirements in WR P1. Water suppliers must:

  1. **Comply with specified water management laws.** Water suppliers must have a current urban or agricultural water management plan that has been reviewed for compliance with applicable laws by the California Department of Water Resources (DWR).
  2. **Analyze and Implement.** Water suppliers must have identified, evaluated, and commenced implementation, consistent with the schedule they identify in their plan, of the technically feasible, locally cost-effective programs and projects that will reduce their reliance on the Delta.
  3. **Report.** Water suppliers must report on the expected outcome for measureable reduction in the amount of water used, or in the percentage of water used, from the Delta watershed, starting in 2015.

- What Types of Measures Should Urban and Agricultural Water Suppliers Consider Implementing to Reduce Their Reliance on the Delta?

Measures that reduce reliance on the Delta and improve regional self-reliance include programs and projects that improve water efficiency, water recycling, stormwater capture and use, conjunctive use projects, local and regional water supply and storage projects, watershed management, and regional coordination of local and regional water supply efforts. The State Water Plan identifies 27 different water supply and management measures that water suppliers may want to consider when developing their water management plans (DWR 2009).

♦ When Should Progress in Reducing Reliance on the Delta Be Reported?

Water suppliers must report on the expected outcome for measureable reduction in the amount of water used, or in the percentage of water used, from the Delta watershed, starting in 2015. Progress in reducing reliance on the Delta will be reported in subsequent urban or agricultural water management plans, which are due in years ending in five or zero (see Water Code section 10621(a) and Water Code section 10820 (a) and (b)).

♦ How Will Water Suppliers Report Their Progress in Reducing Reliance on the Delta?

Starting in 2015, water suppliers will report on the expected outcome of the measures they are implementing in their urban or agricultural water management plans to reduce reliance on the Delta and improve regional self-reliance. Their progress will be reported in these plans as a reduction in the amount of water used, or in the percentage of water used, from the Delta watershed.

♦ Do Water Efficiency and Conservation Count Toward Reducing Reliance on the Delta?

For the purposes of reporting on a water supplier’s progress in reducing reliance on the Delta and improving regional self-reliance, water conservation and efficiency measures are considered a new source of water supply, consistent with Water Code section 1011(a). State water efficiency goals and metrics have been established through State law for urban and agricultural water suppliers. Water saved through implementation of these measures counts as a new source of supply because this is water that otherwise would have been needed to meet future demand. Even if total water use is increasing as a result of population or economic growth, a water supplier can demonstrate that its water use is more efficient and is contributing to reduced reliance on the Delta and improved regional self-reliance.

♦ What Should Water Suppliers Do if They Want to Voluntarily Implement WR P1?

Water suppliers that do not receive water directly from the Delta, such as suppliers located in the Delta’s upper watershed, are not subject to the regulatory provisions of WR P1. However, the Delta Plan recommends that all water suppliers located within the Delta watershed voluntarily implement the measures contained in WR P1 to reduce their reliance on water from the Delta watershed and improve regional self-reliance. An example of how water suppliers may voluntarily implement the measures in WR P1 is discussed below.

An Example of Voluntary Implementation of Measures to Reduce Reliance on Water from the Delta Watershed and Improve Regional Self-Reliance

Although WR P1 is a regulation that applies only under specific conditions, the Delta Plan recommends that all water suppliers within the Delta watershed voluntarily implement the actions contained in WR P1 to reduce their reliance on water from the Delta watershed and improve regional self-reliance.

It is important to recognize that reliance on water from the Delta and the Delta watershed varies throughout California, from region to region and water supplier to water supplier. Some water suppliers have greater access to alternative water supplies or have a greater ability to implement a diverse range of water efficiency and water supply projects. Others, particularly in the Delta’s upper watershed, may have a narrower range of options; indeed, for many, the only source of water is out of the Delta watershed. The key is that every supplier must do its part and take appropriate action to improve regional self-reliance and contribute to reduced reliance on water from the Delta watershed.

Improvements in regional self-reliance may be assessed at a local, regional, and statewide level. Given the Delta Reform Act mandates to improve water supply reliability for California, reduce reliance on the

Delta, and improve regional self-reliance, water suppliers should meet the existing requirements of Senate Bill X7 7, comply with applicable urban water management and agricultural water management plan laws, and other water management statutes to identify, evaluate, and commence implementation of locally cost-effective and technically feasible measures, consistent with their water management plan schedules, that will reduce reliance and improve regional self-reliance and to report on the expected outcome of implementing these measures as the reduction in the amount of water used, or the percentage of water used, from the Delta watershed.

One approach to demonstrating improved self-reliance at the regional level is to conduct a regional assessment, consistent with the “regional compliance” guidelines provided by DWR in its 2010 guidebook (DWR 2010), which incorporates information from the relevant urban and agricultural water management plans. Regions may be described as the entire hydrologic region as defined by the State Water Plan (DWR 2009), a DWR-accepted integrated regional water management planning region, a region based on the boundaries of water supplier, or another appropriate scale.

The entity leading the development of a regional plan would identify the appropriate scale and all water suppliers (and other entities) that are participating in the regional plan. Measures to be considered include programs and projects that improve water efficiency, water recycling, stormwater capture and use, conjunctive use projects, local and regional water supply and storage projects, watershed management, and regional coordination of local and regional water supply efforts as well as the 27 different water supply and management strategies identified in the State Water Plan (DWR 2009).

Regional plans should document and report on the expected outcome for measureable reduction in reliance on water from the Delta watershed and improved regional self-reliance from the implementation of the identified programs and projects. This should be reported as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed.

References

DWR (California Department of Water Resources). 2009. *California Water Plan Update 2009*. Sacramento, CA.

DWR (California Department of Water Resources). 2010. *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan, Methodology 9: Regional Compliance*.

Appendix H
Key California Water Conservation and Management Laws

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Appendix H
Key California Water Conservation and Management Laws

MANDATED ACTIONS:		
Date	**Legislation**	**Key Provisions**
2009	Sustainable Water Use and Demand Reduction (SBX7 7) (Water Code section 10608 et seq.)	• All water suppliers – urban and agricultural – must increase water use efficiency. • Agricultural water suppliers must adopt Agricultural Water Management Plans by 2012 (and update in 2015 and every 5 years thereafter), which include measured volume of water delivered, adopted price structure based at least in part on volume delivered, and additional efficient water management practices. • Urban water suppliers must achieve a 20 percent reduction in statewide urban per capita water use by 2020 (at least 10 percent by 2015) and include per capita targets in their Urban Water Management Plans by 2011. • All water suppliers that fail to comply (agriculture by 2013 and urban by 2016) are not eligible to receive State grants or loans.
	Groundwater Monitoring (SBX7 6) (Water Code section 10920 et seq.)	• Local agencies must establish a groundwater level monitoring program; California Department of Water Resources (DWR) will implement groundwater monitoring for them if they fail to do so (or do not submit monitoring reports as required). • All responsible agencies that fail to comply are not eligible to receive State grants or loans.
	Water Diversion Reporting Requirements (SBX7 8) (Water Code section 5100)	• Water diverters, including those in the Sacramento–San Joaquin Delta, must provide more detailed information on location and amounts of diversions in annual reports to the State Water Resources Control Board. • Civil liability and monetary penalties are increased for those who fail to report.
2009 2007 2004 1991 1983	Urban Water Management Planning Act (AB 797 and subsequent amendments) (Water Code section 10631)	• Urban water suppliers must update and adopt Urban Water Management Plans every 5 years that include assessments of water supplies and needs; compliance with water conservation requirements; plans to maximize local water supplies and minimize imported water; water reliability assessments; and contingency plans for drought and catastrophic interruption of water supplies based on the past, current, and future (up to 20 years) conditions. • Water suppliers that fail to comply are not eligible to receive water management State grants or loans.

MANDATED ACTIONS:		
Date	**Legislation**	**Key Provisions**
2007	Water Efficiency Demand Management Measures (AB 1420) (Water Code section 10630 et seq.)	• Urban water suppliers must implement specific water efficiency measures, including adoption of a rate structure that promotes water conservation, and report on implementation through Urban Water Management Plans. • Water suppliers that fail to comply are not eligible to receive water management State grants or loans.
	Agricultural Water Management Measures (AB 1404) (Water Code sections 5100, 5103, 10004.6)	• Agricultural water suppliers must report on farm-gate water deliveries to DWR.
2006 1990	Water Conservation in Landscaping Act (AB 1881) (Government Code section 65591 et seq., Public Resources Code section 25401.9, Water Code section 535 et seq.)	• Cities and counties must adopt landscape water conservation ordinances by 2010 that include water-budget requirements that are appropriate to the climate.
2004	Water Meter Installation and Use (AB 2572) (Water Code section 525 et seq.)	• Urban water suppliers must install water meters on all municipal and industrial water service connections by 2025. • Urban customers that have water meters must be charged based on actual volume of deliveries by 2010.
2002	Groundwater Management Planning Act (SB 1938) (Water Code section 10753 et seq.)	• To be eligible for State grants and loans, groundwater agencies must adopt a plan that meets minimum requirements, including basin management objectives and a monitoring program.
2001	"Show Me the Water" Legislation (SB 610, SB 221) (Water Code section 10631 et seq., Government Code section 65867.5 et seq.)	• For residential development projects of 500 units or more (or equivalent levels for other types of development), cities and counties must show documentation on water availability to meet development's needs. – SB 610 requires water availability assessments to be included in environmental documentation. – SB 221 requires verification of water availability prior to construction.
VOLUNTARY ACTIONS:		
Date	**Legislation**	**Key Provisions**
2008	Integrated Regional Water Management Planning Act (SBX2 1) (Water Code section 10530 et seq.)	• Provides guidance for Integrated Regional Water Management Plans (IRWMPs) including expanded collaboration and public outreach (must include at least three agencies), and assessment of key water issues including water reliability, vulnerabilities, quality, groundwater management, sustainability of supplies and use needs of disadvantaged communities, and integration of land use and improved resource stewardship. • Bond funds are available for DWR-approved IRWMPs. A new 2010 funding eligibility requirement includes assessment of how the plan contributes to the region's reduced dependence on Sacramento–San Joaquin Delta water.
1992	Groundwater Management (AB 3030) (Water Code section 10750 et seq.)	• Encourages local agencies to prepare and adopt groundwater management plans, and provides guidance on what the plans should include.
1990	Agricultural Water Suppliers Efficient Water Management Practices Act (AB 3616) (Water Code section 10900 et seq.)	• Authorizes public agencies that supply agricultural water to initiate water conservation and efficiency programs. DWR is also authorized to establish the Agricultural Water Management Council and to evaluate potential water-efficient practices.

Notes:
AB = Assembly Bill
SB = Senate Bill

Appendix I
Addressing Multiple Stressors and Multiple Goals in the Delta Plan (memorandum)

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DELTA STEWARDSHIP COUNCIL

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January 26, 2011

To: Phil Isenberg, Chair, Delta Stewardship Council
Members of the Delta Stewardship Council

From: Delta Independent Science Board

Re: Addressing Multiple Stressors and Multiple Goals in the Delta Plan

On August 18, 2010, some members of the California Legislature wrote to you requesting that the Delta Science Program and the Delta Independent Science Board (Delta ISB) "…conduct an assessment of stressors on populations of native fish species in the Delta, the Sacramento and San Joaquin rivers, and the tributaries of those rivers below the rim dams of the central valley." In your response dated September 15, 2010, you stated, "It is my intent to ask our science team, including the Independent Science Board, to develop a list of 'stressors' to the Delta and then prioritize the stressors."

Based on the members' experience, a quick survey of key environmental management efforts around the world, and information gleaned from a one-day workshop organized by the Delta Science Program, the Delta ISB notes that environmental planners, managers, and scientists worldwide are struggling with the assessment and prioritization of multiple stressors. Given the clear urgency around developing an approach to handling multiple stressors for the Delta Plan, the Delta ISB notes and advises:

1. The Council's decisions will necessarily blend scientific and political judgment. There is at present no broadly agreed upon objective methodology for prioritizing multiple stressors, but there are scientific tools, discussed in the attached supporting material, that can add rigor to subjective prioritization.
2. The Council, with the help of the Science Program and review by the Delta ISB, needs to make sure that there are strong causal connections between the stressors addressed in the Delta Plan and particular objectives within the broad coequal goals of the Plan. Sound science and improved modeling can help further ensure these causal connections as the Plan is implemented.
3. A large number of stressors need to be addressed. The Delta ISB has found no reason to think that reducing one stressor, or several stressors, will solve even a particular problem such as the pelagic organism decline (POD). The Delta ISB has prepared a list of key stressors, provided as Attachment 2 to this memo. These are organized under the following four categories:
    a. Global drivers that cannot be controlled by the Delta Plan but whose impacts can be reduced through adaptation,
    b. Legacy stressors resulting from past actions in the Delta watershed that cannot be undone,
    c. Anticipated stressors that can be foreseen resulting from present or future activities, and

   d. Current stressors that result from ongoing activities such as water management practices, agricultural practices, and waste discharges.

4. The Council should plan around the long-term drivers that are producing multiple stressors effecting the major changes in the Delta for the foreseeable future. Climate change, population growth, and pollution are driving numerous particular stressors causing unwanted impacts. Some of these drivers and their associated stressors cannot be mitigated by local action (e.g. temperature increase and changes in precipitation patterns from climate change) and the main planning response must be adaptation. Informed planning can mitigate other drivers and stressors (e.g. patterns of urban expansion from population growth).
5. The success of the Delta Plan depends on the strength of the system of environmental monitoring and adaptive management it establishes. The response of the Delta to management actions is uncertain and will be more so as climate change and other drivers shift the Delta system into new states. The Delta Plan needs to support substantially more intensive monitoring, strong ecological analytical capability, and clear mechanisms for review and updating all aspects of policy and management over time.
6. The implementation of the Delta Plan can improve over time through better integration of Delta science. The Delta Science Program and the prior efforts under CALFED provide the primary journal, conference venue, research support, and shared modeling efforts integrating the scientific understanding of the Delta. This coordinating role needs to be strengthened and expanded. The DRERIP (Delta Regional Ecosystem Restoration Implementation Plan) models, developed as part of CALFED, provide the most relevant set of scientific tools for assessing the significance of different stressors in the Delta, but the models need further development to be useful as dynamic tools for policy and planning.

The supporting material attached elaborates on the findings of the Delta ISB. The content of this memo and supporting material was approved for transmittal to the Council by a quorum of the Delta ISB on January 24, 2011.

Attachment 1

Supporting Material

The implementing legislation for the Delta Stewardship Council and Delta Plan, SBX7-1, specifies in Section 83502(c) that: "The Delta Plan shall include measures that promote all of the following characteristics of a healthy ecosystem" including (4) "reduced threats and stresses on the Delta ecosystem." Thus, threats and stressors and their reduction must be addressed in the Delta Plan.

Members of the Delta ISB, with assistance from the Delta Science Program, reviewed the approaches used for classifying and prioritizing stressors in a wide variety of environmental planning and management efforts in the United States and around the world. A list of key stressors was also developed. Then, the Delta Science Program and Delta ISB organized a workshop held in Sacramento on January 12, 2011, at which invited experts, members of the Delta ISB and the Science Program Lead Scientist addressed two questions: 1) Is it feasible to classify stressors in terms of their importance to the goals of Delta management; and 2) What methods could be used to accomplish that classification? The workshop also helped the Board assess the available science for use in Delta planning and recommend sustaining the science for future needs.

We elaborate on the key points of our discussion about multiple stressors and best available science as follows:

1. *There is no broadly agreed upon methodology for classifying and prioritizing multiple stressors*

In the collective experience of the Delta ISB, the issues of multiple stressors and multiple objectives are pervasive, are of considerable concern to scientists, and are still being evaluated in the Delta, as they are for ecosystem planning and management worldwide. For a variety of reasons noted below, the ranking of stressors is especially difficult. With present understanding, it is not possible to identify a small number of key stressors preventing the achievement of the coequal goals. Nonetheless, the Board finds that there are several approaches that can be used to assist in classifying and prioritizing stressors. Council decisions about which stressors to address at which time will involve a blend of science and political judgment. The scientific tools that can help with this process are discussed further in the following sections.

2. *The importance of a stressor depends on the importance of the management objective it impedes*

The Delta Reform Act of 2009 specifies four basic goals for the Delta (section 29702) and further identifies a number of subgoals and characteristics of the Delta ecosystem and reliable water supply that the Delta Plan shall address (section 85302). These goals, subgoals and characteristics suggest an integrated set of objectives that the Delta Plan must try to address. Stressors can be considered as variables or aspects of the Delta system that are obstacles to meeting the objectives. Thus, stressors and objectives are tightly linked in the sense that objectives define the important stressors and stressors affect the difficulty, or even possibility, of reaching the objectives.

Because of this tight linkage between policy and management objectives and stressors, the relative importance of stressors cannot be assessed, or prioritized, independent of the relative importance of the objective that is stressed. Scientists rarely address the relative values of different social objectives explicitly, and, as a consequence, the scientific literature provides little information about the relative importance of stressors.

3. *Assessing, or ranking, stressors is very complex for many reasons*

For example:

a) Multiple stressors typically affect an objective in complex, interactive ways that can make it very difficult to ascertain that one stressor is more important than another.
b) Objectives can also be interconnected.
c) A stressor that impedes reaching one objective may have positive effects on achieving another objective.
d) The action and importance of a stressor can vary over seasons or from year to year, or from place to place.
e) Objectives and stressors can vary in importance, for example, as they are assessed at different spatial and temporal scales.
f) There are two broad categories of stressors, those that can be mitigated and those to which the Delta Plan must adapt, and prioritizing across these categories is probably counterproductive.

In developing the Delta Plan, it will be important for the Council to look closely at the relationship between stressors and objectives to ensure that the most important stressors are identified and addressed in the Plan. At the same time, for the reasons noted in a-f above, this will be difficult and will require interactive scientific and political judgment.

4. *The terminology for describing and classifying stressors is not standardized*

Some environmental scientists use quite elaborate terminology to describe how systems respond to stressors and how stressed ecosystems can be managed, splitting terms that other scientists lump together. Even when referring to the same phenomenon, such as something that has a negative effect on an ecosystem attribute, some scientists refer to them as stressors, others call them threats. The inconsistent terminology can be quite frustrating, but this is the state of the science available for crafting The Delta Plan.

The DPSIR (Driver, Pressure, State, Impact and Response) framework has been adopted by the European Environment Agency for describing the challenges of environmental management.[1] We have modified the DPSIR terminology slightly to tailor it to the needs of planning in the Delta (the relationships among these components are shown in the conceptual model of section 5):

[1] http://enviro.lclark.edu:8002/rid=1145949501662_742777852_522/DPSIR%20Overview.pdf).

- *Drivers* are the sources or creators of stress that exert pressure on the ecosystem; for example, altered flows through the Delta.
- *Pressures* are the *stressors*, the factors that act to determine the condition of a system attribute of interest; for example, altered flows result in increased salinity as well as other stressors (temperature, currents, etc.).
- *Key system attributes* are the components of the system that are of interest or concern; for example, the condition (e.g., physiology, reproduction, productivity) of wetland vegetation. Other examples of key system attributes might include the specific life-history stage of a species that is affected by a particular stressor, the population size of a listed species, or the availability of irrigation water for agricultural crops.
- *Responses* are the actions that are taken to maintain or improve the condition of key system attributes. For example, this could be changing the flow regime to reduce salinity stress at critical times of the year. Responses can be directed at the drivers or the stressors, to remove or mitigate their effects, or at the key system attributes, to facilitate adaptation to the stressors. For example, one response would be to manage flows—the driver, to reduce salinity—the stressor. Other management actions could be directed at the wetland vegetation (e.g., protecting critical areas or vegetation restoration), but management directed at the stressor itself, in this case salinity, is less likely.
- *Objectives* describe preferred outcomes of management actions on key system attributes; for example, restoring or improving wetland functioning.
- *Performance measures* are metrics describing the state of key system attributes that can be used to assess progress in meeting objectives; for example, progress might be evaluated by monitoring measures of productivity, biomass, or biodiversity.
- All elements of this conceptualization – the linkages among drivers, stressors, key system attributes, responses, objectives, and performance measures – are parts of an ongoing, dynamic process of *adaptive management*.

Note that, depending on the key system attributes of interest, what is a driver of stressors in one case can be a stressor in another. This has led some scientists to lump drivers and stressors together. This is the situation for the DRERIP (Delta Regional Ecosystem Restoration Implementation Plan), in which a driver-linkage-outcome terminology is used.[2] The DRERIP approach also underlies the POD (Pelagic Organism Decline) studies and BDCP (Bay Delta Conservation Plan).[3] The U.S. Environmental Protection Agency has developed the "Causal Analysis/Diagnosis Decision Information System" or CADDIS that uses source, stressor, outcome terminology.[4] Each of these approaches has different strengths and weaknesses. It is important to recognize, however, that the different approaches and terminologies are conceptually rather similar. Mainly, they differ in the degree to which they may aggregate causal

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2 see: http://www.dfg.ca.gov/delta/erpdeltaplan/

3

http://science.calwater.ca.gov/pod/pod_index.html
(http://baydeltaconservationplan.com/Home.aspx).

4 http://www.epa.gov/caddis

factors and in the labels they apply to different aspects of the system linking causes to outcomes. It is important to distinguish between what is stressing a system attribute (e.g., a species population, water quality) and what is producing or driving the stress, because this could affect the likelihood of successfully realizing goals and objectives. However, management actions can target different levels in the chain of causation depending on circumstances.

5. *Ecosystem management models are a critical element in the characterization and assessment of stressors*

The Delta ISB believes that defining and delineating stressors is best accomplished by developing a conceptual model that clearly specifies the relationships between cause and effect with respect to the attributes of interest. Such models have been successfully used as a template for structuring an ecosystem-management approach in numerous regional assessments. For example, they have been used as a basis for management programs in the Everglades of south Florida[5] (Gentile et al. 2001) and Alaska[6] and are the foundation of conservation planning in The Nature Conservancy[7] and the Conservation Measures Partnership.[8] In these programs, the conceptual models have been used to identify risks and develop performance criteria as well as to provide a clear understanding of stressors in the systems. Conceptual models also are a prominent part of DRERIP, which includes both species life-history models and ecosystem-component models. Because they are specific to the Delta, the DRERIP models provide a valuable resource for characterizing causal linkages between stressors and objectives and for prioritizing stressors.

The following diagrams illustrate (on the left) a conceptual model of the pathways linking drivers to outcomes and objectives and how stressors fit into this causal chain and provide a hypothetical example (on the right, described in section 4) to clarify the components and linkages of this conceptualization. The elements within the oval are the components linking drivers and stressors to system attributes, management responses, and objectives. The box below the oval indicates how all of these components feed into the monitoring and performance assessment that are at the core of adaptive management, and the arrows encircling the oval indicate that adaptive management is a continuous, ongoing process.

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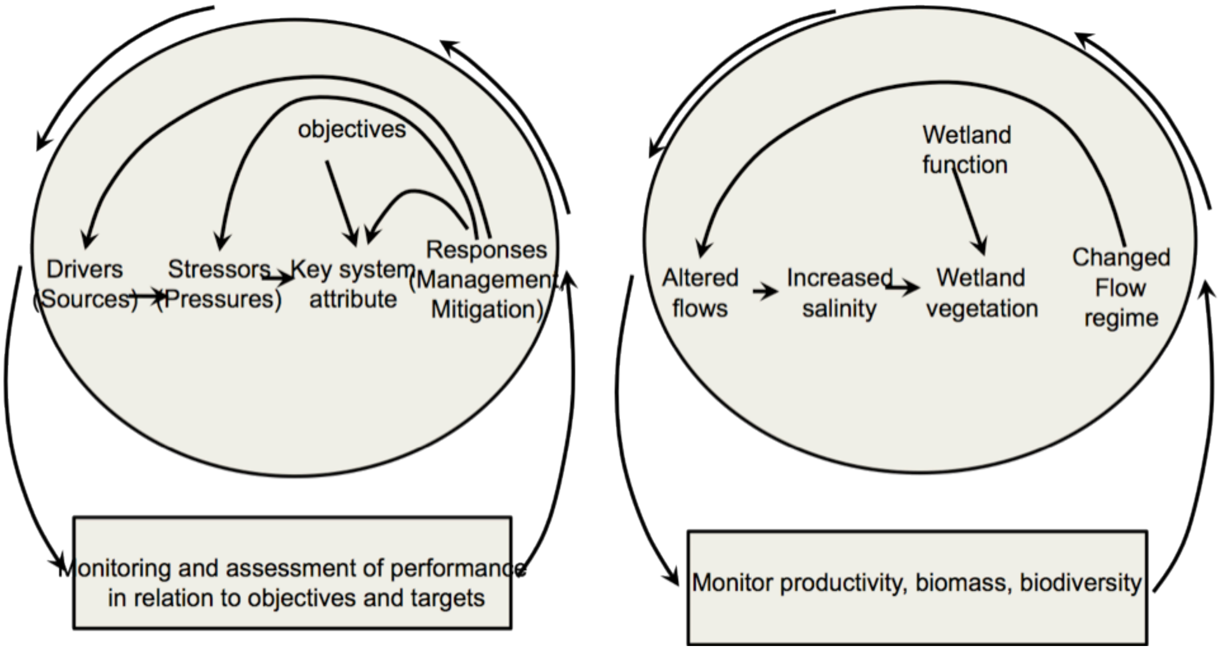
[5] Gentile, J.H., M.A. Harwell, W. Cropper Jr., C.C. Harwell, D. DeAngelis, S. Davis, J.C. Ogden, and D. Lirman. 2001. Ecological conceptual models: a framework and case study on ecosystem management for South Florida sustainability. *Science of the Total Environment* 274: 231-253.

[6] Harwell, M.A., J.H. Gentile, K.W. Cummins, R.C. Highsmith, R. Hilborn, C.P. McRoy, J. Parrish, and T. Weingartner. 2010. A conceptual model of natural and anthropogenic drivers and their influence on the Prince William Sound, Alaska, ecosystem. *Human and Ecological Risk Assessment* 16: 672-726.

[7] see http://conserveonline.org/workspaces/cbdgateway/cap/index_html

[8] see http://www.conservationmeasures.org/



This conceptual model is derived from the DPSIR approach and generally follows the approach of Gentile et al. (2001). The DRERIP models, in general, represent the left three steps within the large oval (Drivers, Stressors, Key ecosystem attribute, which in DRERIP terms are Drivers, Linkages, Outcomes).

Understanding how particular factors fit into this conceptualization – as drivers, stressors, or key system attributes – and developing scientifically sound conceptual models of the causal relationships is critical because it affects where management actions can be most effective and what to expect (and monitor) as a result of the actions. In general, actions directed at a driver (e.g., water flow) will affect multiple stressors (e.g., water temperature, seasonality, chemistry, as well as salinity), whereas actions directed at stressors will have more targeted effects. Importantly, **a stressor should be defined in terms of its effect on a key system attribute and an objective for that attribute**. In the above example, increased salinity may be a widespread or frequent consequence of altered flows, but it will differ in its effects (i.e., its status as a stressor) on different species or system components. Furthermore, there are temporal and spatial dimensions to the presence of a stressor; salinity levels may vary seasonally and be dependent on location in the Bay-Delta system. Finally, stressors are scale-dependent – some stressors may act broadly, others only in localized situations. Proper assessment of stressors requires consideration of temporal and spatial variation and the operating scales at which drivers are linked to stressors and attributes. Management actions need to be commensurate with the scale of the stressor.

6. *Different kinds of stressors call for different kinds of responses*

Stressors can be classified in various ways; in terms of origin, mode of action, spatial and temporal breadth of impact, whether or not managers have the ability to affect their action, and so on. Classifying stressors is an essential step toward understanding, and eventually to assessing them. The Delta ISB found the following four categories of stressors to be helpful in our own discussions of the Delta:

- Globally determined stressors—stressors, like the effects of climate change or human population growth, which cannot be eliminated or mitigated within the purview of the Delta Plan. Management actions must adapt to the continued effects of these stressors in the Delta.
- Legacy stressors—stressors that result from past actions in the Delta watershed that cannot be undone. These include stressors such as the continuing effects of sediment and mercury discharge during the gold mining era. Infrastructure that causes stress on the Delta and is not likely to be significantly altered, such as upstream dams and the network of levees, can also be treated as legacy stressors. Although these stressors cannot be eliminated, management actions can reduce their effects on the Delta.
- Anticipated stressors—stressors that scientists can anticipate will result from present or future activities. The Delta Plan can modify these stressors in such a way as to prevent or reduce the stressor or better adapt to the stressor.
- Current stressors—stressors that result from ongoing activities, such as water management practices, agricultural practices, waste discharges, etc. Management actions can either change those practices, take steps to reduce their effects-on the Delta, or both.

Note that the legacy stressors exist because of an historic failure by Californians to anticipate and prevent or mitigate the long-term effects of human activity. They serve as a good reminder to us of the importance of anticipating stressors and reducing them through planning.

We list "current stressors" last because The Delta Plan needs to take the long temporal view. To the extent that current stressors are expected to carry on into the future, including how water is managed, the DSC should address them.

In preparing for the workshop on January 12, the Delta ISB compiled a list of stressors affecting the Delta. These are organized in relation to the categories above in Attachment 2. The list of stressors is not comprehensive, nor has it as yet been vetted in terms of how the various stressors relate to the objectives, subobjectives and characteristics listed in SBX7-1. However, the list serves to illustrate the broad range of kinds of stressors that must be considered in developing the Delta Plan and some of the constraints on opportunities to mitigate their effects.

Some long-term stressors, such as sea level rise, cannot be mitigated and must be adapted to. In some cases, when confronted with such stressors, objectives will have to be modified to fit the reality of the stressor. In other cases, the objective might be reached, or partially reached, through adaptation, for example, by improving levees. Where adaptation is necessary, the stressor requires us to reconsider the objective.

Where mitigation is possible, specific objectives are needed simply to identify what the stressors are. For example, section 83502(c)(1) specifies the objective of having "viable populations of native resident and migratory species." To determine which stressors are preventing viable populations of native species, one typically must look at particular species – Chinook salmon, Sandhill crane, etc. – and what has been stressing them. In the process of identifying stressors, one might logically overlook less valued species or less valued states of the environment except to the extent they are important to valued species or valued states of the environment. A focus on particular species (listed species, for example) may lead to management measures that are detrimental to other species. Thus, even where a stressor can be mitigated, the outcome may not be universally positive. Trade-offs will be necessary as will vigilance in assessing the broad consequences of stressor reduction.

7. Pay attention to the long-term drivers

Decision-makers need to plan management in the context of the directional changes that are occurring in the Delta as well as the potential for catastrophic change if Delta levees fail. Decision-makers need to be looking 30-50 years into the future as they develop policy. Experience has shown that the development and implementation of major policies can take more than a decade and response times to policy change are also on the order of a decade or more. In essence, policies to manage for the coequal goals will need to be flexible and nimble enough to succeed in the context of continual but uncertain long-term directional change.

Climate change is driving directional change in several key variables affecting the coequal goals. Although total precipitation is not changing much, less is falling as snow so that the winter snowpack is decreasing. Because the snowpack is the major storehouse of water for spring and summer irrigation, loss of snowpack strongly affects the amount of water that is available for human and other uses. With warming temperatures, snowpack is melting earlier and winter flows are less stable. Consequently, peak flows occur earlier and over a shorter period of time. Air temperatures are also increasing so that both patterns of inflow to the Delta and water temperature are changing over time. Rising sea level is changing the salinity of the Delta and also increasing the risk to Delta levees. In addition to changes resulting from climate change, the likelihood of an earthquake within this century that will cause catastrophic breaks in Delta levees is high. Thus, there is significant risk that a number of Delta islands may be flooded in the future. Economic considerations will influence any decision about restoration of the levees, so that the future Delta may include a number of flooded islands as large deep lakes. Such flooding of islands will have important implications for the hydrodynamics and salinity of the Delta, will affect the quality of water exported from the Delta, and will impact Delta land use. New species continue to be introduced to the Delta so scientists expect that the biological community will continue to change with uncertain implications for native species. These kinds of broad-scale changes will also affect terrestrial ecosystems; changing habitat conditions for plants and wildlife, particularly migratory birds. Exotic species are also invading terrestrial habitats, with effects on productivity and food webs for native species. Processes of continual change also derive from population growth, urban expansion, agricultural practice and a host of other human activities in and around the Delta.

These continual processes of change greatly complicate development of effective management policy to protect, restore and enhance the Delta and maintain reliable water supply. Indeed, some analysts suggest that the Delta has entered a new ecological regime significantly different from its historic regime or even the recent past. This may not be a stable regime but rather a transitory condition that will continue to change as climate change and other unmanageable stressors continue to change the Delta. As changing climate increases stress on listed species, conservation may demand more water for environmental protection, further reducing the flows available for other uses.

8. Policies to deal with multiple stressors have highly uncertain consequences

Although the Delta is a relatively well-studied environmental system, our ability to predict the Delta of the future is not strong. Scientific inferences are quite uncertain because the ongoing, serial change that is occurring in the Delta makes future states difficult to predict. Relationships that appear relatively well developed at one point in time (e.g., the relationship between abundance of four species in the Pelagic Organism Decline, and X_2 (The distance upstream from Golden Gate of the isopleth of two practical salinity units)) tend to break down as additional years of data are accumulated. Another consequence of change and non-linear responses to stressors is that even in circumstances where there is a clear dose/response relationship between change in a stressor and response of the system in the past, removing the stressor may not result in a reversal of the observed dose response relationship. A consequence of this uncertainty is that simply relieving stressors may not lead to desired outcomes. This fact speaks strongly to the need to implement policy as adaptive management experiments in which there is a clearly developed process for gathering information on the effectiveness of the policy and a mechanism for review and updating of all aspects of the policy over time. This need includes problem definition, conceptual model, indicator variables, and policy response.

SBX7 defines adaptive management in section 85052. "'Adaptive management' means a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvement in management planning and implementation of a project to achieve specified objectives." This definition is a fairly standard one. In applying adaptive management to the Delta, however, it is not reasonable to assume that the system is stable over time. The directional change that is occurring in the Delta means that the adaptive approach cannot assume that uncertainty will decline as more information is gathered. Planning and management must include rigorous programs of data gathering to assess the effectiveness of policy, but it needs also to recognize that policies may fail not only because of uncertainty in system behavior but because the system is actually changing over time in fundamental ways. In practical terms this makes monitoring programs and timely analysis of the data generated more important. There will also need to be ongoing research in the Delta to identify and anticipate the emergence of conditions that could undermine the effectiveness of policy.

9. *Support Delta science*

The Delta ISB is impressed with the variety and depth of past scientific study and ongoing research in the Delta. The Delta Science Program plays a central role in communicating and coordinating Delta science as well as funding and publicizing critical scientific initiatives. But the Delta ISB is also concerned that Delta science needs stronger integration and coordination. In this sense, the Delta ISB found the DRERIP models and approach to be an especially good start with considerable potential for further development. Although designed to evaluate restoration actions, the DRERIP models also provide an objective, science-based set of tools for evaluating stressors. The models do not, as yet, cover all the aspects that are of concern to the Council and at present they are static models that require staff to work out the effects of varying a stressor qualitatively. The usefulness of these models would be greatly enhanced if they were made dynamic and interactive. Support to accomplish this through the Delta Science Program would give the Science Program and the Council a powerful, locally designed set of tools for assessing stressors now and in the future.

10. *Expect surprises*

As noted earlier, the Delta is changing over time. Some changes, like the effects of changing hydrology and sea level rise due to climate change, can be anticipated and modeled. In addition to changing climate, the 21st century Delta faces the likelihood of earthquakes that may leave a number of islands permanently flooded. Other changes are more contingent on unforeseeable circumstances, like species invasion or levee failure by decay. Regardless, uncertainty virtually guarantees that large, unexpected events will occur from time to time. From the perspective of analysis and prioritization of drivers and stressors, this has several implications. First, scientists and managers need to be continually alert for the emergence of new drivers and stressors. Second, the governance process needs to be nimble enough to adjust policy and management to respond to emerging problems. Third, even if management is focused on a subset of stressors, monitoring should continue to gather information on a broad spectrum of stressors as a means to monitor the "pulse" of the Delta. Such broad scale monitoring also has the potential to identify emerging issues and stressors before their effects are irreversible.

Attachment 2

Some Key Drivers and Stressors Demonstrating a Possible Classification

As noted in section 6 of Attachment 1, the Delta ISB has found the following categorization of drivers and stressors to be helpful.

- **Globally Determined stressors (Global)** - stressors, like the effects of climate change or human population growth, which cannot be eliminated or mitigated within the purview of the Delta Plan. Management actions must adapt to the continued effects of these stressors in the Delta.
- **Legacy stressors (Legacy)** - stressors that result from past actions in the Delta watershed that cannot be undone. These include stressors such as the continuing effects of sediment and mercury discharge during the gold mining era. Infrastructure that causes stress on the Delta and is not likely to be significantly altered, such as upstream dams and the network of levees, can also be treated as legacy stressors. Although these stressors cannot be eliminated, management actions can reduce their effects on the Delta.
- **Anticipated stressors (Anticipated)** - stressors that scientists can anticipate will result from present or future activities. The Delta Plan can modify these stressors in such a way as to prevent or reduce the stressor or better adapt to the stressor.
- **Current stressors (Current)** - stressors that result from ongoing activities, such as water management practices, agricultural practices, waste discharges, etc. Management actions can either change those practices, take steps to reduce their effects-on the Delta, or both.

The Delta ISB also prepared a list of drivers and stressors for the Delta. We present these under the categories suggested above with notes with respect to each stressor's impact.

Table of Some Key Drivers and Stressors in the Bay-Delta [Notes include both changes in state of the ecosystem as well as examples of impacts.]

PLEASE NOTE THAT THE FOLLOWING LIST OF DRIVERS AND STRESSORS IS NOT TO BE CONSIDERED A COMPLETE LISTING OF ALL POTENTIAL DRIVERS AND STRESSORS IN THE SYSTEM. THE ORDER OF THEIR OCCURRENCE ON THIS TABLE IS NOT INTENDED TO DENOTE ANY FORM OF PRIORITIZATION.

Type	Whether Driver (D) or Stressor (S)	Notes
Global		
	D Climate change	
	S Reductions in inflow and outflow	Possibly lower water yield
	S Alterations in hydrograph	Changes in seasonal patterns (earlier, smaller freshest)
	S Higher temperatures	Seasonal temperature variation; altered phenology (e.g., timing mismatch between predators and prey, flower and pollinator); species and biogeochemical processes impacted

Type	Whether Driver (D) or Stressor (S)	Notes
		by temperature
	S Sea level rise	Salinity intrusion, levee breaches, altered rates of erosion and deposition. Shifting species distribution and food web dynamics
	S Changes in ocean conditions	Many Delta species spend part of their lives living or feeding in the ocean
Global		
	D Earthquakes	Levee and highway damage
	D Population growth	Places increasing pressure on land and water resources
	D California economy	Patterns of development, agriculture, recreation are driven by economics
Legacy		
	S Habitat loss and alteration	Loss or reduction of seasonal and tidal wetlands, riparian habitats, gallery forests and native grasslands; simplified system of leveed agricultural islands separated by deep channels with leveed shorelines; small, unconnected fragments of natural habitat; channels unconnected to floodplain; uplands less connected to Delta; channels dredged, interconnected, and simplified; terrestrial diversity reduced; impacts include: changing competition and predation, loss of access to breeding sites
	S Changed pattern of flow	Channel simplification and interconnection changed flow velocity and pattern; infrequent floodplain inundation; impacts include: migration barriers, altered migration corridors, improved water conveyance to south Delta, salt entrainment affects domestic water supply, loss of access to breeding sites, greater tidal excursion and salt penetration into Delta
	S Methyl-mercury from released mercury	Changing Delta conditions can affect the methylation of mercury stored in sediments; impacts include mercury bioaccumulation in the foodweb
	S Selenium	Past practices resulting in residual toxins in the food web
	S Subsidence	Loss of peat soils in islands; impacts include increased risk of levee breaks with loss of structures and habitat
	S Changing sediment loads	Sediment delivery increased with European colonization and is now declining; impacts include: turbidity declines, altered erosion and deposition, SAV expansion, smelt distribution
	S Artificial levees	Isolated land and water ecosystems that made possible the development of the Delta's cultural and economic character

Type	Whether Driver (D) or Stressor (S)	Notes
	D Water management infrastructure	Increases reliability of water delivery; habitat loss; altered migration corridors
	S Levee breaks	Permanent flooding of multiple islands would likely raise salinity in the south Delta; native fish may not use deeply flooded islands
Legacy		
	D Upstream dams	Loss of access to breeding sites; existence and operation affect virtually every aspect of Delta environment, society and economy
	D Federal-state agricultural policies	Ag subsidies affect land use and habitation patterns
	D Development, zoning, building codes	Affects land use, lifestyle choices and many other human decisions affecting the Delta
	S Invasive species	Low prey; changes food web; changing competition; higher predation; agricultural pests
Anticipated		
	S Subsidence	Loss of peat soils in islands; impacts include increased risk of levee breaks with loss of structures and habitat
	D Landscape change	Delta's habitat mosaic is constantly changing as human land and water use evolves
	D Urban expansion	Affects the Delta in many ways that threaten native species and ecosystems, water quality and demand, unique Delta attributes
	D Upstream land use	Affects the quantity and quality of water entering the Delta, sediment load, habitat for species migrating through Delta
	D Upstream dams	Existence and operation affect virtually every aspect of Delta environment, society and economy
	D Lifestyle choices	Decisions about where and how to live affect species, habitats, water demand
	D Urban-rural migration patterns	Dominant human migration patterns are rural to urban and inland to coastal
	S Invasive species	Low prey; changed food web; changing competition; higher predation
Current		
	S Changed hydrograph; reduced inflow and outflow	Upstream water withdrawals; water project and in-Delta withdrawals reduce flow through Delta; reduced seasonal flow variation; improved seasonal availability of water for agriculture; impacts include: salinity intrusion, less salinity variability, seasonal temperature changes, water residence time more uniform, stranding, low DO and thermal migration barriers
	S Entrainment at pumps & other diversions	Effect of OMR flows on fish movement and water supply; in-Delta withdrawals for agriculture, domestic water, power plants. Mortality of

Type	Whether Driver (D) or Stressor (S)	Notes
		entrained fishes, including threatened species
	S More nitrate, ammonium and less phosphorus	Excess nutrients from agriculture and domestic waste; altered N/P ratios; impacts include: low DO, SAV expansion, *Microcystis* blooms, reduced phytoplankton production, can favor invasive species
Current		
	S Selenium release	Releases by agriculture and industry can be toxic through the food web
	S Pesticide release	Agriculture, industry, and residential use (pyrethroids and organophosphates of concern)
	S Other trace metals and toxics	Lead, chromium, copper, surfactants, endocrine mimics and disruptors introduced from agriculture, industry, domestic waste, and storm water
	S Dredging	Channel dredging mobilizes sediment and toxins; impacts benthic organisms
	S Legal harvest	Incidental take of threatened species
	S Illegal harvest	Illegal take of threatened species
	D Hatchery impacts	Alters genetic makeup affecting ability to perform in the wild and the wild conspecifics with which they breed. Introduction of diseases to wild populations
	D Federal-state agricultural policy	Ag subsidies affect land use and habitation patterns
	D Development, zoning, building codes	Affects land use, lifestyle choices and many other human decisions affecting the Delta

Appendix J
Excerpt from Draft Ecosystem Restoration Program's Conservation Strategy for Stage 2 Implementation for the Sacramento-San Joaquin Delta Ecological Management Zone (DFG 2011): "Section III. Stressors; Non-Native Invasive Species"

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from February through June when Delta inflows are typically higher (NMFS 2009a). The E/I ratio is used in management of Delta aquatic resources because it measures the influence of SWP and CVP diversions (Newman and Rice 2002, Kimmerer and Nobriga 2008). Kimmerer and Nobriga (2008) evaluated E/I ratio as a predictor of entrainment probability for neutrally buoyant particles to represent larval fish using a two-dimensional model and associated particle tracking model developed by DWR. The E/I ratio was found to be useful as a predictor of entrainment probability for organisms with limited mobility, although the model may be less applicable to more competent swimmers such as salmon smolts (Kimmerer and Nobriga 2008). Significant SWP/CVP entrainment of particles injected into the south and eastern Delta occurred at E/I rations of 0.2 and above. One criticism of using the E/I ratio to manage effects on Delta fish is that the actual volume of exports can increase substantially while maintaining the same overall E/I ratio as inflow increases. Better resolution of the relationship(s) between salvage and E/I ratio may be achieved if either the export or inflow term is held constant (NMFS 2009a). Due to their very large hydrodynamic footprint, reducing the negative effects of the SWP and CVP pumps cannot be accomplished through screening and will depend in part on the alternative conveyance chosen in the BDCP planning process.

The CALFED Science Program convened workshops in 2007 to identify and discuss key scientific and technical issues pertaining to conveying Sacramento River water through or around the Delta to the SWP and CVP export pumps. Several important broad conclusions emerged:

- All conveyance options involve trade-offs and compromises.
- Science can help select, but not choose the “best” water conveyance alternative.
- Clear objectives are critical to a thorough evaluation of conveyance alternatives.
- A coastal ocean to watershed perspective is needed to effectively evaluate conveyance alternatives.
- Through-Delta conveyance must be made to work effectively for decades into the future.
- Adaptive management should be used in implementing any conveyance alternative.
- Alternative financing must be found to fund the construction of an alternative conveyance system.

Non-Native Invasive Species. ERPP Goal 5 (Non-native Invasive Species) aims to prevent the establishment of additional non-native invasive species and reduce the negative ecological and economic impacts of established non-native species in the Bay-Delta estuary and its watershed. Immense ecological changes have occurred throughout the Bay-Delta ecosystem as a result of introduced non-native invasive species (NIS). They have altered food webs and habitats, they compete with native species for resources, and they directly prey upon native species. NIS represent one of the biggest impediments to restoring habitats and

> **Mission of the CALFED Non-native Invasive Species Program:** Prevent establishment of additional non-native species and reduce the negative biological and economic impacts of established non-native species.
>
> *ERPP Strategic Plan, July 2000*

populations of native species (CALFED 2000a). NIS have been introduced into the Delta over time via several mechanisms, the most common being discharge of ships' ballast water in ports. NIS are also transported from one place to another via watercraft, fishing gear, live bait, intentionally (either legally or illegally) introduced for recreational or other purposes (e.g., centrarchids), or released from aquariums into the environment. In 2006, the State Water Resources Control Board listed the Delta, upper San Joaquin River, and Cosumnes River on its 303(d) list as impaired for exotic species and is expected to formulate a TMDL program for these waterways within the next ten years (SWRCB 2007).

The ERP has funded many projects since 2000 to try to educate the public about, and control the threat of NIS. Such projects included a study of the feasibility of ships exchanging their ballast water out in the ocean rather than destination ports. Other ERP projects provided outreach geared toward educating recreational boaters and anglers, as well as individuals involved in the aquarium trade, on the threats posed by NIS.

As part of the Bay-Delta (formerly CALFED) NIS Program, a Strategic Plan and an Implementation Plan were developed, and the Non-Native Invasive Species Advisory Council (NISAC) was established. The NISAC no longer meets; however the USFWS, DFG, and other stakeholders continue to coordinate and implement activities and projects that address NIS issues in the Bay-Delta area of concern. The USFWS is currently promoting an invasive species prevention approach known as Hazard Analysis and Critical Control Point Planning (HACCP). HACCP is a planning tool that originated with the food industry, but has been modified to include natural resource management. HACCP identifies and evaluates potential risks for introducing "non-targets", such as invasive species, chemicals, and disease, during routine activities, and focuses attention on critical control points where "non-targets" can be removed.

Stage 2 Actions for Non-Native Invasive Species:

Action 1: Continue implementing DFG's California Aquatic Invasive Species Management Plan (CAISMP) to prevent new introductions; limit or eliminate NIS populations; and reduce economic, social, and public health impacts of NIS infestation.

Action 3: Continue research and monitoring programs to increase understanding of the invasion process and the role of established NIS in the Delta's ecosystems.

Action 4: Continue studies on the effectiveness of local treatment of zebra and quagga mussels using soil bacteria.

Action 5: Standardize methodology for sampling programs to measure changes in NIS populations over a specific timeframe.

Action 6: Collect and analyze water quality sampling data (e.g., velocity, salinity, turbidity and water temperature) for correlation analysis between NIS distribution and habitats.

Action 7: Complete an assessment of existing NIS introductions and identify those with the greatest potential for containment or eradication; this assessment also would be used to set priority control efforts.

As a separate effort, DFG issued its California Aquatic Invasive Species Management Plan (CAISMP) in January 2008. CAISMP's focus is on coordinating the efforts of State agencies to minimize the harmful ecological, economic, and human health impacts from aquatic invasive species. CAISMP provides a common platform of background information from which State agencies and other entities can work together to address the problem of aquatic invasive species, and identifies major objectives and associated actions needed to minimize these impacts in California. Depending on the species and the level of invasion, there are different management responses that could be pursued. The CAISMP includes examples of management responses to specific invasive species in the Delta. The NIS of highest management concern in the Delta includes:

Non-Native Centrarchids. The most common centrarchids in the Delta are largemouth bass, smallmouth bass, spotted bass, bluegill, warmouth, redear sunfish, green sunfish, white crappie, and black crappie. The increase in non-native SAV has provided conditions that likely enhanced largemouth bass and bluegill populations (Brown and Michniuk 2007), possibly others. Centrarchids, which benefit from the use of SAV, can have a large negative impact on native fish through predation and competition (Nobriga and Feyrer 2007, Brown and Michniuk 2007). The presence and distribution of some centrarchids may be manipulated by managing environmental conditions such as water velocity, salinity, and turbidity that affect the extent of SAV.

Overbite Clam. The overbite clam (*Corbula amurensis)* was first observed in 1986 and has since become extremely abundant in Suisun Bay and the western Delta (Carlton et al. 1990). This species is well adapted to the brackish areas of the estuary and is largely responsible for the reduction of phytoplankton and some zooplankton in the Bay-Delta region (Kimmerer 2006). This loss of primary and secondary production has drastically altered the food web and is a contributing cause of the POD (Sommer et al. 2007). Overbite clam have been shown to strongly bioaccumulate selenium (Linville et al. 2002), which could have reproductive implications for fish (e.g., sturgeon, splittail; see Stewart et al. 2004) and diving ducks that feed on overbite clam.

Asian Clam. The Asian clam (*Corbicula fluminea)*, introduced from Asia, was first described in the Delta in 1946 (USGS 2001). This clam does not tolerate saline water. It is now very abundant in freshwater portions of the Delta and in the mainstem of rivers entering the Delta. Ecologically, this species can alter benthic substrates and compete with native freshwater mussels for food and space (Claudi and Leach 2000). The Asian clam, however, has not historically been viewed as significantly impacting the aquatic food web.

Because the overbite clam and Asian clam have become so well-established in the estuary, there is currently no known environmentally acceptable way to treat or remove these invertebrates (DFG 2008a). The only apparent management action at this time is to determine whether the manipulation of environmental variables, such as salinity, can be used to seasonally control their distribution in the estuary. There is not consensus among scientists that manipulation of salinity would do much to affect the distribution of these clams or diminish their impacts on the estuarine food web. Many experts believe that the distribution and impacts of invasive clams cannot be controlled (CALFED Science Program 2008).

Zebra Mussel and Quagga Mussel. Neither the zebra mussel (*Dreissena polymorpha)* nor quagga mussel (*Dreissena bugensis)* have been observed in the Delta, but given suitable environmental conditions these species have proven to be highly invasive. Establishment of dreissenid mussels is limited by salinity greater than 10 ppt (Mackie and Claudi 2010). In addition to similar threats to the ecosystem posed by the overbite clam and Asian clam, dreissenid mussels colonize hard and soft surfaces, often in high densities (greater than 30,000 individuals per square meter), and can impede the flow of water through conveyances. One of the most predictable outcomes of a dreissenid invasion, and a significant abiotic effect, is enhanced water clarity linked to a greatly diminished phytoplankton biomass. For example, rotifer abundance in western Lake Erie declined by 74 percent between 1988 and 1993, the same time that an enormous zebra mussel population became established in that area (Claudi and Leach 2000).

A State and Federal interagency coordination team was established to coordinate management responses to the threat of further quagga spread in California. Three subcommittees were established: Outreach and Education, Monitoring, and Sampling/Laboratory Protocols. The Quagga Mussel Scientific Advisory Panel was convened in April 2007 and charged with considering the full range of eradication and control options for this organism irrespective of cost. Under the direction of DFG, the San Francisco Estuary Institute performed a phased risk assessment of California waters in order to rank sites for further monitoring based on the likelihood that quagga or zebra mussels will become established.

There are a couple of relatively recent developments with respect to controlling quagga (and zebra) mussels. A common soil bacteria, *Pseudomonas fluorescens*, when applied at artificially high densities, has been demonstrated to be effective at killing mussels, with a 95 percent kill rate at treatment sites reported. The bacteria, even when dead, contain a toxin which destroys the invasive mussels' digestive gland, killing them. Research has indicated that the bacteria do not harm non-target fish and mussel species (Science Daily 2007). Also, research is showing that a potassium salt solution may be an effective measure to control relatively localized and isolated infestations. It is possible that these control methods could be used to control both quagga and zebra mussel populations, but further evaluations are needed.

Zooplankton. An extensive set of monitoring data from the IEP continues to show how introduced zooplankton species have become important elements of the Bay-Delta. *Eurytemora affinis* was probably introduced with striped bass around 1880. Until the late 1980s, it was a dominant calanoid copepod in the estuary, providing on the important food source for juvenile fishes. In the last decade, however, *Eurytemora* has been replaced by two calanoid copepods introduced from China which appear to be less desirable as a food source. It has been postulated that this replacement was a result, in part, of *Eurytemora's* greater vulnerability to overbite clam grazing (Bouley and Kimmerer 2006)..

Populations of the native mysid shrimp *Neomysis mercedis*, another form of zooplankton, began dwindling in the late 1970s and crashed in the late 1980s subsequent to the proliferation of the overbite clam. Its population decline was affected by competition with the smaller *Acanthomysis aspera*, an introduced mysid shrimp with similar feeding habits. The decline of the native shrimp species has been identified by the POD work team as one possible cause for the food web decline in the Delta (IEP 2007b). Synthesis of IEP's extensive modeling data could help assess trends in rates of invasion and different invasive species populations.

Non-native Invasive Plants. Non-native aquatic weeds in the Delta pose serious problems to native flora and fauna. Research, monitoring, mapping, and control are needed for Brazilian waterweed (*Egeria densa)*, as well as water pennywort, Eurasian watermilfoil, parrot feather, and water hyacinth. These weeds flourish in a wide geographic area, sometimes in high densities, and are extremely harmful because of their ability to displace native plant species, harbor non-native predatory species, reduce food web productivity, reduce turbidity, or interfere with water conveyance and flood control systems. Areas with large densities of SAV have been implicated in reduced abundance of native fish larvae and adults (Grimaldo et al. 2004, Nobriga et al. 2005, Brown and Michniuk 2007). Restoration of habitats in intertidal areas must be designed and managed to reduce non-native SAV if conservation goals are to be met (Nobriga and Feyrer 2007).

The California Department of Boating and Waterways (CDBW) is the lead agency for the survey and control of *Egeria densa* and water hyacinth in the Delta. CDBW's control programs use two tools to determine coverage and biomass of these aquatic weeds: hyperspectral analysis and hydroaccoustic measurements. This technology has aided the assessment of *Egeria densa* coverage and biovolume, which in turn was instrumental in evaluating the effectiveness of mechanical and chemical treatment. A key asset of the technology is that it yields a very rapid, verifiable characterization of the entire water column beneath the transducer (Ruch and Kurt 2006). While this technology has been helpful in controlling localized patches of SAV, ongoing efforts of CDBW's control program may not be successful over time because other aquatic weeds (such as Eurasian watermilfoil or curlyleaf pondweed) may replace *Egeria densa*. Both of these plants have different growth properties that may require different control techniques than those currently employed in the control program (CDBW 2006).

Other non-native plants that have been the focus of ERP NIS-related activities include giant reed (*Arundo donax)*, *Tamarisk* species, and purple loosestrife (*Lythrum salicaria*) in terrestrial areas. Grazing of perennial grasslands has helped control the spread of some invasive weeds in some areas (Stromberg et al. 2007).

As mentioned earlier, NIS has become particularly problematic in the Delta. Water management has focused on maintaining a common freshwater pool for water export and in-Delta agricultural use and has reduced the historical variability under which native species evolved. It is hypothesized that periodic salinity intrusion into the Delta may help to reduce the abundance and/or distribution of certain harmful invasive species, and give native species a competitive advantage. The Pelagic Fish Action

Plan (IEP 2007b) recommends the following actions to address invasive aquatic species in the estuary:

- Support California State Lands Commission's (CSLC) work to control ballast water, including DFG oversight of studies to determine the location and geographic range of NIS in the estuary and assessment of ballast water controls.
- Assist CSLC, DFG, and others in the development of regulations or control measures for hull-fouling.
- Support implementation of the CAISMP.

Water Temperature. Water temperature is a key factor in habitat suitability for aquatic organisms. Unnaturally high water temperature is a stressor for many aquatic organisms, particularly because warm water contains less dissolved oxygen. Lower water temperatures can also hinder growth and distribution of some non-native species, thus reducing their predation on, and competition for food and habitat with native species. Major factors that increase water temperature and negatively impact the health of the Delta are disruption of historical streamflow patterns, loss of riparian vegetation, reduced flows released from reservoirs, and discharges from agricultural drains.

It may be difficult to manage water temperatures in the Delta because Delta water temperatures are driven mainly by ambient air temperature. With expected localized warming of air temperatures due to regional climate change, particularly in summer, the problem of maintaining sufficiently low water temperatures in the Delta to sustain native species will become more problematic. While creating patches of riparian habitat may help cool water in small Delta sloughs through shading, and creating tidal marsh habitat may help cool water locally through nocturnal inundation of marsh plains, managers should seek to facilitate fish access to the water temperature conditions they require rather than focusing resources to achieve water temperatures in a specific area. Provided adequate floodplain and tidal habitat, it is likely that individual species distributions will change during certain times of the year as they attempt to adapt to future conditions in the Delta.

Dissolved Oxygen. ERPP Goal 6 (Water and Sediment Quality) is to improve and/or maintain water quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people. ERPP Goal 6, Objective 2 is to reduce loadings of oxygen-depleting substances from human activities into aquatic ecosystems in the Bay-Delta estuary and watershed to levels that do not cause adverse ecological effects. A sufficient level of dissolved oxygen (DO) is critical to the health and survival of aquatic species. Oxygen depletion is exacerbated by warm water temperatures, since warm water holds less DO than cold water. DO concentrations typically are lowest during the summer when river temperatures are warmer. Besides high water temperatures, the occurrence of decomposing aquatic vegetation, poor channel geometry, low streamflow, poor mixing of the stream water with the atmosphere, and the presence of oxygen-depleting substances (e.g., sewage,

Appendix K
Delta Dredged Sediment Long-Term Management Strategy

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U.S. Army Corps
of Engineers

San Francisco District

DELTA DREDGED SEDIMENT LONG-TERM MANAGEMENT STRATEGY
(PINOLE SHOAL MANAGEMENT AREA)
STUDY WORK PLAN

MANAGEMENT COMMITTEE REVIEW DRAFT

U.S. Army Corps of Engineers
San Francisco District
333 Market Street
San Francisco, California 94105

May 9, 2007

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BA	Biological Assessment
BMPs	Best Management Practices
CBDA	California Bay-Delta Authority
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESPD	U.S. Army Corps of Engineers South Pacific Division
COCs	Constituents of Concern
Corps	U.S. Army Corps of Engineers
CVP	Central Valley Project
CVRWB	Central Valley Regional Water Board
DDRS	Delta Dredging and Reuse Strategy
DMMO	Dredged Material Management Office
DMMP	dredged material management plan
DPC	Delta Protection Commission
DWR	California Department of Water Resources
DWSC	Deep Water Ship Channel
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
GI	General Improvement
HQUSACE	Headquarters of the U.S. Army Corps of Engineers
IWG	Interagency Working Group
SPK	U.S. Army Corps of Engineers Sacramento District
SPN	U.S. Army Corps of Engineers San Francisco District
LTMS	Long-Term Management Strategy
MC	Management Committee
NAS	network analysis system
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Association
NMFS	National Marine Fisheries Services
OBS	organizational breakdown structure
PEIS	Programmatic Environmental Impact Statement
PMP	Project Management Plan
QA/QC	quality assurance/quality control
RAM	Responsibility Assignment Matrix

SMP	sediment management plan
SQO	Sediment Quality Objectives
SRG	Strategy Review Group
State Water Board	the State Water Resources Control Board
SWP	State Water Project
TWG	Technical Work Group
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VSA	Value Stream Analysis
WBS	work breakdown structure

EXECUTIVE SUMMARY

Background

The Delta estuary is the largest estuary on the West Coast. Covering more than 738,000 acres in five counties, it is a maze of tributaries, sloughs, and islands and a haven for plants and wildlife, supporting more than 750 plant and animal species, including more than 110 species listed as "species of concern." The Delta is critical to California's economy, supplying drinking water for two-thirds of Californians and irrigation water for more than 7 million acres of the most highly productive agricultural land in the world.

The Delta is also the hub of California's two largest water distribution systems – the Central Valley Project (CVP) operated by the U.S. Bureau of Reclamation (Reclamation) and the State Water Project (SWP) operated by the California Department of Water Resources (DWR). Maintaining high quality water in the Delta is critical for drinking water supplies, agricultural irrigation, and ecosystem function. More than 1,100 miles of levees protect the water conveyance functions, ecosystem, and land uses on Delta islands. The Sacramento and San Joaquin River channels also provide important waterborne commerce access to the Ports of Sacramento and Stockton.

In recent years, conflicts about levee rehabilitation, dredging, and placement of dredged sediments have been increasing. There is an ongoing need to dredge Delta channels for navigation, water conveyance, flood control, and levee maintenance. At the same time, there are increasing regulatory concerns about the potential impacts to water quality and the ecosystem from levee work, dredging activities, and dredge materials placement and reuse.

In the last several years, agencies (Federal, State, and local), the public, political leaders, and the media have become increasingly concerned about the urgent need for levee rehabilitation in the Delta. Sediment management and reuse from dredging activities is a potential source of material for Delta levee rehabilitation. At the same time, the Delta environment is showing signs of major stress and dysfunction, as evidenced by the rapid decline of pelagic species in recent years.

Concerns about the complex and sensitive environment in the Delta have resulted in stringent regulatory requirements for dredging and sediment reuse and placement in the Delta. These two apparently conflicting objectives, protection of the Delta environment and increased dredging and sediment reuse and placement, highlight the need for better coordination and management of Delta dredging and sediment management and reuse requirements.

In late 2004, local sponsors of Delta dredging projects and the U.S. Army Corps of Engineers (Corps) met to explore the feasibility of developing a long-term management strategy (LTMS) for dredging and dredged materials placement or reuse in the Delta. A similar process was used to successfully develop a collaborative, coordinated approach to dredging and sediment management in San Francisco Bay.

Project Goals and Objectives:

The five initial participating agencies (Corps, U.S. Environmental Protection Agency [USEPA], DWR, California Bay-Delta Authority [CBDA], and Central Valley Regional Water Board [CVRWB]) agreed to examine the sediment issues and needs within the Delta. The participating agencies drafted a three-part project purpose statement:

- The Delta Dredged Sediment LTMS development process will examine and coordinate dredging needs and sediment management in the Delta to assist in maintaining and improving channel function (navigation, water conveyance, flood control, and recreation), levee rehabilitation, and ecosystem restoration.
- Agencies and stakeholders will work cooperatively to develop a sediment management plan (SMP or LTMS) that is based on sound science and protective of the ecosystem, water supply, and water quality functions of the Delta.
- As part of this effort, the sediment management plan will consider regulatory process improvements for dredging and dredged material management so that project evaluation is coordinated, efficient, timely, and protective of Delta resources.

To achieve these goals, the Delta LTMS seeks to improve coordination and planning efforts between dredging proponents and regulatory agencies, and to streamline, wherever possible, the regulatory approval process for future Delta dredging and sediment management activities. The following lists some of the specific objectives identified through stakeholder interviews that participants would like to see achieved during the LTMS development process. Some of these items may eventually be found not to be suitable for this group, but have been retained in this document in an effort to address all stakeholder concerns:

- Develop a streamlined permitting process to facilitate and improve coordination and cooperation among agencies with dredging management responsibilities or regulatory authority over dredging and placement activities.
- Develop a Standardized Sediment Characterization Manual that addresses stakeholder concerns pertaining to appropriate tests, protocols, and methods for various disposal options.
- Review and summarize regional best management practices (BMPs) for the dredging and disposal of contaminated and non-contaminated dredged sediments.
- Review regional disposal alternatives for contaminated and non-contaminated dredged sediments.
- Identify environmental restoration and/or enhancement opportunities that are directly related to the dredging and disposal of sediments.
- Develop a Sediment Management Plan to include: (i) approved regional disposal sites and/or identify treatment alternatives; (ii) BMPs for dredging and disposal operations; (iii) a consolidated and consistent plan for regulatory review; (iv)

chemical trigger levels for sediment/elutriate testing and disposal alternative selection; and, (v) a tiered approach for site suitability to dispose dredged sediments.
- Develop a programmatic BA to facilitate dredging and placement activities while ensuring the protection of resources (fish species).
- Prepare a programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) to implement the Delta disposal management alternatives.
- Ensure that the SMP and EIS/EIR are consistent with CVRWB regulations for the surface and groundwater quality.
- Facilitate beneficial use of dredged materials for levee stabilization or other uses while protecting surface and groundwater quality.

Organization

The Delta LTMS is organized in a management process to include an executive committee, management committee, interagency working group, strategy review group, and science advisory teams as described in this section. In addition, public meetings will be held periodically to provide additional opportunities for input and feedback from interested parties.

Executive Committee

At the top level, an Executive Committee will direct the overall program, set policy direction, and provide oversight of the study. The directors of each of the following agencies will serve on the Executive Committee. The appointed executive managers should have the decision-making authority to represent the agency on the policy and regulatory issues to be addressed. The Agency Executive Committee will meet annually or as necessary to set policy direction for the study and keep abreast of the progress of the study.

- U.S. Army Corps of Engineers, Commander, South Pacific Division
- U.S. Environmental Protection Agency, Regional Administrator, Region 9
- State Water Resources Control Board (State Water Board), Chairperson
- Central Valley Regional Water Board, Chairperson
- California Department of Water Resources, Director
- California Bay-Delta Authority, Chairperson
- Delta Protection Commission, Chairperson

Management Committee

The Management Committee will consist of the deputy-level managers for the State and Federal agencies. The Management Committee will oversee the work of the Interagency Working Group (IWG) and the associated Strategy Review Group, review policy recommendations, study plans, budget proposals, and provide recommendations to the Executive Committee. The Management Committee will meet quarterly. Members of the Management Committee are:

- U.S. Army Corps of Engineers, District Commander, San Francisco District
- U.S. Army Corps of Engineers, District Commander, Sacramento District
- California Department of Water Resources, Deputy Director, Public Safety

- U.S. Environmental Protection Agency, Director, Water Management Division, Region 9
- California Bay-Delta Authority, Executive Director
- State Water Board, Executive Officer
- Central Valley Regional Water Board, Executive Officer
- NOAA Fisheries, Southwest Region, Executive Director
- U.S. Fish & Wildlife Service, Pacific Region, Director
- California Department of Fish & Game , Executive Director
- Delta Protection Commission

Interagency Working Group

An Interagency Working Group (IWG) includes program-level staff at five agencies. The IWG will serve as the primary program managers of the Delta LTMS process and steering committee for the Strategy Review Group. The IWG will coordinate with the Management Committee, the Strategy Review Group and others with an interest in Delta activities and the LTMS process. The IWG's role is to identify study issues and questions to be addressed such as: identify technical work groups and expert resources, confirm purpose, charter, and assignments for the science advisory teams and technical review groups, discuss and review study work plans and scopes, discuss and review study budgets and resource needs, prepare and approve study reports, develop management and policy options for the Management and Executive Committees, and escalate issues to the Executive Committee that cannot be resolved at the Management Committee. The members of the IWG currently consist of the following:

- USEPA
- Corps
- CVRWB
- CBDA
- DWR

The Management Committee may identify other participants in the IWG.

Strategy Review Group

Study activities will be conducted in coordination with a Strategy Review Group consisting of representatives of other agencies, stakeholders, and interest groups in the Delta working in or affected by dredging and reuse activities for navigation, levee stability, or ecosystem restoration. The Interagency Working Group will coordinate meetings monthly or as needed with the Strategy Review Group to identify, review, and discuss: (1) the Delta sediment issues of concern to be addressed by the Delta LTMS study and in what order; (2) lines of inquiry that the science advisory teams (described below) will be tasked to pursue; and (3) coordinated regulatory approach for Delta dredging to be approved by the Executive Committee.

Members of the Strategy Review Group may also provide public comment at the Executive Committee meetings. In addition to the agencies on the Executive Committee, the Strategy Review Group also includes, but not be limited to the following organizations:

- NOAA Fisheries, Southwest Region
- U.S. Fish & Wildlife Service, Pacific Region
- California Department of Fish & Game
- Delta Protection Commission
- State Lands Commission
- Reclamation Board
- Reclamation Districts
- Contra Costa, Sacramento, Solano, Yolo, and San Joaquin Counties
- North, Central, and South Delta Water Agencies
- The Ports of Sacramento and Stockton
- Bay Planning Coalition
- DeltaKeeper
- The Nature Conservancy
- The Bay Institute
- Environmental Water Caucus
- California Sportfishing Protection Alliance
- California Farm Bureau Federation
- State Water Contractors
- California Delta Chamber

Technical Work Groups

The Management Committee will establish specific technical work groups to address Delta LTMS issues. The technical work groups will consist of agency staff with expertise in the relevant subject areas. Technical work groups are open to interested participants from any agency, interest group, or the public. With the direction and approval of the Management Committee, technical work groups will identify study needs, develop study scopes and work plans, identify resources, and review results and conclusions. The Management Committee will identify the leader for each technical group. The initial technical work groups created for the LTMS include the following:

- Regional Dredging and Reuse Permitting;
- Testing Protocols Review;
- Programmatic BA Development; and
- Disposal and Reuse Alternative Development.

Other Stakeholders/Interested Public

Other interested parties will have the opportunity to learn about the Delta LTMS process and activities by viewing the project website (www.deltaltms.com) and attending the public meetings to be held on an as needed basis, at project milestones.

Science Review Panel

The Management Committee will establish a Science Review Panel made up of independent scientists. The purpose of the Science Review Panel is to provide an independent science review process for Delta LTMS studies. The Management Committee will approve the leader and participants for the Science Review Panel. The Science Review Panel will evaluate existing information; identify gaps, and review results and conclusions.

Anticipated Project Tasks

Early in the development phase for Delta LTMS, a project process flow diagram was created (see Figure ES-1) to present an outline for an overall strategy for identifying and prioritizing project needs, identifying and evaluating management alternatives, forming technical work groups to contribute scientific information and policy direction, and key steps needed to successfully complete the LTMS. Similar approaches have been used successfully to develop long-term sediment management plans in San Francisco, Los Angeles, and Puget Sound. The initial technical tasks identified for this project and described in this Work Plan have been organized to follow the key tasks identified in that process diagram, including the following:

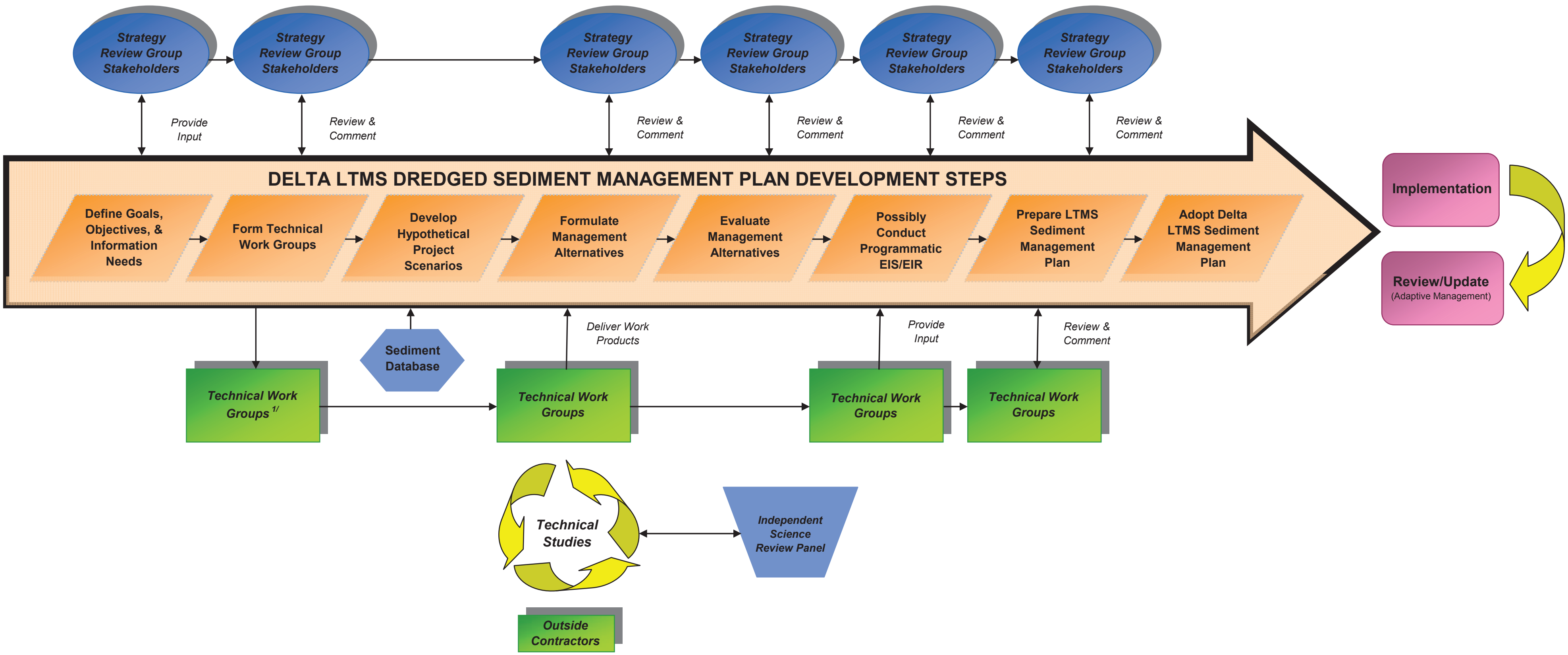
- Review and define project goals and objectives;
- Form technical work groups to address specific technical issues;
- Develop hypothetical project scenarios to frame potential management solutions;
- Formulate management alternatives;
- Evaluate management alternatives;
- Possibly conduct a programmatic EIS/EIR
- Prepare a sediment management plan to summarize project efforts; and
- Adopt and implement the LTMS sediment management plan.

Anticipated Project Schedule

The anticipated project schedule for completing the Delta LTMS sediment management plan is approximately 3 years. Several interim work products (e.g., possible formation of a Dredged Materials Management Office (DMMO), consolidated dredging permit application, sediment quality database, etc.) will be completed before that date and would be implemented upon completion.

Anticipated Project Budget

It is too early in the development process to accurately estimate the exact cost to complete the LTMS sediment management plan and associated technical studies; however, the planning level estimate based on the level of efforts required to complete similar projects in other regions is a little over $6 million.



Footnote: 1/ Ex: Work groups include Scientific Technical Studies & Permitting Coordination Activities

Figure ES-1
Delta Dredged Sediment LTMS Development Process
Management Committee Review Draft

1 INTRODUCTION

1.1 Project Background

In late 2004, local sponsors of Delta dredging projects and the U.S. Army Corps of Engineers (Corps) met to explore the feasibility of developing a long-term management strategy (LTMS) for dredging and dredged material placement and/or reuse in the Delta. In 2005, the Corps worked with multiple stakeholders including other Federal and State agencies to define a cooperative, collaborative approach to address the problems, challenges, and opportunities related to levee repairs, dredging, and beneficial reuse of dredge materials in the Delta.

As a result of these discussions, the Corps began working with other Federal and State agencies – the U.S. Environmental Protection Agency (USEPA), the California Bay Delta Authority (CBDA), California Department of Water Resources (DWR), Delta Protection Commission (DPC), and the Central Valley Regional Water Board (CVRWB) – to develop the initial Process Framework describing a cooperative approach for developing the Delta dredged sediment LTMS (Delta LTMS) Program for the Delta region.

The Process Framework describes the overall purpose and structure of the effort so that participating agencies can assess the study objectives, gauge their level of required participation, and assign resources to assist in developing the Delta LTMS Program. As with any cooperative planning effort, the Process Framework will be refined as participation increases and implementation proceeds.

In conjunction with the Process Framework document, the five agencies listed above used the framework as the basis for establishing a charter to promote participation and commitment to achieving the goals and addressing the concerns identified in the framework process document. Agencies signing the charter agreed to fully participate in the study activities and operate under the final Charter. Copies of the Final Delta LTMS Charter and Process Framework can be found in Appendix A).

The Delta LTMS Process Framework (Corps et al. 2006) summarizes the initial framework for the Delta LTMS, identifying the following components:

- Study purpose, goals, and objectives
- Structure, participants, and roles

- Authorities and decision making
- Related programs
- Study activities and phases

Based on those items, a Federal Project Management Plan (PMP) was developed by the Corps of Engineers to guide their internal managers on appropriate project direction, schedule, work assignments and potential costs. Because a Corps PMP follows a strict systems generated outline, not always easily understood by most non-Federal stakeholders, it was decided to also prepare this Study Work Plan to present those same topics and provide the operating framework for preparing the Delta LTMS.

1.2 Project Purpose and Need

Accurate estimates of historical dredge volumes within the Delta (Figure 1-1) are sometimes difficult to calculate because some of the smaller dredging projects do not have detailed records of the specific volumes removed and final placement destination. Accurate estimates are available, however, or all recent projects and the larger historical projects. The bulk of the dredging within the Delta (at least on a volume basis) occurs in either of the two deepwater shipping channels to the Ports of Stockton and Sacramento. Between 1966 and 2006, the average annual volume of material removed from these channels was 320,000 cubic yards (Stockton DWSC) and 593,000 cubic yards (Sacramento DWSC). Specific dredge volumes removed from the Stockton DWSC range from a low of 15,000 cubic yards in 1971 to a high of 841,000 cubic yards in 1978. Specific dredge volumes removed from the Sacramento DWSC range from a low of 35,000 cubic yards in 2005 to a high of 2.2 million yards in 1966. Additional, detailed information of historical and projected dredge volumes is provided later in this report in Section 2.2.

1.3 LTMS Structure Participants and Roles

The Delta LTMS is organized (Figure 1-2) in a management process to include an Executive Committee, Management Committee, Interagency Working Group (IWG), Strategy Review Group (SRG), Technical Work Groups (TWGs) and an Independent Science Review Panel as described in this section. In addition, public meetings will be held periodically to provide additional opportunities for input and feedback from interested parties.

Figure 1-1
Plan View of Delta Region
Management Committee Review Draft
Source: CALFED Bay-Delta Program

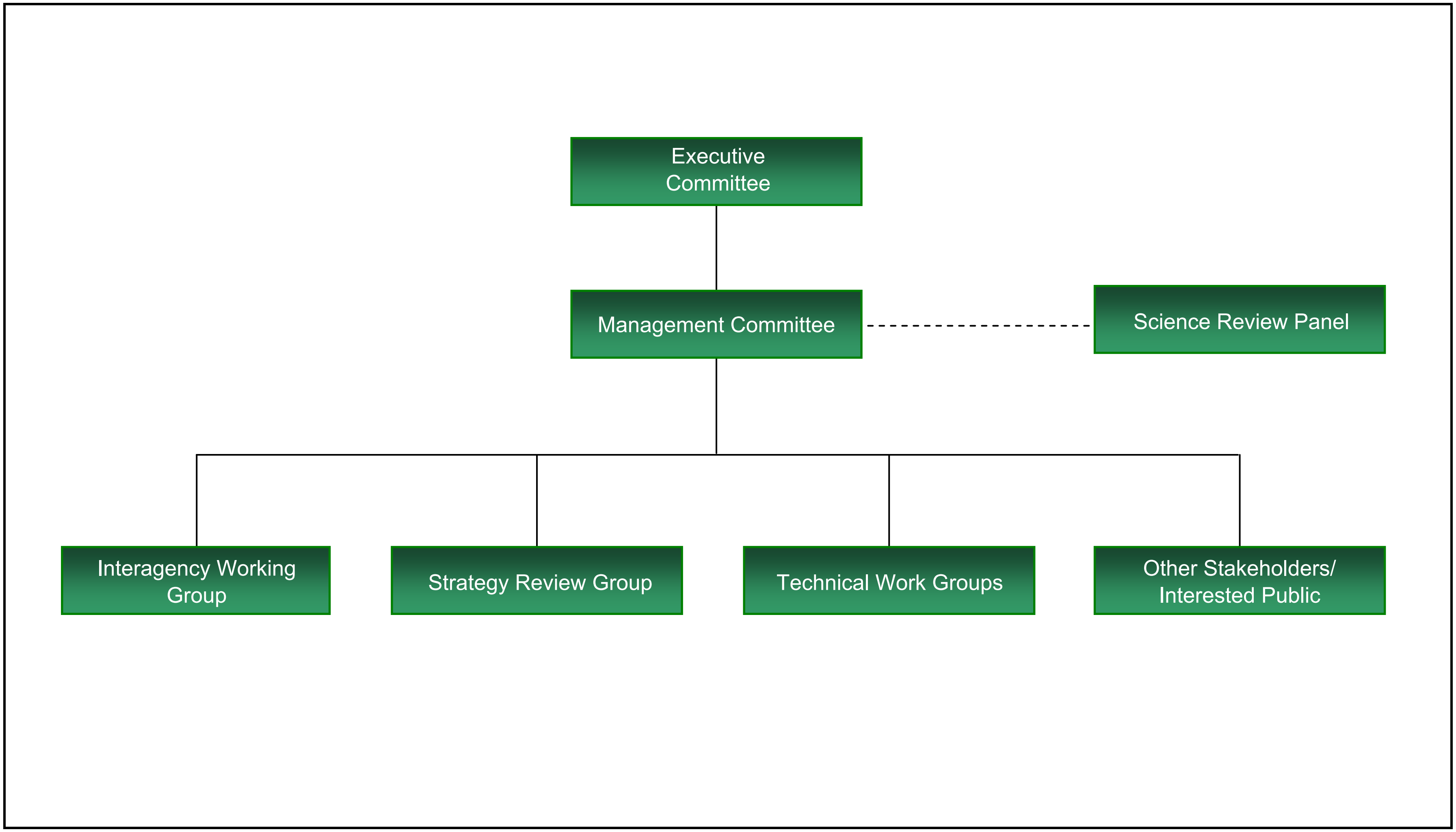


Figure 1-2
Organizational Structure
Management Committee Review Draft

Executive Committee

At the top level, an Executive Committee directs the overall program, sets policy direction, and provides oversight of the study. The directors of each of the following agencies serve on the Executive Committee. The appointed executive managers should have the decision-making authority to represent the agency on the policy and regulatory issues to be addressed. The Executive Committee will meet annually or as necessary to set policy direction for the study and keep abreast of the progress of the study.

- U.S. Army Corps of Engineers, Commander, South Pacific Division
- U.S. Environmental Protection Agency, Regional Administrator, Region 9
- State Water Resources Control Board (State Water Board), Chairperson
- Central Valley Regional Water Board, Chairperson
- California Department of Water Resources, Director
- California Bay-Delta Authority, Chairperson
- Delta Protection Commission, Chairperson

Management Committee

The Management Committee consists of the deputy-level managers for the Federal and State agencies. The Management Committee will oversee the work of the IWG and the associated Strategy Review Group, review policy recommendations, study plans, budget proposals, and provide recommendations to the Executive Committee. The Management Committee will meet quarterly. Members of the Management Committee are:

- U.S. Army Corps of Engineers, District Commander, San Francisco District
- U.S. Army Corps of Engineers, District Commander, Sacramento District
- California Department of Water Resources, Deputy Director, Public Safety
- U.S. Environmental Protection Agency, Director, Water Management Division, Region 9
- California Bay-Delta Authority, Executive Director
- State Water Board, Executive Officer
- Central Valley Regional Water Board, Executive Officer
- NOAA Fisheries, Southwest Region
- U.S. Fish & Wildlife Service, Pacific Region
- California Department of Fish and Game

Interagency Working Group

An IWG includes program-level staff at five agencies. The IWG serves as the primary program managers of the Delta LTMS process and steering committee for the Strategy Review Group. The IWG will coordinate with the Management Committee, the SRG and others with an interest in Delta activities and the LTMS process. The IWG's role is to identify study issues and questions to be addressed such as: identify technical work groups and expert resources, confirm purpose, charter, and assignments for the science advisory teams and technical review groups, discuss and review study work plans and scopes, discuss and review study budgets and resource needs, prepare and approve study reports, develop management and policy options for the Management and Executive Committees, and escalate issues to the Executive Committee that cannot be resolved at the Management Committee. The members of the IWG currently consist of the following:

- U.S. Environmental Protection Agency
- U.S. Army Corps of Engineers
- Central Valley Regional Water Board
- California Bay-Delta Authority
- California Department of Water Resources
- The Management Committee may identify other participants in the IWG

Strategy Review Group

Study activities will be conducted in coordination with a SRG consisting of representatives of other agencies, stakeholders, and interest groups in the Delta working in or affected by dredging and reuse activities for navigation, levee stability, or ecosystem restoration. The Interagency Working Group will coordinate meetings monthly or as needed with the Strategy Review Group to identify, review, and discuss:

1. The Delta sediment issues of concern to be addressed by the Delta LTMS Study and in what order;
2. Lines of inquiry that the science advisory teams (described below) will be tasked to pursue; and
3. Coordinated regulatory approach for Delta dredging to be approved by the Executive Committee.

Members of the SRG may also provide public comment at the Executive Committee meetings. In addition to the agencies on the Executive Committee, the SRG also includes, but is not limited to the following organizations:

- NOAA Fisheries, Southwest Region
- U.S. Fish & Wildlife Service, Pacific Region
- California Department of Fish and Game
- Delta Protection Commission
- State Lands Commission
- Reclamation Board
- Reclamation Districts
- Contra Costa, Sacramento, Solano, Yolo, and San Joaquin Counties
- North, Central, and South Delta Water Agencies
- The Ports of Sacramento and Stockton
- Bay Planning Coalition
- DeltaKeeper
- The Nature Conservancy
- The Bay Institute
- Environmental Water Caucus
- California Sportfishing Protection Alliance
- California Farm Bureau Federation
- State Water Contractors
- California Delta Chamber

Technical Work Groups

The Management Committee will establish specific science and technical work groups to address Delta LTMS issues. The science and technical work groups will consist of agency staff with expertise in the relevant subject areas. Technical work groups are open to interested participants from any agency, interest group, or the public. With the direction and approval of the Management Committee, technical work groups identify study needs, develop study scopes and work plans, identify resources, and review results and conclusions. The Management Committee identifies the leader for each technical work group. Currently planned TWGs include the following:

- Regional Dredging and Reuse Permitting;
- Testing Protocols Review;
- Programmatic Biological Assessment (BA) Development; and
- Dredged Sediment Disposal and Reuse Alternative Development.

These work groups (discussed in more detail in Section 3.1.2) will be formed by the IWG and authorized by the Management Committee.

Other Stakeholders/Interested Public

Other interested parties will have the opportunity to learn about the Delta LTMS process and activities by viewing the project website and attending public meetings to be held on an as needed basis, at project milestones.

Science Review Panel

The IWG and Management Committee will establish a Science Review Panel made up of independent scientists. The purpose of the Science Review Panel is to provide an independent science review process for all Delta LTMS studies. The Management Committee will approve the leader and participants for the Science Review Panel.

1.4 Study Goals and Objectives

The five initial participating agencies (Corps, USEPA, DWR, CBDA, and CVRWB) agreed to examine the sediment issues and needs within the Delta. The participating agencies drafted a three-part project purpose statement:

1. The Delta Dredged Sediment Long-Term Management Strategy development process will examine and coordinate dredging needs and sediment management in the Delta to assist in maintaining and improving channel function (navigation, water conveyance, flood control, and recreation), levee rehabilitation, and ecosystem restoration.
2. Agencies and stakeholders will work cooperatively to develop a sediment management plan (SMP or Long-Term Management Strategy) that is based on sound science and protective of the ecosystem, water supply, and water quality functions of the Delta.

3. As part of this effort, the sediment management plan will consider regulatory process improvements for dredging and dredged material management so that project evaluation is coordinated, efficient, timely, and protective of Delta resources.

To achieve these goals, the Delta LTMS seeks to improve coordination and planning efforts between dredging proponents and regulatory agencies, and to streamline, wherever possible, the regulatory approval process for future Delta dredging and sediment management activities. The following lists some of the specific objectives identified through stakeholder interviews, conducted during the project planning phase by Circle Point, that participants would like to see achieved during the LTMS development process. Some of these items may eventually be found not to be suitable for this group, but have been retained in this document in an effort to address all stakeholder concerns.:

a) Develop a streamlined permitting process to facilitate and improve coordination and cooperation among agencies with dredging management responsibilities or regulatory authority over dredging and placement activities.
b) Develop a Standardized Sediment Characterization Manual that addresses stakeholder concerns pertaining to appropriate tests, protocols, and methods for various disposal options.
c) Review and summarize regional best management practices (BMPs) for the dredging and disposal of contaminated and non-contaminated dredged sediments.
d) Review regional disposal alternatives for contaminated and non-contaminated dredged sediments.
e) Identify environmental restoration and/or enhancement opportunities that are directly related to the dredging and disposal of sediments.
f) Develop a Sediment Management Plan to include: (i) approved regional disposal sites and/or identify treatment alternatives; (ii) BMPs for dredging and disposal operations; (iii) a consolidated and consistent plan for regulatory review; (iv) chemical trigger levels for sediment/elutriate testing and disposal alternative selection; and, (v) a tiered approach for site suitability to dispose dredged sediments.
g) Develop a programmatic BA to facilitate dredging and placement activities while ensuring the protection of resources (fish species).
h) Prepare a programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) to implement the Delta disposal management alternatives.
i) Ensure that the SMP and EIS/EIR are consistent with CVRWB regulations for the surface and groundwater quality and resource agencies.

j) Facilitate beneficial use of dredged materials for levee stabilization or other uses while protecting surface and groundwater quality.

1.5 Federal, Non-Federal, and Public Concerns

A number of concerns related to planning needs and constraints have been identified during the plan development process for the Delta LTMS Program and are described below. Initial concerns were received through meetings and interviews with the potential sponsor(s), other agencies, dredging proponents, and interested parties.

1.5.1 Environmental/Permitting

Identified concerns with the current permitting framework include:

1. Difficulties obtaining permits for dredging and placement of material at either designated disposal sites or beneficially reusing the material (i.e., levee maintenance, restoration, construction grade) have been identified as a primary driver for developing the LTMS.
2. Clarifying agency jurisdiction to dredging stakeholders and responsibility regarding Delta dredging, disposal and beneficial reuse actions.
3. Streamlining the permitting process by developing a General Order including National Environmental Policy Act, Clean Water Act, and California Environmental Quality Act (CEQA) compliance.
4. Due to perceived differences in agency policies, general permitting requirements, and overlapping jurisdiction, a need to facilitate better coordination between agencies regulating dredging, disposal, and reuse was identified by some stakeholders.

1.5.2 Technical

Technical questions and desired investigations thus far identified include:

1. As part of the overall characterization of sediment quality impacts and perceived lack of agreed upon sediment quality thresholds, the permitting/authorization process and the ability to efficiently plan dredging operations should be reviewed. Thus, developing sediment screening criteria for specific disposal/reuse applications has been identified as a task to assist in determining sediment suitability.

2. Summarizing contaminant exposure pathways for upland and wetland placement of dredged material, and potential impacts to water quality and biological resources will assist in developing a guidance manual for assessing sediment quality for various disposal options. Impacts from dredging operations could include: (i) turbidity, noise, depletion of dissolved oxygen, and/or degradation of air quality; (ii) potential resuspension of contaminants in the water column; and (iii) chemical advection and diffusion at dredge material placement sites.
3. Review BMPs to address potential construction impacts of dredge and disposal operations on air/water quality, ambient noise, turbidity, dissolved oxygen and vessel traffic, and mechanical and logistics modifications required to reduce impacts need to be identified.

1.5.3 Economics

Regional economic issues associated with dredging and placement of material include:

1. The cost to the Federal government, Non-Federal Sponsors and regulatory applicants for finding suitable sites for disposal and beneficial reuse of dredged material must be assessed. The desire to identify economically feasible options for disposal management and ensuring levee stability has been identified as an issue by all participants.
2. The potential economic degradation of regional and national economies due to the inability to efficiently dredge channels.
3. Reuse, redevelopment, modernization and expansion of facilities at the Ports of Stockton and Sacramento should be evaluated.
4. Potential economic impacts of levee failure should be considered when prioritizing suitable reuse alternatives.
5. A benefit-cost analysis (for Federal projects) for the dredging and disposal of sediments for levee stabilization and habitat restoration/enhancement should be established.
6. The desire to beneficially reuse dredge material has been identified as a priority for the Delta LTMS. Factors that can impact beneficial reuse of dredge material such as costs, feasibility, re-handling, and transportation need to be identified and evaluated.
7. Evaluate ways to encourage more opportunities for dredging companies to cost effectively operate in the Delta (longer dredging windows, lack of experienced crews, etc.).
8. Evaluate ways for cost effective rehandling and reuse of dredge materials.

1.5.4 Political

Identified political questions and issues include:

1. The perception that there is a lack of consensus regarding the permitting, testing, and suitability determinations for dredged material has been voiced by various participants, including some agency participants.
2. Conflicting mandates from different agencies with regard to levee repair and associated water quality and biological impacts versus the impacts of potential levee failure.
3. Identification of other stakeholder groups with an interest in the program, including resource agencies, environmental groups, and dredgers. Public perception will be crucial in the development and continued success of the program.

1.6 Adaptive Management and Integration Plan

Because planning is an iterative process, more or less funding and time may be required to accomplish the formulation and evaluation of the study objectives, specific management alternatives, and ultimately the Sediment Management Plan. With clear descriptions of the scopes and assumptions outlined in the PMP and the Work Plan, deviations are easier to identify. The impact in either time or money is easily assessed and decisions can be made on how to proceed. The PMP and Work Plan are intended to be living documents, periodically updated and revised as necessary as the project progresses and study findings require adjustments to the study program as agreed to by the Executive and Management Committees.

1.7 Summary of Work Plan Organization

Using the components of the Corps' PMP document, this Work Plan has been arranged in the following format:

Chapter 1 – Introduction. A description of the Work Plan and the LTMS in general, including structure and goals.

Chapter 2 – Delta LTMS Study Area. A description of the Study Area, including geography, historical, and projected dredge areas and volumes, and sediment characteristics.

Chapter 3 – Delta LTMS Development Process. A detailed discussion of the tasks and coordination involved in the LTMS.

Chapter 4 – Technical Quality Control Plan. A brief description of the project Quality Control Plan.

Chapter 5 – Public Involvement and Coordination. Description of key public involvement tasks and coordination activities for the Delta LTMS Study.

Chapter 6 – Delta LTMS/SMP Agency Implementation Strategy. Describes how the agencies and stakeholders will implement the plan.

Chapter 7 – References. Lists all project references.

2 DELTA LTMS STUDY AREA

2.1 Geographic Boundaries

One of the first tasks for the Technical Work Groups to address will be to review and finalize the geographic boundaries for the Delta LTMS Study. Until the point that it is revised, this document assumes that the Study Area will be that known as the "Legal Delta" according to the Delta Vision program (www.deltavision.ca.gov). Located roughly between the cities of Sacramento, Stockton, Tracy, and Antioch (Figure 1-1), the "Legal Delta" extends approximately 24 miles east to west and 48 miles north to south, including parts of five counties (Sacramento, San Joaquin, Contra Costa, Solano, and Yolo).

The delta consists of a myriad of small natural and man-made channels (locally called sloughs), creating a system of isolated lowland islands and wetlands (defined by dikes or levees). The extensive system of earthen levees has allowed wide-spread farming throughout the delta, one of the most fertile agricultural areas in California.

Today, the Delta provides critical habitat to many of California's fish species residing in the region, including several threatened and endangered species. Recreationally, the Delta contains 635 miles of boating waterways which are served by approximately 95 marinas containing over 11,000 in-water boat slips and dry storage space for an additional 5,000 boats.

An additional, critical early task to be addressed by the Technical Work Groups and IWG members will be to identify and prioritize which areas of the Delta may be most suitable for developing dredge material beneficial reuse opportunities for levee repairs. Figure 2-1 presents an overview of the Delta levee system showing the areas of greatest concern with regards to the Federal (project) levee system according to a recent report prepared by the Corps (Appendix B). It should be noted, however, that this map does not show the hundreds of miles of levees in need of repair that are part of the State (non-Project) flood protection system.

2.2 Historical and Projected Dredge Volumes

Additional data is still being collected to complete this section.

2.3 Sediment Physical and Chemical Characteristics

Additional data is still being collected to complete this section.

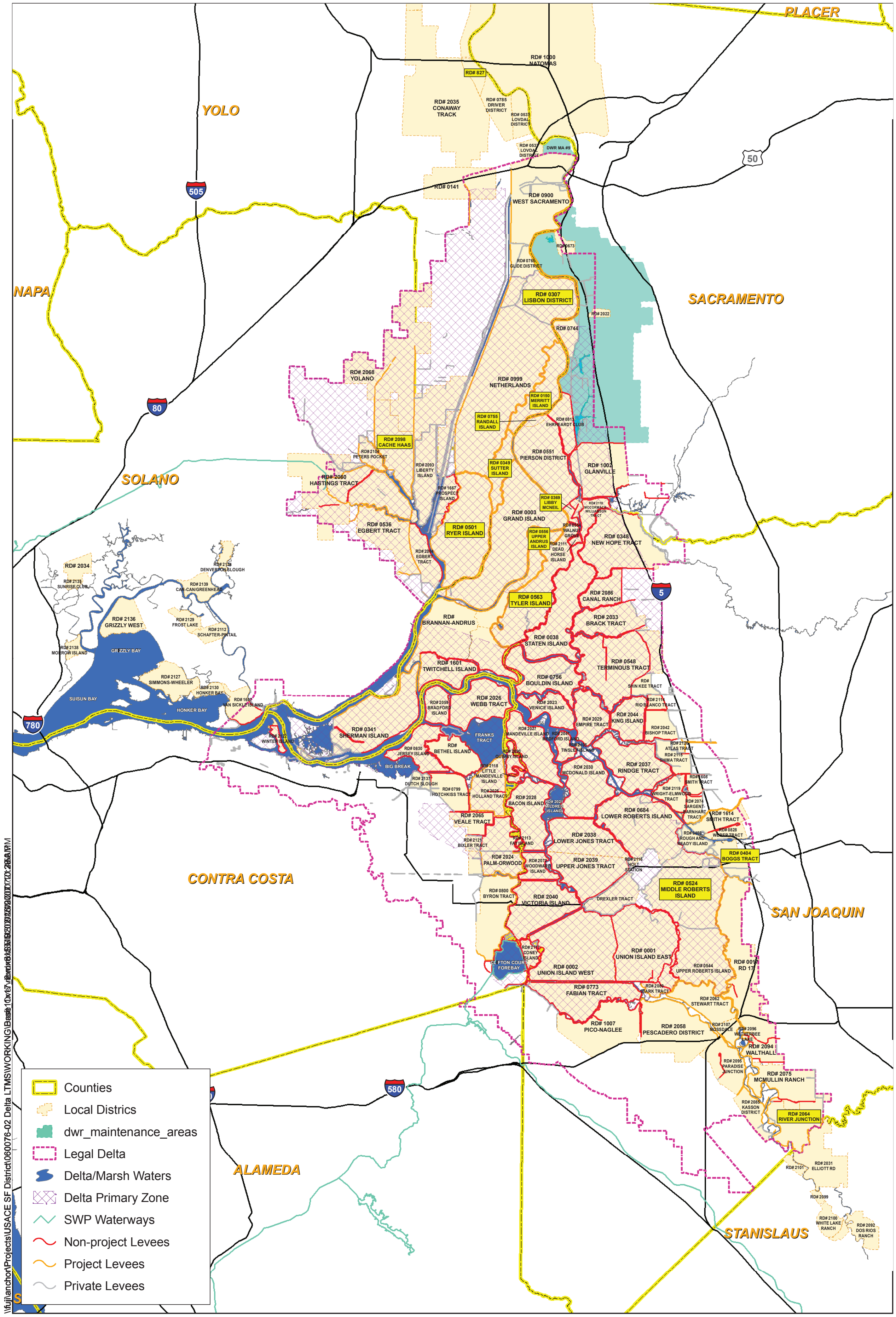


Figure 2-1
Delta Levees and Federal Areas of Concern
Management Committee Review Draft

3 DELTA LTMS DEVELOPMENT PROCESS

Early in the development phase for Delta LTMS, a project process flow diagram was created (see Figure 3-1) to present an outline for an overall strategy for identifying and prioritizing project needs, identifying and evaluating management alternatives, forming technical work groups to contribute scientific information and policy direction, and key steps needed to successfully complete the LTMS. Similar approaches have been used successfully to develop long-term sediment management plans in San Francisco, Los Angeles, and Puget Sound. The technical tasks described in this Work Plan have been organized to follow the key tasks identified in that process diagram, as described below.

3.1 List of Initial Tasks

3.1.1 Define Goals, Objectives, and Information Needs

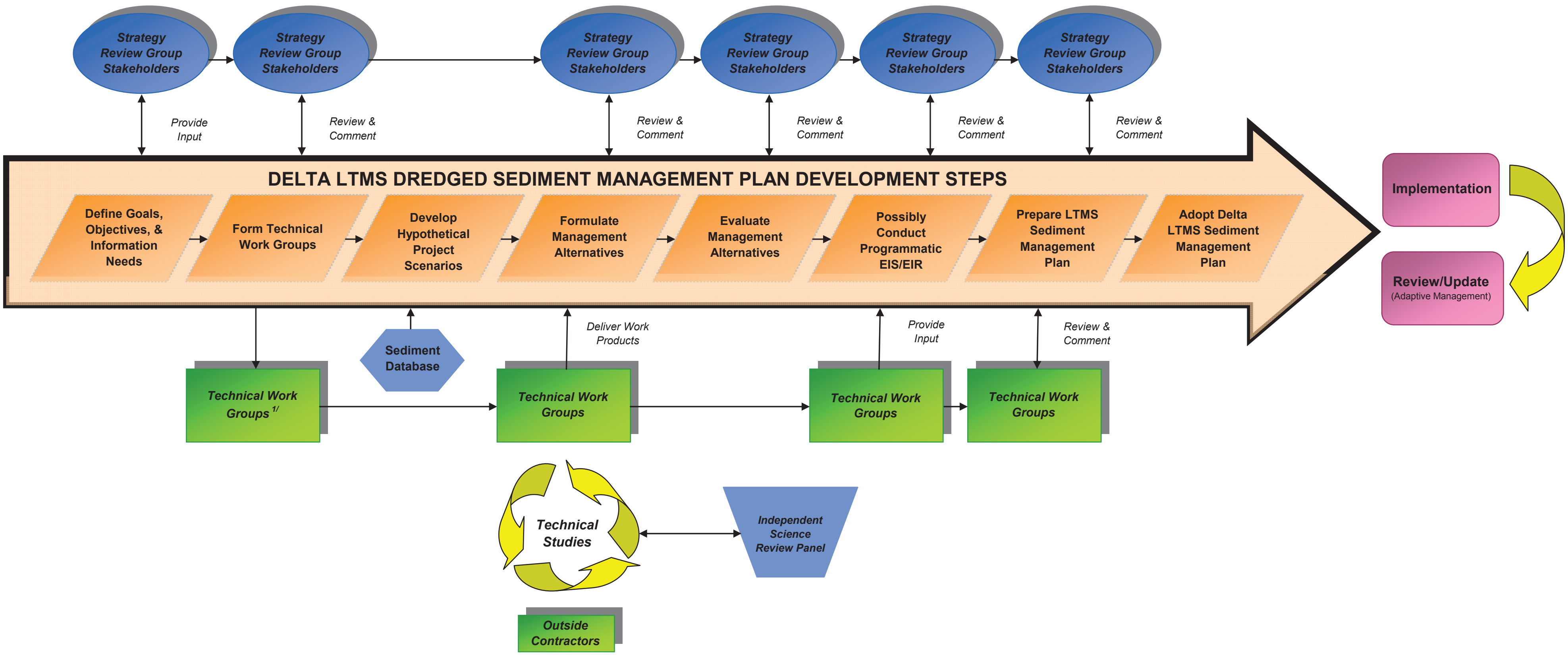
As described in Section 1.3, a series of stakeholder meetings, one-on-one interviews and targeted outreach programs were used to develop a list of overall goals, specific project objectives, and, subsequently, informational needs required to successfully prepare a regional sediment management plan for the Delta. That task has already been completed so is not included in this section.

3.1.2 Formation and Coordination of Technical Work Groups

The technical framework of the Delta LTMS will be driven by four key TWGs:

- Regional Dredging and Reuse Permitting;
- Testing Protocols Review;
- Programmatic BA Development; and
- Disposal and Reuse Alternative Development.

A key first step in the LTMS development process, therefore, has been working to form these groups and identify the scope and direction for each. Coordination between these groups and IWG/SRG will be critical to prevent overlap and to remain focused on project priorities. Group participation will be open to all LTMS stakeholders and participants can choose to attend whenever interests arise. Overall direction and approval will be provided by on a daily basis by the IWG and, ultimately, the Management Committee.



Footnote: 1/ Ex: Work groups include Scientific Technical Studies & Permitting Coordination Activities

Figure 3-1
Delta Dredged Sediment LTMS Development Process
Management Committee Review Draft

Each TWG will be led by an appropriate agency person chosen from amongst the agency stakeholders to be the primary point-of-contact for that group. Anchor Environmental will provide a technical liaison to each TWG for purposes of meeting coordination, note taking, document production services, etc. Once the point-of-contact for each TWG is chosen, its members will assemble for an initial kick-off meeting to review the scope and direction for the group, and choose a satisfactory meeting schedule and venue for future gatherings. The following sections describe the initial direction expected for each of the four TWGs.

3.1.2.1 Regional Dredging and Reuse Permitting Work Group

The purpose of this Work Group will be to review and summarize the current procedures required for each stakeholder agency, and address perceived confusion and inefficiencies regarding the proper regulatory steps required for permitting various dredging, disposal and reuse projects within the Delta.

Five key agencies currently have jurisdiction over different aspects of the dredging process within the Delta: the Corps, National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), and the CVRWB. In addition to these organizations, various ordinances and land use restrictions of local agencies, such as the county or municipality, may apply to dredging projects with land disposal. In some cases, other agencies such as the California Department of Transportation, California Department of Conservation, and Reclamation Board also may require permits.

Prior studies conducted by the CALFED Bay-Delta Program and summarized in the June 2002 Delta Dredging and Reuse Strategy (DDRS) report identified specific areas where the current regulatory process could be enhanced, and recommended several key topics for future study. These include:

1. Developing general order Waste Discharge Requirements to help streamline the Regional Board’s approval process;
2. Prepare a programmatic EIR/EIS that addresses all of the requirements of CEQA and National Environmental Policy Act (NEPA) for all impacts associated with maintenance dredging, disposal and reuse projects – a

general order already exists for maintenance dredging of the deep water ship channels which could be used as a starting point for additional general orders;

3. Develop regional permits to reduce redundancy in the process and expedite agency review;
4. Develop programmatic biological opinions (addressed by separate Work Group); and
5. Form multi-agency review committee for dredging projects to meet routinely and review processes and potential improvements.

The members of this Work Group should use the information developed for the CALFED program as a basis for beginning this evaluation and build upon it to reach consensus among the members for making recommendations to the Management Committee.

In order for this Work Group to be successful, staff participation from the following Delta LTMS stakeholders must occur:

- Corps (Sacramento and San Francisco Districts);
- USEPA;
- DWR;
- CBDA; and/or
- CVRWB.
- Staff participation and technical contributions from other agencies (State or Federal) or stakeholders would be beneficial to assist completing the proposed tasks.
- Other agencies that will be crucial and may have permitting authority for dredging or disposal sites include: State Lands Commission, Department of Water Resources.

A total of three main deliverables are expected from this Work Group along with monthly updates in the form of progress memos or verbal updates at the IWG and/or SRG meetings.

1. Permitting Summary/Value Stream Analysis – The first deliverable will be a summary of the current permitting processes required for dredging, disposal and reuse of sediments within the Delta system, including areas where agencies overlap in their jurisdiction. This information should be separated by upper and lower reaches, and again by navigable waters and flood control channels. Input will be required from the Work Group created to identify current and future potential disposal and reuse opportunities. Core agency participants should take the lead in preparing this deliverable. The likely method to develop this summary and identify opportunities and constraints will be through a Corps directed Value Stream Analysis under the Lean-Six-Sigma program currently in use throughout the Corps' South Pacific Division.
2. Joint Permit Application – The second deliverable will be a draft consolidated permit application including all required information to meet the needs of the appropriate agencies with jurisdiction over regional dredging projects. The goal of this deliverable will be to create a template that can be used by the Management Committee in the short-term.
3. Dredged Material Management Office (DMMO) – The third deliverable will be a review , and possibly a recommendation (if deemed beneficial), for the formation of a Delta DMMO, similar to those in place for the Bay Area and the Northwest states. If implemented, a Delta DMMO should be led by the Corps of Engineers Sacramento District, and involve assigned regulatory agency personnel from dredging stakeholder groups. If the work group ultimately recommends the formation of a DMMO, a strategy should be developed to outline issues associated with individual agency participation, jurisdiction for each dredging, disposal and reuse strategy, funding sources within each agency, meeting procedures, permit application submittal and review and approval processes. A draft Strategy should be submitted for Management Committee and IWG approval. Comments on the draft will then be incorporated into a final version for review and comment by the rest of the Delta LTMS Stakeholders.

Formation of a DMMO is a large logistical issue requiring significant input from agencies, especially the Corps and USEPA. As such, the task to decide if one is warranted for the Delta Region is included as an early step in the LTMS process to promote early coordination and allow time for resolution of staffing, funding, and other logistical issues. The DMMO formation, if it occurs, will largely be a parallel track, and the LTMS stakeholders should expect some periodic updates from the Corps and USEPA on this task.

It is anticipated that, at a minimum, the Work Group will meet once a month to collaborate on achieving the tasks specified and addressing priority of short and long-term issues pertaining to the permitting process. Work Group participants should also anticipate a minimum of 10 hours a month to review, produce, or discuss documents relevant to the permitting deliverables listed below. The Value Stream Analysis may require a one-time commitment of 2 to 4 consecutive days by all key participants.

3.1.2.2 Testing Protocols Review Work Group

The Strategy Review Group identified reviewing appropriate testing protocols for the characterization of sediments proposed for dredging and disposal as a critical issue for the Delta LTMS program. Existing methods and protocols for the evaluation of dredged material will be reviewed and documented.

The DDRS provides a technical analysis of potential contaminants in dredge material related to impacts on water quality, human health and biological resources. This document provides a foundation with which the Work Group can move forward. It provides a summary of the existing information (e.g., chemistry, dredging project, etc.) and water testing protocols within the Delta (2002). The DDRS made recommendations in Chapter 6 for future research and analyses for specific tests and evaluating new contaminants of concerns. The Work Group should review and if appropriate prioritize these recommendations for implementation.

Utilizing the DDRS as a starting point, the Work Group will have a head start on the subtasks identified below:

1. Literature Search – The Work Group will conduct a review of the current methods and protocols used to characterize sediments proposed for dredging and disposal, as well as any information regarding the method's technical accuracy. As previously stated, the DDRS (Volumes I and II) provides a solid foundation for this information. The Work Group will need to update this summary with current testing protocol information accessible from the

sediment database developed under a separate task as well as from other programs around the nation such as the Northwest Regional Sediment Evaluation Framework (Corp et al. 2006). Once testing protocol information has been updated, the Work Group can then identify new procedures possibly developed for other regions.

2. The Work Group will review regional sediment quality data from LTMS data base.
3. A sediment characterization framework for dredging and disposal will identify a list of chemicals of concern, physical parameters; elutriate tests, and biological tests appropriate for characterizing Delta sediments. This framework will use a risk based approach, will be adaptive, and integrate new methods or processes as they are approved by the Work Group, IWG, and possily a DMMO (if created).
4. The final report will provide recommendations for testing protocols for dredging, disposal, and beneficial use of dredged sediment in the Delta. It will also include a process for annual reviews to assess the accuracy and predictability of the testing framework. This review process will include implementation of adaptive management, introducing new methods or testing protocols where pertinent.

Overall, the key focus of this group should be to determine what testing methods most accurately characterize dredge material and their placement sites in terms of possible impacts to water quality. For example, the group should be focused on how soil conditions in the delta may attenuate contaminants at dredge placement and reuse sites. The goal is to reduce the uncertainty of dredge material placement on water quality so more informed decisions can be made by the Board and more certainty for the dischargers. In order for this Work Group to be successful, staff participation from the following stakeholders must occur:

- Corps (Sacramento and San Francisco Districts);
- USEPA;
- DWR;
- CBDA; and/or
- CVRWB.

- Experienced staff participation and technical contributions from other agencies (State or Federal) or stakeholders would be beneficial to assist completing the proposed tasks.

The primary deliverables for this Work Group are expected to include:

- A list of chemicals of concern;
- Sediment screening guidelines established using a risk based approach;
- Elutriate tests for various disposal options;
- Biological tests for various disposal options; and
- A Final Report detailing recommendations for a comprehensive characterization framework and annual review process. Recommendations for additional studies will also be included with this report.

These deliverables will focus on developing a strategy for applying the correct test to the right application rather than developing new tests. The draft report will be submitted to the IWG for review and approval. A draft final report will then be submitted to the Strategic Review Committee for review and comment. If approved, the framework will then be incorporated into each of the agencies current dredging project approval process. The Work Group chair will provide monthly updates in the form of progress memos or verbal updates at the IWG and/or SRG meetings.

It is anticipated that, at a minimum, the Work Group will meet once a month to collaborate on achieving the tasks specified and addressing priorities of short and long-term issues pertaining to the permitting process. Work Group participants should also anticipate a minimum of 10 hours a month to review, produce, or discuss documents relevant to the regional disposal and reuse alternative deliverables listed below.

3.1.2.3 Programmatic Biological Assessment Development Work Group

The Strategy Review Group identified a potential need for developing a programmatic biological opinion as a critical issue for the Delta LTMS. Currently, individual projects are reviewed by NMFS and USFWS and often have been time consuming and difficult on all parties due to the lack of data. Therefore, to address the lack of consolidated data related to biological resources and potential impacts from dredging and disposal within the Delta, several tasks are proposed to help formulate a programmatic BA.

The Work Group will need to accomplish the following components listed below before a Programmatic Biological Assessment can be written and implemented for Delta dredging projects:

1. Literature Search/Review Summary Report – A comprehensive review of existing data related to the physical and biological baseline conditions within the Study Area will be conducted. The participating resource agencies will provide the federally- and state-listed species and critical habitat in the Delta and their status. They will also provide each species life history and population dynamics. Stakeholders and other interested parties can submit pertinent information to the group for their review and inclusion in the baseline. This baseline will be used to determine how projects may affect biological resources and physical conditions, and whether there have been significant changes in habitat values and resources compared to historical conditions. The literature search will also identify data gaps to help prioritize the need for additional studies such as biological surveys or water quality monitoring.
2. Biological Surveys – Data gaps for biological resources identified in the previous component will be prioritized. Once prioritized, the Work Group will present a study design specific for the biological resource identified. These will then be distributed to the SRG to seek support and funding for completion. Once a survey/study is completed the Work Group will review the data and integrate it into the overall BA.
3. Evaluation of Impacts – In the interim of finalizing additional studies or surveys, preliminary environmental windows could be established for species with sufficient supporting data. This approach will need to be discussed and reviewed with the resource agencies as well as other regulatory agencies. Regardless of an interim approach, the final programmatic BA will evaluate the potential impacts from proposed dredging projects (e.g., maintenance dredging) to resources and provide biological windows when dredging and disposal may occur while still providing resource protection.

In order for this Work Group to be successful, staff participation from the following Delta LTMS stakeholders must occur:

- Corps (Sacramento and San Francisco Districts);
- USEPA;
- DWR;
- CBDA; and/or
- CVRWB.
- The Resource Agencies: Marine National Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game are critical participants in this process. Staff from these agencies must participate.
- Experienced staff participation and technical contributions from other agencies (State or Federal) or stakeholders would be beneficial to assist completing the proposed tasks.

The primary deliverables for this Work Group are expected to include:

- A list of species of concern, their life history and population dynamics;
- An environmental baseline for the Study Area (Delta);
- Proposed additional studies;
- BMP recommendations for use by the Permitting Review Work Group;
- Interim environmental windows; and
- A Final Programmatic Biological Assessment.

The Work Group chair will provide monthly updates in the form of progress memos or verbal updates at the IWG and/or SRG meetings. The Science Review Panel will be asked to review this information, as appropriate.

It is anticipated that, at a minimum, the Work Group will meet once a month to collaborate on achieving the tasks specified and addressing priority of short and long-term issues pertaining to the permitting process. Work Group participants should also anticipate a minimum of 10 hours a month to review, produce, or discuss documents relevant to the regional disposal and reuse alternative deliverables listed below.

3.1.2.4 Dredge Material Disposal and Reuse Alternatives Development Work Group

This Work Group will develop a list of current regional disposal sites, reuse alternatives and hypothetical project scenarios. The list will provide information on project types, sediment type and quality, volumes dredged, disposal allocations and disposal site capacities. Once this information is compiled and existing conditions are mapped out – typical and atypical project scenarios can be generated. This process will dovetail with the permitting process and may generate changes in the permitting application or testing to address standardization.

Proposed activities for the Regional Disposal and Reuse Alternatives Development Work Group shall include the following items:

- Review and summarize what alternatives currently exist for Delta projects and how often they are used;
- Determine how successful past projects have been;
- Review and evaluate alternatives from other regions for use in Delta;
- Assess recommendations for screening criteria and testing processes for reuse alternatives (See Testing Protocols);
- Identify end users and/or disposal sites for use in Delta;
- Evaluate and identify a centralized dredged material re-handling facility;
- If needed, identify improvements to existing alternatives;
- Identify long-term sediment management needs (i.e., capacity accommodations for increasing or decreasing volume of material of the next 50 years); and
- Develop a decision making policy and sediment management plan.

The members of this Work Group should use the information developed for the CALFED DDRS as a basis for beginning this evaluation and build upon it to reach consensus among the members for making recommendations to the Management Committee. Other key sources of information that should be considered include the following documents:

- Long-term management strategy (LTMS) for the placement of dredged material in the San Francisco Bay region. Management Plan 2001. Prepared by U.S. Environmental Protection Agency, Region IX; U. S. Army Corps of Engineers, San Francisco District; San Francisco Bay Conservation and Development Commission; and San Francisco Bay Regional Water Quality Control Board, California State Water Resources Control Board. San Francisco, CA.

- Contaminated Sediments Task Force, Los Angeles Region. Long-Term Management Strategy. Prepared for the CSTF by Anchor Environmental CA, L.P., Everest International Consultants, Inc., and AMEC Earth and Environmental, Inc.
- U.S .Environmental Protection Agency. 1994. ARCS Remediation Guidance Document. USEPA 905-B94-003. Chicago, Ill.: Great Lakes National Program Office.
- Northwest Sediment Evaluation Framework. Interim Final 2006. Prepared by Corps Seattle District, USEPA Region X, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, Idaho Department of Environmental Quality, National Marine Fisheries Service, U.S. Fish and Wildlife.

In order for this Work Group to be successful, staff participation from the following Delta LTMS stakeholders must occur:

- Corps (Sacramento and San Francisco Districts);
- USEPA;
- DWR;
- CBDA; and/or
- CVRWB.
- Experienced staff participation and technical contributions from other agencies (State or Federal) or stakeholders would be beneficial to assist completing the proposed tasks.

The primary deliverable for this Work Group will be a list of agency approved, cost effective, and technically feasible disposal and reuse alternatives for use with Delta dredging projects. Alternatives should be separated, as appropriate, by sub-region, and type of dredge scenario. Recommendations for additional study, if needed, would be developed by this Work Group and presented to the Management

Committee for approval and to assist in developing funding opportunities. The Science Review Panel will also review this information, as appropriate. The report will form the basis for the management alternatives evaluated in the EIR/EIS.

It is anticipated that at a minimum the Work Group will meet once a month to collaborate on achieving the tasks specified and addressing priority of short and long-term issues pertaining to the permitting process. Work Group participants should also anticipate a minimum of 10 hours a month to review, produce, or discuss documents relevant to the regional disposal and reuse alternative deliverables listed below.

3.1.3 Sediment Quality Database Development

A sediment quality database is being developed to assist in identifying and quantifying past and planned dredging activities for navigation, flood control, water conveyance, recreation, and other Delta functions. The goal of this task is to develop and document a database on sediment quality and populate it with data from the San Francisco Bay Delta. The database will be used for characterizing sediments in areas planned for dredging to assess quality and aid in selecting appropriate management approaches. Example management approaches include selection of potential material suitable for wetland creation, rehabilitation, and restoration; levee maintenance; and other dredge material beneficial re-use schemes. The database should also have the potential to support other possible purposes as well, including, but not limited to applied research.

The database will be prepared using: (1) data from the Corps which contains information prior to 2001 from Sacramento District which has already been compiled; (2) data the contractor (Exa) is in possession of for related projects; and (3) additional sources. Efforts will be focused on quality assurance of the existing pre-2001 data as well as compiling post-2001 data not already in the database. The work will incorporate the DDRS database compiled by CDFG in 2002. The work will also be coordinated with the State's Sediment Quality Objectives (SQOs) project conducted by the State Water Board to the extent possible, and related efforts conducted by the CVRWB, and other possible partners to be identified at a later time, to optimize these efforts and provide cost sharing efficiencies.

Data from the various sources may be in a variety of digital and hard copy formats. The type of data used should include sediment contamination, toxicity, benthic fauna, fish and tissue data as well as other incidentally collected water quality (dissolved oxygen, temperature at the time of data collections) or other data that may aid in understanding sediment quality and toxicity issues. The database documentation will include a description of the elements in the database and an evaluation of its contents will also be provided.

Documentation should answer questions such as:

- Which sediment contaminants were measured?
- What collection and analytical methods were used?
- Do the method detection limits meet QA/QC guidelines?
- Are toxicity test protocols using standard ASTM methods?
- Were appropriate laboratory methods used?
- Which species, tissue type, methods used, etc.?
- Which contaminants were measured?
- Where were samples taken?

The format of the database will be easily transferable to other database types and formats, including those that can be used across a web interface and easily convertible to GIS format with measurements as attributes. Further, the database will be structured such that new data may be added in a relatively straightforward manner. The database will be easily usable by a broad range of stakeholders, including the Corps, other Federal, State, and local agencies as well as non-governmental concerns. It is anticipated that in the future, data should be available in a web-based format requiring no specialized programs and/or cost for the typical end-user. Determining such structure will be an important part of the task and should be accomplished in part with input from the Corps.

Because the quantity and quality of data available are not clearly known, a first priority will involve documenting data sources. It is realized that the product to be produced is one which will be complete and usable as delivered, but may of necessity document steps required to incorporate data which could not be completely addressed due to logistic difficulties.

3.1.4 Develop Hypothetical Project Scenarios

The Disposal and Reuse Alternative Development TWG will lead in developing a series of hypothetical project scenarios as part of its mandate. Significant input will be required from all the Technical Work Groups, as well as the IWG and Management Committee members.

Hypothetical project scenarios consist of dredging projects that most (i.e., 75 percent or more) of the typical dredging projects in the Study Area. For example, one hypothetical scenario will likely be maintenance dredging of deep-water ship channels. This project scenario would then describe a "typical" project in terms of volume, material type, equipment, and disposal locations/issues. Once the project scenarios are developed, they become the critical element in forming the "project description" component of the LTMS EIS/EIR.

3.1.5 Identification and Evaluation of Management Alternatives

The Disposal and Reuse Alternative Development TWG will also be charged with the lead in developing a series of dredged material management alternatives (see 3.1.2.4) and evaluating them against a series of criteria, also to be developed by the group. All information developed by the work group will be presented to the IWG for comment and approval.

Example alternative evaluation criteria may include: short and long-term effectiveness, implementability, environmental impacts, environmental benefits, cost, and public acceptance. Based on these evaluations, a recommended decision framework should be developed for each hypothetical project scenario. These analyses and the decision framework will eventually form the basis of the technical evaluation in the LTMS EIS/EIR.

3.1.6 Development of a Programmatic EIS/EIR

Corps policy described in EC 1165-2-200 requires each Corps District to develop a dredged material management plan (DMMP) (or LTMS) for each harbor or jurisdiction to address dredged material management. This policy encourages the development of a range of feasible management alternatives that are cost effective and environmentally acceptable, use sound engineering techniques, and that optimize the beneficial reuse of dredged materials. The LTMS also ensures that sufficient confined disposal facilities and beneficial reuse opportunities are available for at least the next 20 years. A management plan is usually developed for an individual harbor; however, as part of the Delta LTMS program, the Corps is proposing to develop a master LTMS for the Study Area. The environmental documentation for the LTMS would take the form of a Programmatic EIS (PEIS).

The primary objective of this PEIS is to identify potential environmental impacts of the proposed LTMS on a regional basis. Components of the LTMS would summarize the future (20 years) disposal/management needs for the Region, the expected physical and chemical characteristics of the dredged material, the potential available reuse and disposal alternatives in the Region, and a strategy for evaluating and selecting the most appropriate management alternative given varying project scenarios. To accomplish this task, hypothetical project scenarios will be developed and evaluated by the technical work groups.

In order for this EIS/EIR and Sediment Management Plan to be completed, staff participation from the Corps of Engineers must include participation from the Regulatory, Real Estate, Planning, Engineering, and Programs and Project Management Functions. LTMS stakeholder agencies will provide comments on the draft and final documents, and the output of the TWGs is crucial to the EIS/EIR technical analyses (as described before). Comments will be solicited from all participating LTMS agencies and the public.

The primary deliverable will be the completed Programmatic EIS/EIR, which will be a key component of the Sediment Management Plan. It is anticipated that completion of the EIS/EIR will take between 12 and 18 months. Some of the specific subtasks for the Delta LTMS PEIS are described below.

3.1.6.1 Environmental Baseline Conditions

Development of the environmental baseline within the Delta is necessary for accurate evaluation of existing conditions and impacts of various alternatives. Baseline condition evaluations will include the general sediment characteristics of the region; water resources within the region; amounts and frequency of dredging; and a description of the environmental baseline for relevant NEPA/CEQA and Clean Water Act variables including all relevant aspects of the human and biological environment.

- *Sediment and Dredged Material Characteristics* – Will describe the typical characteristics of dredged material in the Study Area. Utilize the typical scenarios developed under the Hypothetical Project Scenarios Task (and Technical Work Group).
- *Biological Surveys* – The results of the Biological Assessment Work Group effort will be incorporated into an evaluation of biological resources in the region, and inform the evaluation of impacts.

3.1.6.2 Project Scenarios and Alternatives Development

The hypothetical project scenarios and management alternatives framework developed by that TWG will be the basis of the technical evaluation.

3.1.6.3 Technical Analyses

- *Real Estate Analyses/Report* – Conduct a baseline and with-project analysis of property values and potential for changes in property value resulting from potential dredging and discharge of dredged materials within the Study Area.
- *Air Quality Report* – Conduct a baseline and with-project analysis of air quality, including potential air quality impacts of dredging and discharges of dredged material at a programmatic level.
- *Cultural Resources Report* – Conduct an inventory level assessment of listed and eligible sites under the auspices of Section 106 of the National Historic Preservation Association (NHPA).
- *Geotechnical Investigation Report* – Conduct a qualitative geotechnical evaluation of the condition of levees and channels within the Study Area, consisting primarily of a detailed literature search and, possibly, new field assessments if deemed necessary by the technical working groups.

- *Hydrologic Investigation Report* – Conduct a hydrologic evaluation of the Sacramento and San Joaquin River systems.
- *Cost Estimates* – Evaluate costs associated with management alternatives presented and calculate B/C ratios.
- *Public Process Documentation* – Summarize public involvement, including progress meetings, agency coordination, NEPA/CEQA scoping, workshops, etc.

3.1.6.4 Impacts Analysis and Programmatic 404(b)(1) Evaluation

Based on the suite of management alternatives developed, baseline conditions identified, and technical analyses identified, conduct a NEPA/CEQA impacts evaluation and programmatic 404(b)(1) evaluation for each hypothetical dredging scenario. Discuss relative benefits and impacts of each management alternative for each hypothetical dredging scenario.

3.1.7 Sediment Management Plan Report Development

The results of the EIS/EIR will form the basis of the Sediment Management Plan, which will contain management level recommendations for hypothetical project scenarios and function as an Executive Summary of the process. This document will essentially become the long-term management strategy document for the Delta. It will summarize the entire development process, individual work products, stakeholder meetings, alternative development and evaluation process and conclusions made by the various committees. It is intended to be a living document that will be reviewed and updated though an adaptive management process.

3.2 Project Schedule and Task Relationships

Using the list of initial tasks presented in Section 3.1, and the LTMS developmental process flow chart presented in Figure 3-1, an example project schedule (Figure 3-2) was developed for each main task and key deliverable expected over the duration of the Delta LTMS Study. Where appropriate, task inter-relationships have been identified and mapped. The content and relationships presented in this figure are intended purely to describe the planned activities as of the time this Work Plan was prepared. This information will be updated frequently as additional details become available. In addition, the colors used in the figure are not of significance and are only intended to represent visual breaks in the tasks.

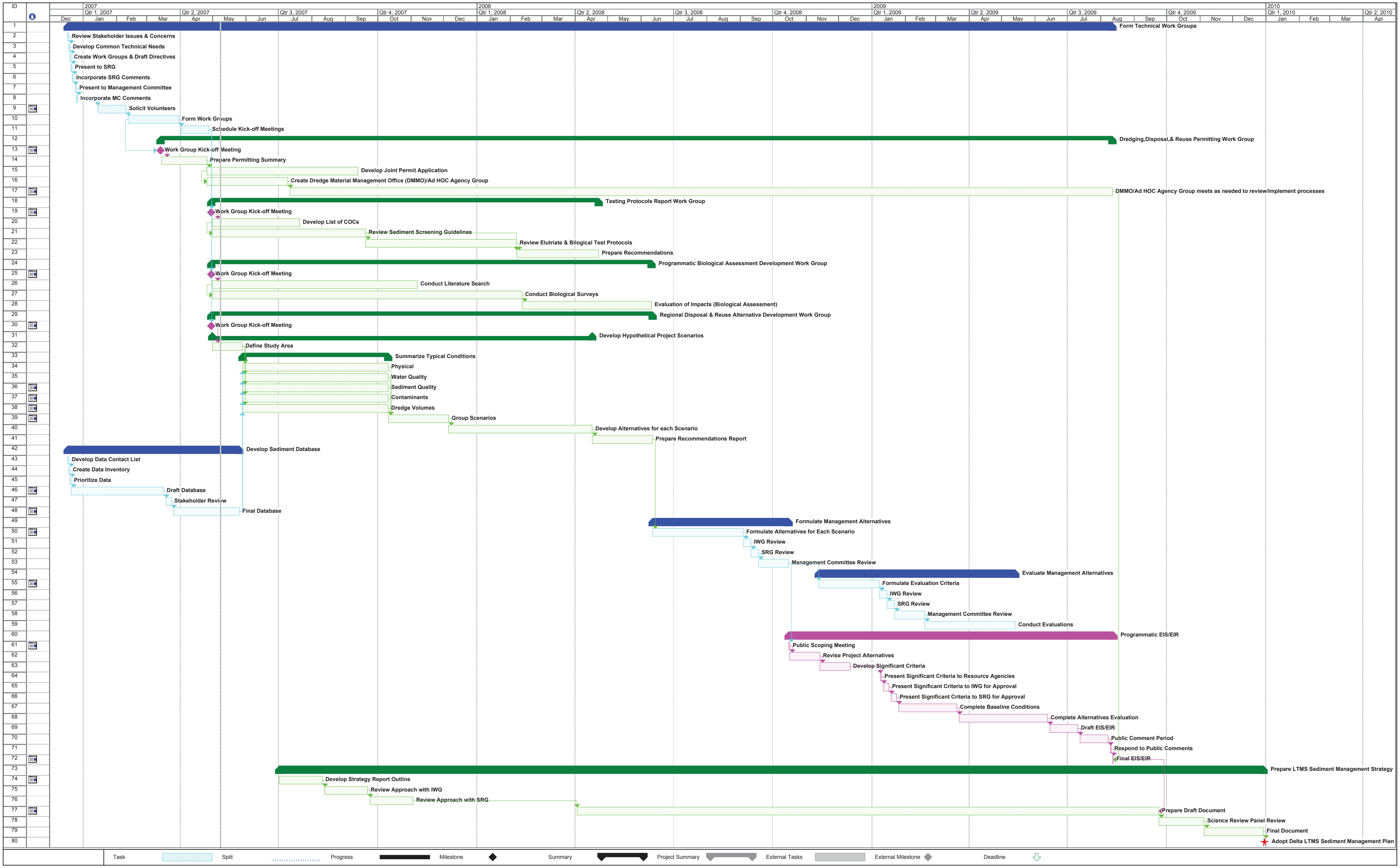


Figure 3-2
Delta LTMS Project Schedule
Management Committee Review Draft

3.3 Estimated Task Costs

Estimated project costs have been developed purely for planning level purposes based on assumptions developed for similar efforts conducted in San Francisco, Los Angeles, and Puget Sound (Table 3-1). When possible, cost estimates have been adjusted to match the estimated level of effort expected for Delta-specific investigations. These costs should not be used for anything other than to project an expected level of effort for each of the primary steps in the development process based on the assumptions currently available. More refined estimates will be prepared as additional details become available. While Table 3-1 presents line items for specific sub-tasks, cost estimates are only provided for higher level categories.

Table 3-1
Summary of Estimated Costs

Corps Work Level [1]/	Description	Federal costs	Non-Fed in-Kind	Total costs
1	**Delta LTMS Program**	---	---	---
5	**IWG meetings**	$150,000	$150,000	$300,000
5	**SRG meetings**	$200,000	$200,000	$400,000
5	**Formulation of Science Advisory Committee**	$200,000	---	$200,000
2	**Strategy Development Process**	$50,000	$25,000	$75,000
3	**Identify Issues of Concern and Responsible Working Groups**	---	---	---
5	*Finalize Issues of Concern*	$15,000	---	$15,000
5	*Formation of Working Groups*	$15,000	---	$15,000
5	Testing Protocols Working Group	$250,000	$150,000	$400,000
5	Biological Windows Working Group	$250,000	$150,000	$400,000
5	Permitting Working Group	$250,000	$150,000	$400,000
5	Regional Disposal and Reuse Alternatives Working Group	$250,000	$150,000	$400,000
4	*Testing Protocols Report*	$50,000	$25,000	$75,000
5	Formulate Working Committee	---	---	---
5	Literature Search	---	---	---
5	Evaluation of Procedures	---	---	---
5	Present Preliminary findings to IWG and SRG	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
4	*Programmatic Biological Opinion*	$250,000	$150,000	$400,000
5	Literature Search	---	---	---
5	Interagency Meetings with Resource Agencies	---	---	---
5	Biological Surveys	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
4	*Regulatory Permitting Process Report*	$300,000	$150,000	$450,000

Table 3-1
Summary of Estimated Costs
(continued)

Corps Work Level [1]/	Description	Federal costs	Non-Fed in-Kind	Total costs
5	Formation of Working Group	---	---	---
5	Lean Six Sigma Value Stream Analysis	---	---	---
5	Development of Draft Joint Permit Application	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
3	**Develop Hypothetical Project Scenarios**	$150,000	$150,000	$300,000
4	*Regional Disposal and Reuse Alternatives*	---	---	---
5	Sediment Database	---	---	---
5	Evaluate Delta Sediment Characteristics	---	---	---
5	Assess Reuse and Placement Capacities	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
3	**Development and Evaluation of Management Alternatives**	$250,000	$150,000	$400,000
4	*Management Alternatives Report*	---	---	---
5	Formation of Working Group	---	---	---
5	Correlate reports from previous Groups and Identify Alternatives	---	---	---
5	Evaluate Management Alternatives	---	---	---
5	Prioritize Management Alternatives	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
2	**EIR/EIS**	$750,000	$100,000	$850,000
4	*Environmental Baseline Conditions within the Delta*	---	---	---
4	*Sediment and Dredged Material Characteristics*	---	---	---
4	*Water and Groundwater Quality w/in Project Area*	---	---	---
4	*Biological Surveys*	---	---	---
4	*Environmental Control Measures for Dredging/Disposal*	---	---	---
4	*Policy level mitigation measures and alternative development*	---	---	---
5	Draft EIS/EIR Report	---	---	---
5	Final EIS/EIR Report	---	---	---
5	With Project Economic Evaluations	---	---	---
5	*Real estate Analyses/Report*	---	---	---
5	Baseline Conditions	---	---	---
4	With Project Economic Evaluations	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
5	*Air quality Report*	---	---	---
5	Baseline Conditions	---	---	---
4	With Project Evaluations	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
5	*Cultural Resources Report*	---	---	---
5	Baseline Conditions	---	---	---
4	With Project Evaluations	---	---	---

Table 3-1
Summary of Estimated Costs
(continued)

Corps Work Level [1]/	Description	Federal costs	Non-Fed in-Kind	Total costs
5	Draft Report	---	---	---
5	Final Report	---	---	---
5	*Geotechnical Investigation Report*	---	---	---
5	Literature Search	---	---	---
4	Levee Investigations	---	---	---
5	Channel Investigations	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
5	*Hydrological Investigation Report*	---	---	---
5	Literature Search	---	---	---
4	Sacramento and San Joaquin River Summary	---	---	---
5	Draft Report	---	---	---
5	Final Report	---	---	---
5	*Cost Estimates*	---	---	---
5	Appraisal of Management Alternatives	---	---	---
4	Appraisal of EIR/EIS (mitigation measures)	---	---	---
5	Appraisal of SMP (cost implications)	---	---	---
5	*Public Involvement Documents*	---	---	---
5	Progress Meetings	---	---	---
4	Coordination with Agencies	---	---	---
5	Public Workshops in Support of SMP Development	---	---	---
5	Public Meetings/CEQA – NEPA Scoping	---	---	---
5	Public Meeting SMP scoping	---	---	---
2	**Sediment Management Plan**	$800,000	$250,000	$1,050,000
5	Draft Plan	---	---	---
2	Final Plan	---	---	---
5	*Supervision and Administration*	---	---	---
5	Planning Division	---	---	---
4	Engineering Division	---	---	---
5	Contracting Division	---	---	---
5	*Technical Review of Documents*	---	---	---
5	Technical Review – Working Group Reports	---	---	---
4	Technical Review – EIR/EIS	---	---	---
5	Technical Review – SMP	---	---	---
5	Technical Review – PMP	---	---	---
5	*Programs and Project Management and Budget Documents*	---	---	---
5	PM to Support Working Groups	---	---	---
4	PM to Support IWG and SRG meetings	---	---	---
5	PM to Support EIR/EIS development	---	---	---
5	PM to Support SMP development	---	---	---
	Total of Federal and Non-Federal Work	**$4,340,000**	**$2,100,000**	**$6,440,000**

[1]/ "Corps work level" is a term used in the Project Management Plan to define task levels. It has been carried over to this document to maintain consistency.

3.4 Task Responsibility Assignment

Although is has not been determined exactly which LTMS stakeholder will execute each of the tasks identified in this Work Plan, the Corps has committed (pending appropriate budget allocation) to complete most of the main categories. As such, Table 3-2 presents a responsibility matrix that identifies which specific tasks the Corps expects to complete and which tasks other stakeholders will be responsible.

Table 3-2
Responsibility Assignment Matrix

Corps Work Level [2]/	Description	Federal	Non-Fed	Other
1	**Delta LTMS Program**	X		
5	IWG meetings	X		
5	PRG meetings	X		
5	Formulation of Science Advisory Committee	X		
2	**LTMS Sediment Management Strategy Development**	X	X	X
3	**Identify Issues of Concern and Responsible Working Groups**	X		
5	*Finalize Issues of Concern*	X		
5	*Formation of Working Groups*	X		
5	Testing Protocols Working Group	X	X	X
5	Biological Windows Working Group	X	X	X
5	Permitting Working Group	X	X	X
5	Regional Disposal and Reuse Alternatives Working Group	X	X	X
4	*Testing Protocols Report*	X	X	X
5	Formulate Working Committee	X	X	X
5	Literature Search		X	X
5	Evaluation of Procedures	X	X	X
5	Present Preliminary findings to IWG and PRG	X	X	X
5	Draft Report	X	X	X
5	Final Report	X	X	X
4	*Programmatic Biological Opinion*	X	X	X
5	Literature Search	X	X	X
5	Interagency Meetings with Resource Agencies	X	X	X
5	Biological Surveys	X	X	X
5	Draft Report	X	X	X
5	Final Report	X	X	X
4	*Regulatory Permitting Process Report*	X	X	X
5	Formation of Working Group	X	X	X
5	Development of Draft Joint Permit Application	X	X	X
5	Draft Report	X	X	X
5	Value Stream Analysis	X		
5	Final Report	X	X	X
3	**Develop Hypothetical Project Scenarios**	X		

Table 3-2
Responsibility Assignment Matrix
(continued)

Corps Work Level [2]/	Description	Federal	Non-Fed	Other
4	*Regional Disposal and Reuse Alternatives*	X	X	X
5	Sediment Database	X		
5	Evaluate Delta Sediment Characteristics	X	X	X
5	Assess Reuse and Placement Capacities	X	X	X
5	Draft Report	X	X	X
5	Final Report	X	X	X
3	**Development and Evaluation of Management Alternatives**	X		
4	*Management Alternatives Report*	X	X	X
5	Formation of Working Group	X		
5	Correlate reports from previous Groups and Identify Alternatives	X		
5	Evaluate Management Alternatives	X	X	X
5	Prioritize Management Alternatives	X	X	X
5	Draft Report	X	X	X
5	Final Report	X	X	X
2	**EIR/EIS**	X		
4	*Environmental Baseline Conditions within the Delta*	X	X	X
4	*Sediment and Dredged Material Characteristics*	X	X	X
4	*Water and Groundwater Quality w/in Project Area*	X	X	X
4	*Biological Surveys*	X	X	X
4	*Environmental Control Measures for Dredging/Disposal*	X		
4	*Policy level mitigation measures and alternative development*	X		
5	Draft EIS/EIR Report	X		
5	Final EIS/EIR Report	X		
5	With Project Economic Evaluations	X		
5	*Real Estate Analyses/Report*	X		
5	Baseline Conditions	X		
4	With Project Economic Evaluations	X		
5	Draft Report	X		
5	Final Report	X		
5	*Air quality Report*	X		
5	Baseline Conditions	X		
4	With Project Evaluations	X		
5	Draft Report	X		
5	Final Report	X		
5	*Cultural Resources Report*	X		
5	Baseline Conditions	X		
4	With Project Evaluations	X		
5	Draft Report	X		
5	Final Report	X		
5	*Geotechnical Investigation Report*	X		
5	Literature Search	X		

Table 3-2
Responsibility Assignment Matrix
(continued)

Corps Work Level [2]/	Description	Federal	Non-Fed	Other
4	Levee Investigations	X		
5	Channel Investigations	X		
5	Draft Report	X		
5	Final Report	X		
5	*Hydrological Investigation Report*	X		
5	Literature Search	X		
4	Sacramento and San Joaquin River Summary	X		
5	Draft Report	X		
5	Final Report	X		
5	*Cost Estimates*	X		
5	Appraisal of Management Alternatives	X		
4	Appraisal of EIR/EIS (mitigation measures)	X		
5	Appraisal of SMP (cost implications)	X		
5	*Public Involvement Documents*	X		
5	Progress Meetings	X		
4	Coordination with Agencies	X		
5	Public Workshops in Support of SMP Development	X		
5	Public Meetings/CEQA - NEPA Scoping	X		
5	Public Meeting SMP scoping	X		
2	**Sediment Management Plan**	X		
5	Draft Plan	X		
2	Final Plan	X		
5	*Supervision and Administration*	X		
5	Planning Division	X		
4	Engineering Division	X		
5	Contracting Division	X		
5	*Technical Review of Documents*	X		
5	Technical Review - Working Group Reports	X		
4	Technical Review - EIR/EIS	X		
5	Technical Review – SMP	X		
5	Technical Review – PMP	X		
5	*Programs and Project management and Budget Documents*	X		
5	PM to Support Working Groups	X		
4	PM to Support IWG and SRG meetings	X		
5	PM to Support EIR/EIS development	X		
5	PM to Support SMP development	X		
5	*Contingencies*	X		

[2]/ "Corps work level" is a term used in the Project Management Plan to define task levels. It has been carried over to this document to maintain consistency.

4 TECHNICAL QUALITY CONTROL PLAN

Maintaining strict quality control throughout the development of the Delta LTMS is critical to the entire agency stakeholder group. To assist in ensuring that all work products are of the highest scientific credibility, a technical quality control plan has been developed.

4.1 Quality Control Plan Objective

The overriding objective of the LTMS Quality Control (QC) Plan is to ensure that all project deliverables are scientifically reviewed at multiple levels to ensure not only their technical efficacy, but also their appropriate use within the development of the Delta LTMS work products. Achieving this QC Plan objective will be accomplished through internal contractor review, internal agency review with each of the IWG members, stakeholder review by the SRG members, and independent technical review by unaffiliated representatives. Sections 4.2 through 4.4 provide additional details on this process.

4.2 Guidelines Followed For Technical Review

The following guidelines will be observed for QC of Delta LTMS deliverables:

- Deliverables will be easily understood by the public and agency stakeholders, and be properly formatted and of professional quality;
- Deliverables will be scientifically accurate, i.e., unit conversions and measurements;
- Statements of fact will be supported based on peer reviewed literature, past agency studies, and the testimony of experts;
- Deliverables will contain accurate references to environmental regulations, and not propose or suggest processes that violate any regulation; and
- Deliverables will be reviewed at the appropriate level dependent on the task and responsible work group.

4.3 Document/Work Product Review Steps

All LTMS deliverables will be subject to QC Plan review. Deliverables include but are not limited to this Work Plan; all TWG deliverables; the EIS/EIR, including technical analyses/reports; sediment database; and the final Sediment Management Plan.

Table 4-1 provides a summary of the *minimum* review steps that must be conducted for each LTMS work product. It should be noted that this list is very conservative because there will likely be several levels of review conducted within each of the IWG member organizations that is not listed in the Table. For example, within the Corps, all primary deliverables/ work products will be reviewed by each branch assigned by the Corps' Project Manager within the San Francisco and Sacramento Districts (i.e., real estate, regulatory, planning, operations, project management, legal, construction, engineering, etc.).

Table 4-1
Minimum Technical Review Steps for Delta LTMS Work Products

Work Product/Function	Primary Review Team	Secondary Review Team
• Data Calculations	• 100% of all calculations by internal contractor review • Appropriate use in work product by contractor review	• IWG Review • Independent Technical Review team
• Database Entries	• See Section 4.3	• See Section 4.3
• Technical Studies Recommended/Conducted by TWGs	• Internal contractor review • IWG • SRG	• Independent Technical Review team
• Programmatic EIS/EIR	• Internal contractor review • IWG • SRG	• Independent Technical Review team • Management Committee • Executive Committee
• Final Sediment Management Plan	• Internal contractor review • IWG • SRG	• Independent Technical Review team • Management Committee • Executive Committee

The DREDGE Database was originally created in support of the Delta Dredging and Reuse Strategy (DDRS) document (CDFG 2002), and has been modified for use in the Delta. For every table in the DREDGE, the following checks were employed:

- The number of records were tracked – any deleted records were saved in a separate table and the reason for deletion stored;
- The uniqueness of the records were evaluated, and reason for duplicates were assessed;
- The relationships between that table and others were assessed to ensure that there were no orphan records (for example, chemistry records with no record in the sample table);

- Each field within each table was evaluated for gaps (nulls) – if possible these gaps were filled;
- Each table was evaluated for consistency among the fields within each study – details are provided below; and
- Unreasonable data was identified within possible limits, including sample depths, dates, locations, and results outside of statistical ranges – an effort was made to find the original data to check these data.

4.4 Deviations from the Approved Quality Control Plan

Any deviations from the QC Plan will be subject to the review and discretion of the IWG and/or Management Committee.

5 PUBLIC INVOLVEMENT AND COORDINATION

The LTMS group is designed to be transparent to the public and aggressive in promoting public involvement. A number of measures are/will be employed to ensure a successful public involvement process. Some of the key steps taken by the IWG members to ensure public involvement and coordination include:

- Creating an open format structure for monthly meetings held to update the project's progress and solicit stakeholder input;
- Creating a website (www.deltaltms.com) to provide status reports, meetings schedules, meeting notes and handouts, technical reports, contact information and links to other useful websites;
- Developing fact sheets and press releases when key milestones are met to inform the public of the project's status;
- Presenting routine updates and technical studies at regional and national conferences;
- Preparing a Programmatic EIS/EIR with all necessary NEPA/CEQA public involvement elements; and
- Seeking public comment on all technical and policy-related work products, as well as the Sediment Management Plan.

6 DELTA LTMS/SMP AGENCY IMPLEMENTATION STRATEGY

Implementation of the LTMS and SMP is expected to occur either through the development of a Sacramento Delta DMMO or, at a minimum, the development of an ad-hoc permitting agency review group. If created, the DMMO would utilize the LTMS and SMP as part of its mandate and, like in other regional DMMOs, would conduct annual review meetings to evaluate and update technical processes (e.g., biological and chemical testing protocols and screening criteria) and policy guidelines. If an actual Delta DMMO is not created, the individual permitting agencies should still plan to meet on a routine basis to review upcoming projects and discuss strategies for implementing and updating the SMP. This latter approach has been adopted successfully in Southern California by the Advisory Committee of the Los Angeles Regional Contaminated Sediments Task Force (http://www.coastal.ca.gov/sediment/sdindex.html).

7 REFERENCES

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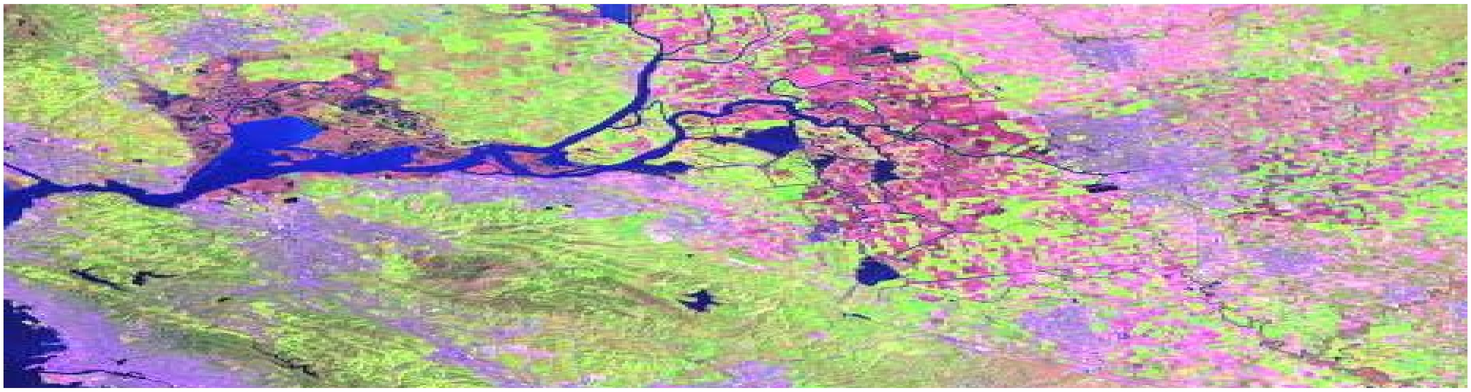
APPENDIX A

LTMS CHARTER AND FRAMEWORK

Long Term Management Strategy for Dredged Material in the Delta

(Delta LTMS)

PROCESS FRAMEWORK



Source: http://glovis.usgs.gov/

Long Term Management Strategy for Dredged Material in the Delta (Delta LTMS)

Process Framework

Pinole Shoal Management Study

November 2006

Delta LTMS Process Framework

1 Introduction and Background

The Delta estuary is the largest estuary on the West Coast. Covering more than 738,000 acres in five counties, it is a maze of tributaries, sloughs, and islands and a haven for plants and wildlife, supporting more than 750 plant and animal species, including more than 110 species listed as "species of concern." The Delta is critical to California's economy, supplying drinking water for two-thirds of Californians and irrigation water for more than 7 million acres of the most highly productive agricultural land in the world.

The Delta is also the hub of California's two largest water distribution systems – the Central Valley Project (CVP) operated by the U.S. Bureau of Reclamation (Reclamation) and the State Water Project (SWP) operated by the California Department of Water Resources (DWR). Maintaining high quality water in the Delta is critical for drinking water supplies, agricultural irrigation, and ecosystem function. More than 1,100 miles of levees protect the water conveyance functions, ecosystem, and land uses on Delta islands. The Sacramento and San Joaquin River channels also provide important shipping access to the Ports of Sacramento and Stockton.

In recent years, conflicts about levee rehabilitation, dredging, and placement of dredged sediments have been increasing. There is an ongoing need to explore alternatives and find solutions that will allow dredging of Delta channels for navigation, water conveyance, flood control, and levee maintenance, while, at the same time, protecting water quality and the ecosystem from levee work, dredging activities, and dredge material placement and reuse.

In the last several years, agencies, the public, political leaders, and the media have become increasingly concerned about the urgent need for levee rehabilitation in the Delta. One possible contributor to Delta levee rehabilitation is sediment management and reuse from dredging activities. At the same time, the Delta environment is showing signs of major stress and dysfunction, as evidenced by the rapid decline of pelagic species in recent years. Concerns about the complex and sensitive environment in the Delta necessitate stringent regulatory requirements for dredging and sediment reuse and placement in the Delta. These two apparently conflicting objectives, protection of the Delta environment and increased dredging and sediment reuse and placement, highlight the need for better coordination and management of Delta dredging and sediment management and reuse requirements.

In late 2004, local sponsors of Delta dredging projects and the U.S. Army Corps of Engineers (USACE) met to explore the feasibility of developing a long-term management strategy (LTMS) for dredging and dredged material placement or reuse in the Delta under the authority of the Pinole Shoal Management Study. The LTMS process was used successfully to develop a collaborative, coordinated approach to dredging and sediment management in San Francisco Bay.

In 2005, the USACE worked with stakeholders including other federal and state agencies to define a cooperative, collaborative, and operational approach to address the problems, challenges, and opportunities related to levee work, dredging, and placement in the Delta. This Process Framework is the result of those discussions.

This document describes the initial framework for the Delta LTMS, including the following:

- Study purpose, goals, and objectives
- Structure, participants, and roles

- Authorities and decision making
- Related programs
- Study activities and phases

This framework is intended to describe the overall purpose and structure of the process so participating agencies can confirm the purpose, participation, and resources for the Delta LTMS. As with any cooperative planning process, the framework will be refined as participation increases and implementation proceeds.

To address these concerns, the U.S. Army Corps of Engineers began working with four other federal and state agencies: U.S. Environmental Protection Agency (USEPA), the California Department of Water Resources (DWR), the Resources Agency, CALFED Bay-Delta Program (CALFED), and the California Regional Water Quality Control Board, Central Valley Region (CVWQCB). These five agencies drafted this initial Process Framework to describe a cooperative approach for developing an LTMS for Delta dredging.

2 Study Purpose

2.1 Problems, Challenges, and Opportunities

The Delta plays a critical role in a number of fronts bringing unique challenges and opportunities in establishment of a Long Term Management Strategy. These challenges and opportunities are in areas of management of sediment, ecosystem integrity, water conveyance, water quality and supply, navigation, recreation, flood control, and agriculture. The following is a brief description of these challenges and opportunities as they relate to the Delta:

Dredging – Dredging in the Delta is a critical activity for maintaining the important functions of the Delta – levee stability, flood control, navigation, ecosystem quality, water supply, and recreation. Dredging activities vary in size from small marina dredging projects to major channel deepening. There is no comprehensive planning for dredging in the Delta to determine the dredging and placement needs, potential beneficial uses of dredged material, or placement sites. In the last ten years, increasing concerns about the potential impacts of dredging on fisheries, habitat, and surface and ground water quality have resulted in greater restrictions on dredging operations and the placement or reuse of dredged material. Today, the complexity of the regulatory permit process for the Delta is viewed by dredging proponents as a major contributor to escalating project costs and lengthy study and review processes by those conducting dredging projects small and large. Delta dredging could support or harm the critical Delta features described below, including the ecosystem, levees, navigation, recreation, water quality, and water supply.

Ecosystem – The Delta ecosystem is the largest estuarine ecosystem on the west coast. It supports more than 750 plant and animal species. There are more than 110 species of fish, plants, animals, and birds in the Delta that are listed by state and federal agencies as "species of concern." For the past ten years, state and federal resource agencies have focused hundreds of millions of dollars on ecosystem restoration projects to protect and enhance the ecosystem functions. In spite of those efforts, there are indications that much more needs to be done. For example, in the last several years, populations of pelagic fish have dropped precipitously.

Continued protection and enhancement of the Delta ecosystem and threatened and endangered species is necessary.

Levees – Delta levees are the most important infrastructure in the Delta. More than 1,100 miles of levees protect thousands of acres of homes and farmland, protect and provide important habitat, and convey fresh water supplies through the Delta for agriculture, municipal, and industrial water supplies. Approximately 410,000 people live in communities of the Delta protected by levees. The Delta levee system is at risk of chronic and catastrophic failure as a result of deferred maintenance, earthquake, or flood. The consequences of major levee failure in the Delta are potentially devastating for water quality, water supply, the ecosystem, and local property and economic activity.

Navigation – The Delta is also a transportation corridor for access to deep water ports in Stockton and Sacramento. Two federally authorized shipping channels exist in the Delta, the Sacramento Deep Water Channel and the Stockton Deep Water Channel. These channels provide access to foreign markets for Central Valley exports such as sulfur, rice and wheat, and imported goods such as cement, fertilizer, and steel. In 2004, more than 325 ships and barges transported nearly 3 million tons of goods through the ports. Without regular maintenance, the deep water channels fill with silt and debris, reducing access by ship traffic.

Recreation – Delta channels are an important recreation resource for the region. As cited in the 1998 Economic Impact of Regional Boating and Fishing in the Delta, boating and fishing recreation accounted for over $378 million in annual expenditures. The Delta boasts more than 100 marinas and waterside resorts, parks, and campgrounds, and more than 50 boat launching facilities. Protecting and enhancing the Delta fish populations and dredging to maintain marina access are high priority goals for recreation in the Delta.

Water Conveyance and Supply – The Delta provides fresh water for more than 23 million Californians and 7 million acres of the most highly productive farmland in the world. Delta channels and sloughs convey water from the major river systems to intake pumps throughout the Delta. The amount and quality of water diverted from the Delta is influenced by hydrology, water operations, and other activities in the Delta. Continued protection of the water supply system is critical for public health and the economy of California.

Water Quality – The waters of the Delta provide for several diverse, and sometimes conflicting, beneficial uses, including drinking water, habitat, irrigation, and recreation. The natural actions of an estuary, where fresh and salt water meet, pose substantial challenges in serving these beneficial uses. These challenges are made even greater by the human activities that channel, move, divert, and return water to the Delta. Protecting and enhancing water quality for all beneficial uses is critical for public health, recreation, and the sustained health of the Delta ecosystem.

2.2 Study Purpose Statement

As a result of these challenges, the five initial agencies, referred to as the Interagency Working Group (IWG) (USACE, USEPA, DWR, CALFED, and CVWQCB) have agreed to examine Delta dredging, reuse, and placement needs and explore ways to operationally improve the regulatory approval process for dredging in the Delta. The agencies seek to coordinate dredging planning and dredged material management in ways that protect and enhance the Delta environment and water quality. The agencies recognize the importance of dredging projects and the need to explore the beneficial use of dredged material to stabilize levees, maintain and improve navigation channels, support ecosystem restoration, and maintain water supply and water quality. With these needs in mind, the agencies have drafted the following three-part project purpose statement:

1. The Delta LTMS will examine and coordinate dredging needs and sediment management in the Delta to maintain and improve channel function (navigation, water conveyance, flood control, and recreation), levee rehabilitation, and ecosystem restoration, and the beneficial use of dredged material.
2. Agencies and stakeholders will work cooperatively to develop a management plan that is based on sound science and protective of the ecosystem, water supply, and water quality functions of the Delta.
3. As part of this effort, the Delta LTMS will consider regulatory process improvements for dredging and dredged material management so that project evaluation is coordinated, efficient, timely, and protective of Delta resources.

3 Goals & Objectives

3.1 Study Goals

There are four overarching goals of the Delta LTMS. These four goals represent the benefits to be achieved from a coordinated sediment material management program and an improved dredging approval process:

- Manage sediment, including exploring the beneficial reuse of dredged material, to maintain and stabilize Delta levees that protect land-based activities and water conveyance
- Manage dredging activities and beneficial reuse to protect and enhance water quality for Delta water supply and ecosystem function
- Manage dredging activities to support and maintain Delta channel functions for navigation, flood control, water conveyance, and recreation
- Manage dredging activities and beneficial reuse to protect and enhance aquatic, wetland, and terrestrial ecosystems

3.2 Study Objectives

To achieve these goals, the Delta LTMS intends to improve coordination, planning, and approvals of Delta dredging activities and sediment management to achieve these specific objectives:

- Improve operational efficiency through the coordination and cooperation among agencies with dredging management responsibilities or regulatory authority over dredging activities
- Protect surface and groundwater quality

- Protect fish species and habitat
- Study the beneficial use of dredged material for levee stabilization or other uses
- Support ecosystem restoration activities in the Delta
- Support cost-effective dredging activities

4 Structure, Participants, and Roles

The Delta LTMS is organized to include an executive committee, management committee, interagency working group, strategy review group, science and technical work groups, and a science review panel as described in this section. In addition, public meetings are held to provide additional opportunities for input and feedback from interested parties.

4.1 Executive Committee

At the top level, an Executive Committee directs the overall program, sets policy direction, and provides oversight of the study. Subject to their approvals, the directors of each of the following agencies serve on the Executive Committee. The executive managers have the decision-making authority to represent the agency on the strategic and regulatory issues to be addressed. The agency Executive Committee generally meets annually or as necessary to establish guidance for the study and keep abreast of the progress of the Delta LTMS.

Federal Agencies

- U.S. Army Corps of Engineers, Commander, South Pacific Division
- U.S. Environmental Protection Agency, Regional Administrator, Region 9

State Agencies

- State Water Resources Control Board, Board member
- California Regional Water Quality Control Board, Central Valley Region, Chairperson
- California Department of Water Resources, Director
- Resources Agency, CALFED Bay-Delta Program, Director
- Delta Protection Commission, Chairperson

4.2 Management Committee

The Management Committee consists of the deputy-level managers for the state and federal agencies. The Management Committee oversees the work of the Interagency Working Group (IWG) and the Strategy Review Group, reviews recommendations, study plans, budget proposals, and provides recommendations to the Executive Committee. The Management Committee generally meets quarterly. Subject to their approvals, members of the Management Committee are:

- U.S. Army Corps of Engineers, District Commander, San Francisco District
- U.S. Army Corps of Engineers, District Commander, Sacramento District
- California Department of Water Resources, Deputy Director, Public Safety
- U.S. Environmental Protection Agency, Associate Director, Water Division, Region 9
- Resources Agency, CALFED Bay-Delta Program, Chief Deputy Director
- State Water Resources Control Board, Executive Director

- California Regional Water Quality Control Board, Central Valley Region, Executive Officer
- Delta Protection Commission, Executive Director
- NOAA Fisheries, Southwest Region
- U.S Fish and Wildlife Service, Pacific Region
- California Department of Fish and Game

4.3 Interagency Working Group

The Interagency Working Group (IWG) includes program-level staff at five agencies. The IWG serves as the primary program managers of the Delta LTMS process and steering committee for the Strategy Review Group. The IWG coordinates with the Management Committee, the Strategy Review Group and others with an interest in Delta activities and the LTMS process. The IWG's role is to identify study issues and questions to be addressed such as: identify technical work groups and expert resources, confirm purpose, charter, and assignments for the science review panel and technical work groups, discuss and review study work plans and scopes, discuss and review study budgets and resource needs, prepare and approve study reports, and develop management and strategic options for the Management and Executive Committees. Subject to their approvals, the members of the IWG consist of the following:

- U.S. Environmental Protection Agency
- U.S. Army Corps of Engineers
- California Regional Water Quality Control Board, Central Valley Region
- Resources Agency, CALFED Bay-Delta Program
- California Department of Water Resources

The Management Committee may identify other participants in the IWG.

4.4 Strategy Review Group

Delta LTMS activities are informed by the Strategy Review Group. The Strategy Review Group will consist of Interagency Work Group members and other interested governmental agencies. The meetings will be open to the public with an opportunity for interested individuals to participate. The Interagency Work Group agencies will invite stakeholders, and interest groups, and individuals working in or affected by Delta dredging and beneficial use activities for navigation, levee stability, flood control, water quality, or ecosystem restoration. The Interagency Working Group coordinates meetings monthly or as needed with the Strategy Review Group to identify, review, and discuss: 1) the Delta sediment issues of concern to be addressed by the Delta LTMS and in what order, 2) lines of inquiry that the science and technical work groups (described below) will be tasked to pursue, 3) coordinated regulatory approach for Delta dredging to be approved by the Executive Committee.

Members of the Strategy Review Group may also provide public comment at the Management and Executive Committee meetings. Subject to their approvals, the Strategy Review Group may include, but is not limited to the following agencies:

State and Federal Agencies

- NOAA Fisheries, Southwest Region
- U.S. Fish & Wildlife Service, Pacific Region

- California Department of Fish & Game
- Delta Protection Commission
- State Lands Commission
- Reclamation Board

In addition, members of the public will be invited to participate in the meetings of the Strategy Review Group, including, but not limited to, the following groups:

Local/Regional Agencies

- Reclamation Districts
- Contra Costa, Sacramento, Solano, Yolo, and San Joaquin Counties
- North, Central, and South Delta Water Agencies

Stakeholders and Interest Groups

- The Ports of Sacramento and Stockton
- Bay Planning Coalition
- DeltaKeeper
- The Nature Conservancy
- The Bay Institute
- Environmental Water Caucus
- California Sportfishing Protection Alliance
- California Farm Bureau Federation
- State Water Contractors
- California Delta Chambers

4.5 Science and Technical Work Groups

The Management Committee will establish specific science and technical work groups to address Delta LTMS issues. The science and technical work groups will consist of agency staff with expertise in the relevant subject areas. Technical work groups are open to interested participants from any agency, interest group, or the public. With the direction and approval of the Management Committee, technical work groups identify study needs, develop study scopes and work plans, identify resources, and review results and conclusions. The Management Committee identifies the leader for each technical group. Some example science and technical work groups include the following:

- **Testing Protocols** – examining the appropriate procedures for testing dredged material
- **Soil and Sediment Studies** – characterizing the quality of sediments and soils in the Delta
- **Permitting Process** – identifying the regulatory approval process and opportunities for improved coordination
- **Placement and Reuse** – identifying criteria, methods, and locations for dredged material placement and reuse

These groups will be formed as determined by the Management Committee.

4.6 Science Review Panel

The Management Committee establishes a Science Review Panel made up of independent scientists. The purpose of the Science Review Panel is to provide an independent science review process for Delta LTMS studies. The Management Committee approves the leader and participants for the Science Review Panel. The Science Review Panel will evaluate existing information, identify gaps, and review results and conclusions.

4.7 Other Stakeholders/Interested Public

Other interested parties have the opportunity to learn about the Delta LTMS process and activities and to comment on them at public meetings to be held on an as needed basis, at project milestones.

5 Authorities and Decision Making

A number of state and federal agencies regulate dredging and dredged material management in the Delta. Different laws and regulations govern their roles and responsibilities, but often their purposes and goals overlap. The following summarizes the agency responsibilities for dredging, water quality, natural resources, levees, and land use. One of the early Study activities will be to document the planning, regulatory, and implementation responsibilities for Delta dredging in order to improve coordination and operational efficiency among the various Federal, State, and local agencies having jurisdictional responsibilities within the Delta. As noted in the Delta LTMS Charter, participating regulatory agencies retain their full authority to regulate dredging, reuse, and disposal activities, and nothing in the Charter or the Delta LTMS Framework shall restrict their authorities. Signatories to the Charter do not indicate their approval for any specific project that may be proposed in the future.

5.1 Dredging

The primary state and federal agencies involved in planning and permitting dredging projects are the U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (USEPA), California Regional Water Quality Control Board, Central Valley Region (CVWQCB) and the State Lands Commission (SLC).

5.2 Water Quality

The primary agencies with responsibility for overseeing compliance with water quality laws and regulations are the U.S. Environmental Protection Agency, the State Water Resources Control Board, and the California Regional Water Quality Control Board, Central Valley Region.

5.3 Natural Resources

Dredging and placement actions in the Delta will involve the review and approval by state and federal resource agencies, including the U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), and the state Department of Fish & Game (DFG).

5.4 Levees

If the placement of dredge material involves levees in the Delta, the USACE, the Department of Water Resources, the California Reclamation Board, and the individual Reclamation Districts have responsibilities and authorities for planning, reviewing and approving levee maintenance and dredged material placement.

5.5 Land Use

The Delta Protection Commission has regional planning and coordination responsibilities in the Delta to protect and enhance agriculture, wildlife habitat, and recreation. Five counties (Contra Costa, San Joaquin, Solano, Sacramento, and Yolo), three Councils of Government, and several cities have land use planning authority in the Delta.

6 Study Activities and Phases

The Delta LTMS will generally combine two parallel approaches – a management approach and a planning approach. These activities are designed to comply with USACE guidance for Long-Term Management Strategies and Dredged Material Management Plans, while at the same time allowing flexibility to consider and incorporate planning and evaluation activities from other federal and non-federal partners. In the near-term, these activities will focus on identifying and addressing the immediate challenges associated with dredging and protecting the Delta's resources. In the long-term, these activities will improve the scientific understanding of the effects of dredging and measures to protect Delta resources and develop a Sediment Management Plan to coordinate dredging planning, dredge material placement and reuse, and the permitting process.

6.1 Management Approach

The management approach for the Delta LTMS is designed as an iterative approach to identify and address priority issues and needs related to Delta dredging and levee rehabilitation. The iterative approach proceeds through five activities. Stakeholders and the public will provide review and input during all activities.

1. **Assessment** – During the Assessment stage, the agencies will identify and prioritize dredging and dredged material management needs, opportunities and constraints, the regulatory approval process, and study and analysis needs.

2. **Research and Analysis** – During the Research and Analysis stage, the agencies will define and implement focused research and policy analysis activities to collect and evaluate information that will assist the Management Committee and the Agency Executive Committee address the priority issues and needs.

3. **Planning** – During the Planning stage, the agencies will develop and evaluate options to address the priority issues and needs related to sediment management, beneficial reuse, and regulatory process improvements.

4. **Implementation** – The Implementation stage will include the activities necessary to implement the actions identified during the planning activities.

5. **Evaluation and Refinement** – During the final stage, the agencies will review and evaluate the performance of the implemented actions. The evaluation results will be reported to

the Agency Executive Committee and stakeholders and used to prioritize activities for the next iteration of the management approach.

6.2 Planning Approach

In parallel with the iterative management approach to priority issues associated with Delta dredging, the Delta LTMS will proceed through five planning phases leading to a long-term Sediment Management Plan. These planning phases are consistent with federal planning guidelines.

Phase 1 – Evaluate Management Options – Establish goals, objectives, geographic scope, and operational boundaries. Forecast dredging requirements, material characteristics placement site capacities, and reuse and placement needs.

Phase 2 – Formulate LTMS Alternatives – Develop and retain all viable long-term management options that meet study goals and objectives.

Phase 3 – Alternatives Analysis – Complete a comparative assessment that weighs and balances engineering, economic, and environmental factors and benefits.

Phase 4 – LTMS Implementation – Develop and implement plan, including environmental documentation, permits, and mitigation requirements.

Phase 5 – Review and Update LTMS – Conduct periodic reevaluation of regulatory, economic, and environmental conditions and identify updates to the Delta LTMS.

6.3 Initial Issues and Topics

The following is an initial list of issues and topics planned for the Delta LTMS:

- **Regulatory Process** –Document the regulatory approval process for dredging activities and beneficial use of dredged material and identify opportunities for improved coordination.
- **Dredging Activities and Quantities** – Identify and quantify planned dredging activities for navigation, flood control, water conveyance, recreation, and other Delta functions.
- **Reuse and Placement Capacity** – Identify and quantify sediment reuse needs, sediment sources, and on-going long-term placement capacity.
- **Testing Protocols** – Identify and conduct research on evaluation of dredged material testing protocols for beneficial use of dredged sediment in the Delta.
- **Sediment Quality** – Develop and implement research on sediment quality in likely areas for dredging.
- **Emergency Procedures** – Identify existing responsibilities and procedures for response to emergency conditions in the Delta (e.g., levee failure or flooding).

7 Summary

The structure and process for the Delta Long-Term Management Strategy described in this document are designed to establish a collaborative framework to examine Delta dredging, beneficial use of dredged sediment for levee reconstruction and ecosystem restoration, and other placement needs and explore ways to operationally improve the regulatory approval process for dredging in the Delta in ways that protect and enhance the Delta environment and water quality.

In this document, the following was detailed: 1) purpose, 2) goals and objectives, 3) structure, participants and roles of committees and working groups, 4) authorities and decision making processes, and 5) study activities and phases for the Delta LTMS process. When taken together, these framework components will enable participants to shape and implement a Delta LTMS work plan and, ultimately, a Delta sediment management plan that may include dredging projects to stabilize levees, maintain and improve navigation channels, support ecosystem restoration, and maintain water supply and water quality. The immediate next steps include development of a project management plan and work plan, as well as preparing a detailed scope of work for development of the Sediment Management Plan.

Appendix A –
Related Programs

The Bay-Delta is an interconnected system that affects and is affected by numerous projects and programs related to levees, navigation, water supply, ecosystem restoration, land development, and recreation. The following is a list of the major programs in each of these areas that will influence or relate to the Delta LTMS.

Multi-Purpose Programs

Delta Vision Process—State-led effort to encompass and integrate many ongoing but separate planning activities for the Delta and Suisan Bay/Marsh that will assess risks and prepare a contingency and emergency response plan for near-term catastrophic events. Will develop a long-term Delta Vision for sustainable management of the Delta's multiple uses, resources and ecosystem in cooperation with elected officials, government agencies, stakeholders, academia, and affected California communities.

Delta Improvement Program – As part of the CALFED Bay-Delta Program, DWR, the federal Bureau of Reclamation (USBR), and the Central Valley Project (CVP)/State Water Project (SWP) water contractors have proposed a program to improve integration of SWP/CVP operations and Delta facilities included in the CALFED Record of Decision (ROD). The program seeks to coordinate the South Delta Improvements Program (SDIP), CVP/SWP Intertie, and the Operations and Criteria Plan (OCAP) schedules, which support continuing the Environmental Water Account and define operational rules for the Banks Pumping Plant and the CVP/SWP Intertie.

South Delta Improvements Program – DWR and USBR are responsible for implementing CALFED's South Delta Improvements Program. Activities include providing for more reliable long-term export capability by the state and federal water projects, protecting local diversions, and reducing impacts on San Joaquin River salmon. Specifically, the CALFED actions in the SDIP include consideration of placement of an operable gate at the head of Old River to protect salmon, up to three operable gates in south Delta channels, dredging and extension of some agricultural diversions, and increasing diversion capability of Clifton Court Forebay.

North Delta Improvement Program – Operated as part of the CALFED Bay-Delta Improvement Projects, the purpose of the North Delta Flood Control and Ecosystem Restoration Project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. The additional objectives include:

- Improve Water Supply Reliability for Conveyance
- Improve Water Quality for Conveyance
- Recommend Ecosystem Restoration and Science Actions
- Improve Levee Stability
- Improve and Enhance Recreation

Delta Protection Commission Land Use and Resource Management Plan—Adopted in November 1995 and reprinted in 2002, the DPC Land Use and Resource Management Plan includes findings, policies, and recommendations for maintaining and improving Delta resources in eight areas: environment; utilities and infrastructure; land use; agriculture; water; recreation and access; levees; and marine patrol, boater education, and safety programs.

Dredging

National Dredging Team – The Army Corps of Engineers and the U.S. EPA are co-chairs of the National Dredging Team (NDT). The NDT was established in 1995 to support implementation of the National Dredging Policy, promote national and regional consistency on dredging issues, and provide a mechanism for issue resolution and information exchange among Federal, State, and local agencies and stakeholders. This policy calls for establishing Regional Dredging Teams and Local Planning Groups to coordinate dredging activities and permitting. The Delta LTMS could function as one or both of these groups under the National Dredging Policy.

Delta Dredging and Reuse Strategy – The Delta Dredging Reuse Strategy (June 20, 2002, Central Valley Regional Water Quality Control Board) analyzed the regulatory and technical considerations for contaminants in dredged material, particularly for the Regional Board's review of dredging projects. The technical analysis focused mainly on upland placement and beneficial use. The recommendations include identification of information gaps, recommendations for permit streamlining, and recommendations for interim screening values and test methods that may be used by Regional Board staff in future General Order Waste Placement Requirements or to assess future projects.

San Francisco Bay LTMS – Beginning in 1994, the USACE, USEPA, the SWRCB, the San Francisco Bay Regional Water Quality Control Board, the Bay Conservation and Development Commission (BCDC) and other agencies began developing a Long-term Management Strategy for dredging in the San Francisco Bay. This program provides useful guidance and experience for implementing the Delta LTMS.

Levees

CALFED Levees Program – The purpose of the CALFED Levees Program is to facilitate levee system integrity to protect water supplies needed for the environment, agriculture, and urban uses by reducing the threat of levee failure and seawater intrusion. This involves collaboration between CALFED, DWR, the Department of Fish and Game, USACE, and the Reclamation Board, and numerous local reclamation districts. The CALFED Authorization Act (108-361) provided further direction on the development and implementation of the Levee Stability and Improvement Program.

Delta Risk Management Study (DRMS) – This is a multi-year program to evaluate the ongoing and future risk of levee failure and to develop a set of alternative risk reduction plans to mitigate the consequences of levee failures. DWR has an ongoing program to reuse dredged material for Delta levee construction. Because levee construction material is in such short supply in the Delta, the primary issue for DWR associated with dredging activities is the long-term viability of this beneficial reuse program while protecting the beneficial uses of the waters of the State.

Navigation

San Francisco to Stockton Ship Channel Deepening – The San Francisco District of the Army Corps of Engineers is managing the planning process for deepening the channel from Stockton to San Francisco to accommodate larger ships of varying commodities.

Sacramento Ship Channel Deepening – Proposed improvements call for deepening the existing 300-ft- wide project from 30 to 35 ft from Sacramento River miles 12 to 20.

Water Quality

Regional Board TMDLs – The California Regional Water Quality Control Board, Central Valley Region is working on four Total Maximum Daily Load (TMDL) studies to address Delta water quality problems related to mercury, salinity, dissolved oxygen, diazinon, and chlorpyrifos. The mercury, diazinon and chlorpyrifos TMDLs are being developed. The salinity and dissolved oxygen TMDLs have been adopted by the Board and are undergoing the approval process with the State Water Resources Control Board and the Office of Administrative Law. The diazinon and chlorpyrifos TMDLs will go to the Board in June.

Stockton Dissolved Oxygen Project – A large stakeholder-driven process to find a regional solution to the seasonal dissolved oxygen depression that occurs in the San Joaquin River. Low dissolved oxygen levels can be harmful to resident aquatic life and can delay the fall salmon migration in the river. The organizational structure for the project includes several oversight committees and diverse stakeholders, including the regional water board, local governments and agencies, and state and federal agencies.

Bay-Delta Basin Plan Update – The State Water Resources Control Board has adopted a Triennial Review staff report with a commitment to review baseline monitoring, aquatic life protection, chloride objectives, flow objectives, export limits and electrical conductivity objectives, among others, over the next decade. The California Regional Water Quality Control Board, Central Valley Region also has a Water Quality Control Plan for the Sacramento River and San Joaquin River Basins with objectives for salt and other constituents in the Delta.

State Water Resources Control Board Sediment Management Program – The State Board is managing a program to characterize and manage Delta sediments to improve water quality.

Ecosystem Restoration

CALFED Ecosystem Restoration Program – One of CALFED's program elements, the Ecosystem Restoration Program is designed to protect and restore aquatic, upland and riparian habitats, fish populations and other native species in the Delta.

CA Aquatic Invasive Species Management Plan—Document that lays out a process by which agencies would coordinate to implement control programs for aquatic invasive species. Draft plan was released in August 2006 by Dr. Karen McDowell of the San Francisco Estuary Project.

Bay-Delta Conservation Plan— Applicant-driven effort to provide for the conservation and management of aquatic species and regulatory assurances related to water supply reliability and water quality.

Local Entity HCP Programs— Local Habitat Conservation Plans (HCPs) are mater plans with the key purpose of balancing the need to conserve habitat for wildlife while accommodating growth for an expanding population. An example is the San Joaquin County Multi-Species

Habitat Conservation and Open Space Plan (SJMSCP), which has been in existence since 2001 covering 97 species with San Joaquin County.

Land Use

County and City General Plans – A city or county's basic planning document. It provides the blueprint for development throughout the community by addressing all aspects of development, including housing, traffic, natural resources, open space, safety, land uses, and public facilities.

DPC Appeal Authority—Any person who is aggrieved by any action taken by a local government or other local agency in implementing the Delta Protection Commission's Land Use and Resource Management Plan for the Primary Zone of the Delta may file an appeal with the Commission.

Recreation

Delta Trail – State Senator Tom Torlakson has proposed a five-county trail network through the Delta that would stretch from the Bay Area to the heart of the Great Central Valley. The trail planning would be coordinated with levee improvement activities.

State Parks Central Valley Vision— California State Parks effort that began in 2003 analyzing gaps in park and recreational lands and services, specifically in the Central Valley. In 2005 State Parks held over three dozen meetings and with significant public input identified short-term actions to pursue over the next five years.

Other

Irrigated Lands Program – In July 2003, the California Regional Water Quality Control Board, Central Valley Region adopted a resolution which sets forth two Conditional Waivers of Waste Discharge Requirements (WDRs) for discharges of waste to surface water from irrigated lands. One Irrigated Lands Conditional Waiver is for Coalition Groups, the other is for individual Dischargers. The California Regional Water Quality Control Board, Central Valley Region also developed Monitoring and Reporting Program Plans for Coalition Groups, and Individual Dischargers. The Regional Board is in the process of adopting a new waiver.

Long Term Management Strategy for Dredged Material in the Delta

(Delta LTMS)

CHARTER

COPY

Long Term Management Strategy for Dredged Material in the Delta

(Delta LTMS)

CHARTER

VISION

The Long Term Management Strategy is designed to improve operational efficiency and coordination of the collective and individual agency decision making responsibilities resulting in approved dredging and dredged material management actions in the Delta. Approved dredging and dredged material management actions will take place in a manner that protects and enhances Delta water quality, identifies appropriate opportunities for the beneficial reuse of Delta sediments for levee rehabilitation and ecosystem restoration, and establishes safe disposal for materials that cannot be reused.

GOALS

The Delta LTMS will facilitate development of long-term management approach for the Delta sediments based on science, enhanced communication and coordination among the stakeholders, and resolution of issues surrounding Delta dredging and beneficial use of sediments. The agency and stakeholder meetings will serve as a forum for developing a Delta Long Term Management Strategy for Delta sediments to be detailed in a Sediment Management Plan (SMP), and for promoting its implementation when adopted.

The goals of the Delta LTMS, to be finalized in the SMP, are to manage dredging and sediment management activities, including the following:

- Maintain and stabilize Delta levees that protect land-based activities and water conveyance
- Protect and enhance water quality for Delta water supply and ecosystem function
- Support and maintain Delta channel functions for navigation, flood control, water conveyance, and recreation
- Protect and enhance aquatic, wetland, and terrestrial ecosystems

OPERATING PRINCIPLES

The participating agencies of the Delta LTMS will operate under the Delta LTMS Process Framework, as last revised on November 1, 2006.

The participating agencies will work towards the timely completion and implementation of the Delta LTMS and Sediment Management Plan.

The participating agencies will continue to seek the participation of other agencies and stakeholders to the Delta LTMS Charter and Process Framework.

The agenda and issues to be addressed will be determined by the Delta LTMS agencies in consultation with other agencies and stakeholders.

The Delta LTMS will provide for peer review of technical studies through the Science Review Panel.

Information will be sought from stakeholders to help identify and clarify specific issues as well as provide factual data on the issues.

It is anticipated that the Delta LTMS will serve as a Regional Dredging Team under the National Dredging Policy.

Participating regulatory agencies shall retain their full authority to regulate dredging, reuse, and disposal activities, and nothing in this Charter or the Delta LTMS Framework shall restrict their authorities. Signatories do not indicate their approval for any specific project that may be proposed in the future.

MEMBERSHIP

The Delta LTMS is organized to include an executive committee, management committee, interagency working group, strategy review group, and science and technical groups as described in this section. In addition, public meetings will be held to provide additional opportunities for input and feedback from interested persons.

Executive Committee
At the top level, an Executive Committee directs the overall program, sets direction, and provides oversight of the study. Subject to their approvals, the directors of each of the following agencies serve on the Executive Committee. The executive managers have the decision-making authority to represent the agency on strategic and regulatory issues to be addressed, to the extent consistent with applicable laws, statutes, and regulations. The agency Executive Committee generally meets annually or as necessary to establish guidance for the study and keep abreast of the progress of the Delta LTMS.

Federal Agencies
- U.S. Army Corps of Engineers, Commander, South Pacific Division
- U.S. Environmental Protection Agency, Regional Administrator, Region 9

State Agencies
- State Water Resources Control Board, Board member

- California Regional Water Quality Control Board, Central Valley Region, Chairperson
- California Department of Water Resources, Director
- Resources Agency, CALFED Bay-Delta Program, Director
- Delta Protection Commission, Chairperson

Management Committee
The Management Committee consists of the deputy-level managers for the state and federal agencies. The Management Committee oversees the work of the Interagency Working Group (IWG) and the Strategy Review Group, reviews strategic recommendations, study plans, budget proposals, and provides recommendations to the Executive Committee. The Management Committee generally meets quarterly. Subject to their agency approvals, members of the Management Committee include:

- U.S. Army Corps of Engineers, District Commander, San Francisco District
- U.S. Army Corps of Engineers, District Commander, Sacramento District
- California Department of Water Resources, Deputy Director, Public Safety
- U.S. Environmental Protection Agency, Associate Director, Water Division, Region 9
- Resources Agency, CALFED Bay-Delta Program, Chief Deputy Director
- State Water Resources Control Board, Executive Director
- California Regional Water Quality Control Board, Central Valley Region, Executive Officer
- Delta Protection Commission, Executive Director
- NOAA Fisheries, Southwest Region
- U.S Fish and Wildlife Service, Pacific Region
- California Department of Fish and Game

Interagency Working Group
The Interagency Working Group (IWG) includes program-level staff at five agencies. The IWG serves as the primary program managers of the Delta LTMS process and steering committee for the Strategy Review Group. The IWG coordinates with the Management Committee, the Strategy Review Group and others with an interest in Delta activities and the LTMS process. The IWG's role is to identify study issues and questions to be addressed such as: identify technical work groups and expert resources, confirm purpose, charter, and assignments for the science advisory teams and technical review groups, discuss and review study work plans and scopes, discuss and review study budgets and resource needs, prepare and approve study reports, and develop management and policy options for the Management and Executive Committees. Subject to their approvals, the members of the IWG consist of the following:

- U.S. Environmental Protection Agency
- U.S. Army Corps of Engineers
- California Regional Water Quality Control Board, Central Valley Region
- Resources Agency, CALFED Bay-Delta Program

- California Department of Water Resources

The Management Committee may identify other participants in the IWG.

Strategy Review Group

Delta LTMS activities are informed by the Strategy Review Group. The Strategy Review Group will consist of Interagency Work Group members and other interested governmental agencies. The meetings will be open to the public with an opportunity for interested individuals and organizations to participate. The Interagency Working Group agencies will invite stakeholders, interest groups, and individuals working in or affected by Delta dredging and beneficial use activities for navigation, levee stability, flood control, water quality, or ecosystem restoration. The Interagency Working Group coordinates meetings monthly or as needed with the Strategy Review Group to identify, review, and discuss: 1) the Delta sediment issues of concern to be addressed by the Delta LTMS and in what order, 2) lines of inquiry that the science and technical work groups will be tasked to pursue, 3) coordinated regulatory approach for Delta dredging to be approved by the Executive Committee.

Members of the Strategy Review Group may also provide public comment at the Management and Executive Committee meetings. Subject to their approvals, the Strategy Review Group may include, but is not limited, to the following agencies:

State and Federal Agencies

- NOAA Fisheries, Southwest Region
- U.S. Fish & Wildlife Service, Pacific Region
- California Department of Fish & Game
- Delta Protection Commission
- State Lands Commission
- Reclamation Board

Local/Regional Agencies

- Reclamation Districts
- Contra Costa, Sacramento, Solano, Yolo, and San Joaquin Counties
- North, Central, and South Delta Water Agencies
- The Ports of Sacramento and Stockton

In addition, members of the public will be invited to participate in the meetings of the Strategy Review Group, including, but not limited to, the following groups:

Stakeholders and Interest Groups

- Bay Planning Coalition
- DeltaKeeper
- The Nature Conservancy
- The Bay Institute
- Environmental Water Caucus
- California Sportfishing Protection Alliance
- California Farm Bureau Federation

- State Water Contractors
- California Delta Chambers

Science and Technical Groups
A Science Review Panel of independent scientists will be formed as determined by the Management Committee. The Management Committee may also establish science and technical work groups of agency staff, the meetings of which will be open to the public

AGREEMENT

Participants in the Delta Long Term Management Strategy agree to participate in the study activities and will operate under this Charter. The undersigned recognize that public agency signatories to this Charter have specific statutory and regulatory authority and responsibilities, and that actions of these public agencies must be consistent with applicable procedural and substantive requirements. Nothing in this Charter or the Delta LTMS Framework is intended to, or shall have the effect of, constraining or limiting any public entity in carrying out its statutory responsibilities to regulate dredging, reuse, and disposal activities. Nothing in this Charter constitutes an admission by any party as to the proper interpretation of any provision of law or policy, nor is anything in this Charter intended to, nor shall it have the effect of, waiving or limiting any public entity's rights and remedies under any applicable law.

The undersigned recognize that certain departments, boards, and commissions (Adjudicative Entities) have adjudicative responsibilities with respect to contested regulatory matters that are brought before them. (See California Gov. Code §§ 11400, et seq.) Such adjudicative responsibilities include the requirement that the Adjudicative Entity and its members avoid bias, prejudice, or interest in the adjudicative matters before them, e.g., they cannot decide the outcome of a matter before completion of any required hearing or equivalent proceeding.

Some such Adjudicative Entities exist within the undersigned agencies. This Charter does not in any way require or commit an Adjudicative Entity to participate in proposing a project that will come before it for approval, nor does this Charter require or imply that an Adjudicative Entity will approve a project that requires an adjudicative proceeding. Under this Charter, the role of Adjudicative Entities in connection with matters that may require an adjudicative decision is limited to promptly and diligently processing any applications, petitions, or other requests for approval. Nothing in this Charter commits an Adjudicative Entity to an approval or disapproval of any project subject to the authority of the Adjudicative Entity, nor to a term or condition in any approval of a project by the Adjudicative Entity.

Legal Consistency
All provisions of this Charter are intended and shall be interpreted to be consistent with all applicable provisions of State and Federal law.

The parties recognize that this Charter is not a contract. This Charter does not delegate to any agency, or the collective group of agencies, the authority to: (1) control another agency's final decision on a project; (2) modify or halt an agency's project; or (3) compromise an agency's discretion to pursue projects according to their individual agency legal authority. This Charter facilitates cooperation and advice among the agencies; it shall not be interpreted to form a partnership, joint venture, or contract that requires federal agencies to analyze state projects and programs under the National Environmental Policy Act.

Contingent on Appropriation of Funds and Future Actions
The expenditure or advance of any money or the performance of any obligation of the United States under this Charter shall be contingent upon appropriation or allotment of funds in accordance with 31 USC 1341(Anti-Deficiency Act). No liability shall accrue to the United States for failure to perform any obligation under this Charter in the event that funds are not appropriated or allotted.

Activities and obligations, if any, under this charter pertaining to entities of the State of California are also subject to the availability of appropriated funds and to the independent decision-making authority of such entities. No liability shall accrue to such entities, or to the State of California, for failure to perform any action under this Charter in the event that funds are not appropriated or if any such entity declines to participate in any activity. Each participating agency's participation under this Charter is and shall remain voluntary.

This Charter shall be effective upon the date of signature of all participating agencies listed on page 7. This Charter may be signed in counterparts.

COPY

Signed by:

John R. McMahon — 12 FEB 07

General John R. McMahon — Date
Commander, South Pacific Division
U.S. Army Corps of Engineers

Wayne Nastri — 22 FEB 07

Wayne Nastri — Date
Regional Administrator, Region 9
U.S. Environmental Protection Agency

14 Feb 07

Lester Snow — Date
Director
California Department of Water Resources

Tam M. Doduc — 2/28/07

Tam M. Doduc — Date
Chairperson
State Water Resources Control Board

Karl E. Longley — 13 Feb 07

Karl E. Longley — Date
Chairperson
California Regional Water Quality Control Board, Central Valley Region

Joseph Grindstaff — 2/14/07

Joe Grindstaff — Date
Director
CALFED Bay-Delta Program (Resources Agency)

Michael Reagan — 2/22/07

Mike Reagan — Date
Commissioner
Delta Protection Commission

APPENDIX B

LEVEES OF FEDERAL CONCERN

Engineers: 122 levees at risk of failing Date?

By BEVERLEY LUMPKIN, Associated Press Writer

WASHINGTON – One hundred twenty-two levees from Maryland to California are at risk of failing, according to a list released Thursday by the Army Corps of Engineers.

There could be danger to people who live in communities near some of the levees as well as a chance that they will have to pay more for insurance, said Butch Kinerney of the **Federal Emergency Management Agency**'s national flood insurance program.

The list was released in response to Freedom of Information Act requests filed by news organizations, including The Associated Press.

If the Corps of Engineers determines a levee to be at risk of failing, homeowners in the area could be required to purchase flood insurance, though exceptions can be made.

Communities near the levees have been notified that they have received an "unacceptable maintenance inspection rating." That means a levee has one or more problems, which can include movement of floodwalls, faulty culverts, animal burrows, erosion or tree growth, according to a statement released by the Corps.

California, with 37 suspect levees, and Washington state, with 19, led the list.

FEMA's Kinerney said he was concerned that the levees present not only a chance of higher insurance costs but a danger to those living nearby. FEMA maps flood plains and helps determine the flood risks that communities face.

Kinerney said people living near the levees should have an evacuation plan, a family emergency plan, and a disaster supply kit, along with flood insurance.

The Corps has been warning communities they need to take care of routine levee maintenance, said Larry Larson, director of the Association of State Floodplain Managers. Larson said he was glad the Corps was putting out the word on the levees.

"The feds are saying, 'Wait a minute, we haven't been doing our job,'" Larson said. "'We better get on top of this. Your people are at risk. You need to get something done.'"

The Corps historically has constructed the levees and has turned most of them over to local communities for operations and maintenance. Some communities may not have kept up with needed repairs, while others may merely lack the documentation, Kinerney said.

As the Corps decertifies the adequacy of a particular levee, it also notifies FEMA, which can take away the credit communities get on their flood insurance rate for having a levee.

Kinerney added that if residents of the communities at risk were to purchase flood insurance now, before the community's designation changes, they can still pay the cheaper rate.

The Corps can give communities 12 months to make corrections — sometimes it's just a matter of "filling gopher holes," Kinerney said.

Also, FEMA can issue for up to 24 months a provisional accreditation if a community requests it, giving it up to two years to correct the problems or contest the finding that the levee is not sound. During that period, residents are not required to purchase flood insurance.

The list: http://www.hq.usace.army.mil/cepa/releases/leveelist.pdf

Appendix L
State Flood Control Facilities within the Legal Boundary of the Delta
(Map showing Central Valley Flood Protection Board Jurisdictions)

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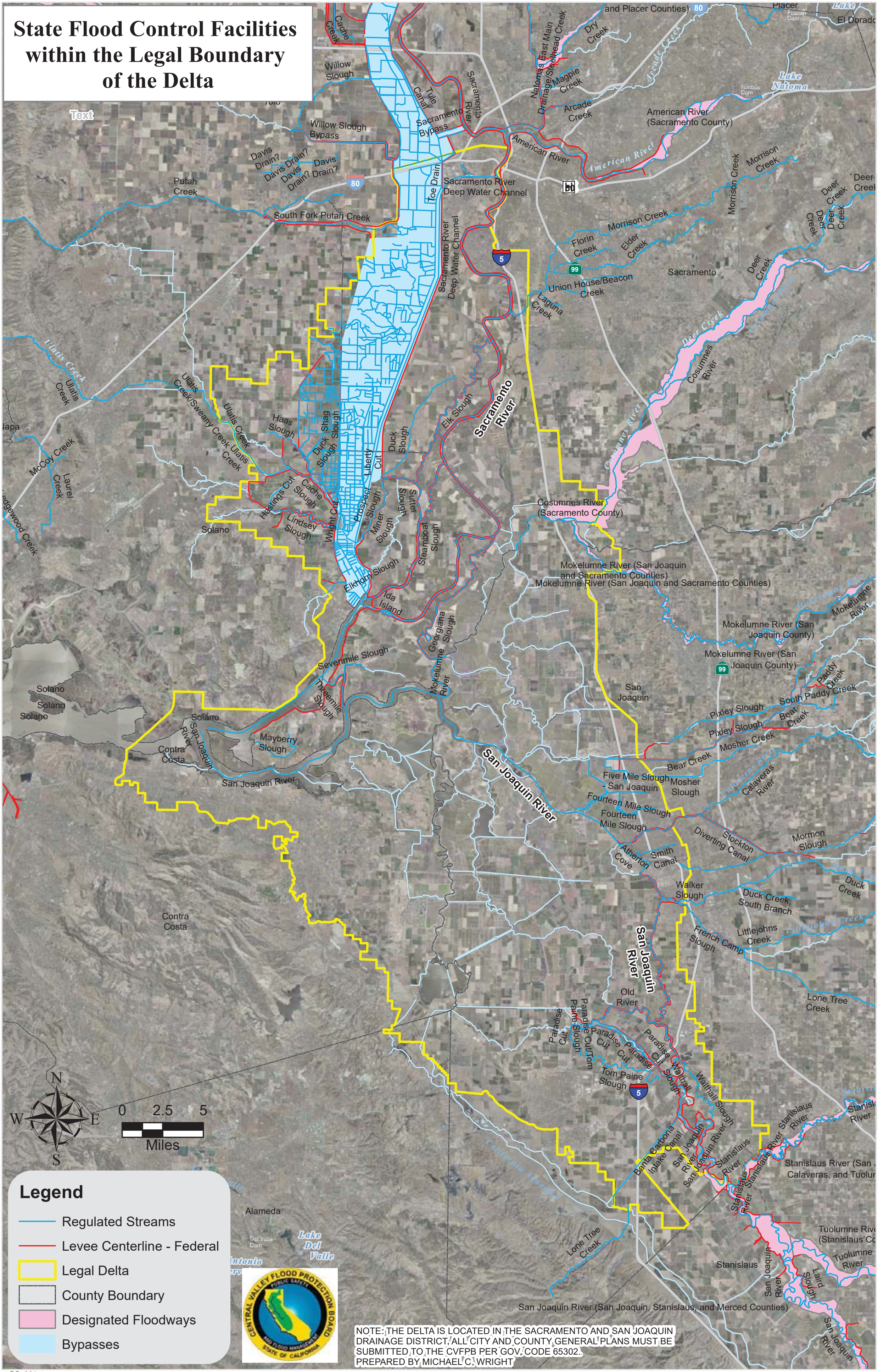
State Flood Control Facilities within the Legal Boundary of the Delta



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Appendix M
Projected 5-year Budgets (Fiscal Years 2012–2017) for Delta Stewardship Council, Delta Protection Commission, and Sacramento-San Joaquin Delta Conservancy

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Appendix M
Projected 5-year Budgets (Fiscal Years 2012–2017) for Delta Stewardship Council, Delta Protection Commission, and Sacramento-San Joaquin Delta Conservancy

Note: The Delta Stewardship Council, Sacramento-San Joaquin Delta Conservancy, and Delta Protection Commission are currently developing long-term finance projections beginning in fiscal year 2013-2014. Budget projections will be updated as more information becomes available.

Table M-1
Projected 5-year Budgets (2012–2017) for Agencies Conducting Sacramento-San Joaquin Delta Projects

	Draft Projections (pending agency input) ($1,000)					
Agency	**2011–12**	**2012–13**	**2013–14**	**2014–15**	**2015–16**	**2016-17**
DELTA STEWARDSHIP COUNCIL						
Expenditures						
Operations and Administration	$6,206	$6,251	$3,906	$3,906	$3,906	$3,906
Science						
Interagency Ecological Program			$2,606	$2,331	$2,331	$2,331
Independent Science Board			$2,341	$2,341	$2,341	$2,341
Studies/Grants	$4,833	$5,382	$20,000	$20,000	$20,000	$20,000
Program Performance			$805	$805	$805	$805
Other Studies (funded by others)	$16,938	$9,736	$9,915	$9,915	$9,915	$9,915
Totals	***$27,977***	***$21,369***	***$39,573***	***$39,298***	***$39,298***	***$39,298***
Revenues						
General Fund	$5,505	$5,548	$7,000	$7,000	$7,000	$7,000

Table M-1
Projected 5-year Budgets (2012–2017) for Agencies Conducting Sacramento-San Joaquin Delta Projects

Agency	Draft Projections (pending agency input) ($1,000)					
	2011–12	2012–13	2013–14	2014–15	2015–16	2016-17
California Environmental License Plate Fund	$701	$703	$700	$700	$700	$700
Bond Funds	$4,833	$5,382				
Federal Trust Fund	$2,919	$2,919	$2,919	$2,919	$2,919	$2,919
Reimbursements	$14,019	$6,817	$7,000	$7,000	$7,000	$7,000
Totals	***$27,977***	***$21,369***	***$39,573***	***$39,298***	***$39,298***	***$39,298***
SACRAMENTO–SAN JOAQUIN DELTA CONSERVANCY						
Expenditures						
Operations and Administration	$1,484	$1,486	$1,963	$1,963	$1,963	$1,963
Strategic Plan Development						
Projects			$10,000	$10,000	$10,000	$10,000
Totals	***$1,484***	***$1,486***	***$11,963***	***$11,963***	***$11,963***	***$11,963***
Revenues						
General Fund	$763	$775	$798	$798	$798	$798
Reimbursements	$500	$500	$500	$500	$500	$500
Federal Trust Funds	$60	$140				
California Environmental License Plate Fund	$161	$71	$165	$165	$165	$165
From Proposition 1E			$10,000	$10,000	$10,000	$10,000
Totals	***$1,484***	***$1,486***	***$11,963***	***$11,963***	***$11,963***	***$11,963***
DELTA PROTECTION COMMISSION						
Expenditures						
Operations and Administration	$1,242	$1306	$983	$983	$983	$983
Economic Sustainability Plan/ Implementation						
Education						
Totals	***$1,242***	***$1,306***	***$983***	***$983***	***$983***	***$983***
Revenues						
California Environmental License Plate Fund	$927	$1,000	$666	$666	$666	$666
Harbors and Watercraft Revolving Fund	$233	$224	$235	$235	$235	$235
Reimbursements	$82	$82	$82	$82	$82	$82
Totals	***$1,242***	***$1,306***	***$983***	***$983***	***$983***	***$983***

Appendix N
Funding and Financing Options

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Appendix N
Funding and Financing Options

This appendix describes various funding and financing schemes that will be evaluated for inclusion in the financing strategy. In examining potential sources, approaches used by other major programs around the country were explored. Some of these approaches are described here.

Capital Funding Sources

To implement Delta Plan infrastructure improvements and to fund habitat acquisitions and improvements, capital funding sources will need to be identified.

Federal Appropriations

Federal appropriations typically pay for the taxpayers' share of capital costs. Federal authorization already exists for several Sacramento-San Joaquin Delta (Delta) programs; however, future funding to continue these programs is uncertain.

General Fund Appropriations

The General Fund includes revenues and spending not required by law to be accounted for in any other fund. Most state expenditures are made from this fund, and the California Legislature may appropriate funds for any purpose. However, the State of California's (State's) fiscal condition will limit the availability of these funds in the future.

Conservation Organizations

Many conservation organizations donate funds for land and water acquisition and management. The Nature Conservancy, for example, has been active in the Delta region. New nonprofit (501(c) (3)) organizations could be established to accept tax-deductible donations for Delta projects and programs.

Repayment and Operations and Maintenance Funding Sources

The Finance Plan will identify revenue sources to repay capital costs, and to pay for ongoing operations, maintenance, and replacement costs.

User Charges for Water

Water agencies generate revenue by selling water. Water sale revenues are normally used to pay for water supply and quality costs, including operations and maintenance expenses, and debt repayment for facilities. The cost of developing new water supplies is usually factored into the price charged for water. However, surface water sale revenues are influenced by the elasticity of demand. If demand is at all elastic (price responsive), then water users will buy less water as price increases (or shift to groundwater if available), and water revenues may fall below levels needed to meet fixed operating costs. For new water supplies, the required infrastructure may be too costly for current customers given the economic returns they receive for water.

Fines and Forfeitures

Administrative and civil enforcement actions may result in the collection of fines and forfeitures. Water Code section 13260 authorizes the State Water Resources Control Board (SWRCB) to collect fees that are deposited in the Waste Discharge Permit Fund. For fiscal year 2008–09, revenues and expenditures were about $80 million. Most of the funds are spent for National Pollutant Discharge Elimination System permit and stormwater programs, and for waste discharge requirements. For each program, most costs are for permitting, enforcement, and compliance (SWRCB 2009). The Delta Stewardship Council (Council) should evaluate the potential for directing fees, fines, and forfeitures for actions detrimental to the Delta to Delta activities.

Carbon Offsets/Tule Farming

A carbon offset is a reduction in emissions of carbon dioxide made in order to compensate for or to offset an emission made elsewhere. The offsets are measured in metric tons of carbon dioxide equivalent, and one offset represents the reduction of one metric ton of carbon dioxide.

There are two markets for carbon offsets. In the large compliance market, companies and governments buy offsets in order to comply with caps on the total amount of carbon dioxide they are permitted to emit. This market was established to comply with various international agreements and protocols.

The smaller voluntary market allows individuals, governments, and companies to purchase offsets to offset their own emissions. Offsets are typically achieved through financial support of projects that reduce the emission of carbon dioxide. In other words, a project to reduce or eliminate emissions may be partially paid for by the sale of the offsets. The cost of an offset has recently ranged from $8 to $30 per ton-year (California Chapter American Society of Farm Managers and Rural Appraisers 2009).

Dead plant material, largely carbon, accumulates in the form of new peat soil on farmed Delta islands. When the farmland is converted to cattails or tules, carbon emissions may be reduced or eliminated. The Delta subsides at a rate of 1 to 3 inches per year, mostly in the form of carbon dioxide releases (Ingebritsen et al. 2000). The amount of carbon emissions from farmed Delta islands is estimated to be 2.5 to 6.5 tons per acre per year.

The U.S. Geological Survey has been measuring carbon sequestration on an experimental plot on Twitchell Island for about 15 years. The additional carbon dioxide sequestered by cattails or tules amounts to 12 to 20 tons per acre per year using high and low ranges, and potential revenue per acre is $100 to $800 per acre per year. It appears that carbon dioxide offsets might repay a significant share of Delta island acquisition and wetland restoration costs. Net revenue of $200 per acre per year is worth about $3,000 to $4,000 per acre in net present value terms as compared to the cost of land, which may be $3,000 to $10,000 per acre (California Chapter American Society of Farm Managers and Rural Appraisers 2009).

User Fees and Stressor Fees

User fees and stressor fees are conceptually similar but somewhat different. User fees may be assessed because the user benefits from improvements funded by the fee. Stressor fees may be assessed to reduce unwanted stressors, and stressor fees may be assessed because the fees create an incentive to reduce stressors. User fees are assessed based on the amount of a resource used or consumed. Stressor fees are assessed based on the amount of stressor released or caused. In either case, physical measurement of the amount of use or stressor is necessary.

Diversion Fees

Diversion fees are commonly assessed based on both use and/or stress. That is, diversions may benefit from expenditures, but they may also contribute to stress.

A number of factors limit the feasibility of additional diversion fees in California. In particular, water users adamantly oppose any new diversion fees, unless perhaps the fees are developed by water users themselves. In 2005, for example, a letter from 39 water district and city managers to Governor Schwarzenegger included the following request (Senator Perata et al. 2005):

> *…do not include CALFED user fees as part of the 2005-06 state budget. Any such proposal is entirely inappropriate, given that all versions of the CALFED needs assessment aired to date have avoided grappling directly with the "beneficiary pays" principle. CALFED cost allocations should be proposed only after CALFED has conducted an open public hearing process in which all stakeholders have had the opportunity to present testimony on appropriate beneficiary payments. Until this process has been completed, no financing plan for CALFED can be considered complete and ready for implementation as part of the state budget.*

Existing laws, such as Proposition 218, limit the ability of any State or local government to establish new diversion fees. Enabling legislation would be required.

The potential for diversion fees is also limited by the inconsistency and lack of water diversion measurement in some places. Diversions are measured by a variety of methods, and some diversions are not routinely measured. The costs of standardized measurement could be significant relative to the amount of fees collected.

Several efforts in the past estimated the revenues that could be collected if the fees were similar to Bureau of Reclamation restoration fees. In 2000, one author estimated that average non-Central Valley Project (CVP) contract diversions of 13.182 million acre-feet with fee levels similar to CVP restoration fees could provide about $105 million in annual revenues (Wahl 2000). In 2004, CALFED estimated that potential fee levels per acre-foot-year of diversion would raise $25 million in annual funds based on "normal" non-CVP contract diversions of 16.522 million acre-feet. These fee levels were $1.50 for all users, or $1.25 for agriculture and $2.50 for urban users, or $3.25 for Delta exporters and $1 for all others (CALFED 2004). CALFED also estimated that a residential fee of $1 per month per household in the CALFED solution area could raise $106 million annually.

Fishing Fees and Payments

From 2004 through 2009, recreational fishing within the Bay-Delta watershed below the first dam required a Bay-Delta Sport Fishing Enhancement Stamp. In 2009, about 300,000 stamps were sold at a retail cost of $6.30, and gross revenues were about $1.9 million. These funds were used for projects and activities that provided a benefit to the primary Bay-Delta sport fisheries and were leveraged with a 75 percent cost share from the federal Sport Fish Restoration Act. In 2009, Assembly Bill 1052 repealed the stamp (California Department of Fish and Game 2011a). The Council should consider supporting legislation to renew this user fee-funded program.

A stressor-based fee could be based on removals of desirable species. In 2011, inland steelhead anglers are required to purchase a Steelhead Report Card at a cost of $6.48, and a North Coast Salmon Report

Card costing $5.66 is required for all anglers taking salmon in the Smith River System or Klamath-Trinity River System (California Department of Fish and Game 2011b). Annual revenues from 2001 to 2006 from the Steelhead Report Card averaged about $200,000 (Jackson 2007). Any person fishing commercially for salmon in California must purchase a commercial fishing salmon stamp for $85.

Similar fees might be collected when substantial salmon fishing is again allowed in the Bay-Delta system. In 2006, about 500,000 freshwater and 1 million saltwater days were taken for salmon fishing (California Department of Fish and Game 2010). Revenue potential from recreational salmon cards is estimated to be $500,000 to $1 million annually.

Hydropower Fees

Fees could be collected from hydropower generators in the Bay-Delta system. The SWRCB collects fees from licensed Federal Energy Regulatory Commission projects at a rate of $0.017 per kilowatt of generating capacity. Higher fees will be collected from generators that recently renewed their Federal Energy Regulatory Commission licenses at higher assessment rates (SWRCB 2010). These fees must be used to cover authorized costs of the Water Rights Program. The estimated amount of revenues from increased fee assessments on hydropower generators is unknown.

Other Stressor Fees

A variety of stressor fees might be used to help finance programs recommended in the Delta Plan. Seven types of stressor fees could be considered:

1. **Water quality loading charge:** charge measured pollutant loads in water discharges.
2. **Land use charge:** charge land use practices that contribute to stressors.
3. **Retail sales fees:** charge retail sales of products that may become stressors.
4. **Habitat alteration fees:** charge existing or proposed land alterations that contribute to habitat stressors.
5. **Special diversion fees:** charge water diversions that contribute more than average to entrainment, stranding, or flow-related habitat loss.
6. **Recreation use fees:** charge for recreation that contributes to stressors.
7. **Hatchery fees:** charge hatcheries for management practices that damage Delta resources.

Some pollutants, ammonia and certain chemicals in particular, originate known sources; and the amount of the pollutant load can be measured. The cost of removing the stressors may determine a fair and efficient charge level. There are complex measurement issues and administrative costs to consider, but these may be minor compared to revenues.

The other stressor-based fees are generally not as straightforward. With respect to a fee for land management practices that release methyl mercury, for example, the stressor being introduced is often diffuse, not well measured, and the amount may vary substantially based on location and local conditions. It may be unfair or expensive to set land use charges based on diffuse and hard-to-measure stressors. The provisions of Proposition 218 procedures must be applied to the assessment of stormwater fees, and it would likely apply to land use charges as well.

A charge on retail sales of stressor materials such as pesticides or fertilizers might also be problematic, because these materials are used in a wide variety of locations and applications. The legality of these types of charges is not clear.

There is some potential for establishing charges for certain types of habitat alteration practices, such as wetland conversions. However, these charges might also fall under Proposition 218. The special diversion charge would be difficult to justify because the amount of unusual damage via entrainment, stranding, or flow habitat loss would often be difficult to quantify and value. Hatchery management fees might be inefficient compared to other efforts to improve hatchery practices.

The revenue potential from stressor fees is unknown, but is probably minor. Also, it is likely that any stressor fees could only be spent for a very limited range of activities that would benefit the persons paying the fee under Proposition 26. There is, however, some potential for revenues in the form of fishing stamps (probably less than $5 million annually) and additional water quality loading charges.

Water Marketing Fees

Water marketing fees would be assessed against water transfers in the Delta watershed. These fees would be above and beyond any existing watershed diversion or export fees. The SWRCB currently collects fees associated with change in water rights that may be required for transfers. This concept can only work if water transfers can occur in a cost-efficient and timely manner.

The number of water transfers between existing water agencies is not large compared to total statewide water use. During the drought years of 2008 and 2009, about 400,000 acre-feet of cross-Delta transfers were reported annually (Smith 2009). If these transfers were assessed a fee of $10 per acre-foot, revenues could total $4 million annually. However, the volume of transfers in most years would be much less than in 2008 and 2009.

Water Resources Fee

A statewide assessment would feature equal application and would be comprehensive, free of loopholes, affordable, understandable, and easy and inexpensive to administer. It would be applied at the retail level with different rates for nonagricultural (acre-feet of water used) and agricultural water users (number of acres irrigated). Proceeds from the assessments would be split equally between statewide/interregional projects and regional projects. The State Board of Equalization would collect and administer the revenues.

Assessment income in the statewide account would pay for administration costs; the operations costs of the Council, the Sacramento-San Joaquin Delta Conservancy, and the Delta Protection Commission; scientific studies; and debt service on general obligation bonds for projects that provide statewide public benefits. Regional projects would qualify for funding if they are consistent with an integrated regional water management plan, a stormwater resources plan, a groundwater management plan, or a water quality control plan.

Public Goods Charges

In 1996, a public goods charge for electricity sold by California Public Utilities Commission-regulated for-profit public utilities was approved in California as part of the energy sector deregulation. The public goods charge is a monthly fee assessed to residential and industrial customers to fund energy efficiency programs. However, the enabling statute authorizing assessment of this fee expired at the end of 2011.

There has been some interest in a public-goods charge for water as a potential tool for achieving the objectives of Assembly Bill 32, known as “The Global Warming Solutions Act of 2006” (Griffin, Leventis, and McDonald 2010). In a study prepared for the California Public Utilities Commission by the U.C. Berkeley Goldman School of Public Policy, a public goods charge for water was proposed that consisted of a volumetric charge on individual water utility bills.

The design of a public-goods charge for water would need to be developed; and, given the passage of Proposition 26, a two-thirds vote would be required to implement it. The primary purpose of a public-goods charge should be to fund investments or activities that have broad, statewide benefit. These might include statewide planning, ecosystem enhancements, or investments that reduce reliance on imported supplies. A public-goods charge could ensure a minimum investment by all urban and agricultural water agencies in water use efficiency and other tools that can reduce reliance on imported water. It could also provide a consistent funding stream over time. Actual activities to be funded would need to be more definitely described before it could be presented to the voters.

Financing Methods

State-issued Debt

State law authorizes the issue of two types of debt for water-related infrastructure: general obligation bonds and revenue bonds. General obligation bonds must be approved by voters, and repayment is guaranteed by the State's general taxing power, resulting in typically low interest costs. Revenue bonds do not require voter approval because they are secured by a dedicated revenue stream, such as water sales.

Local Government Debt

Capital expenditures may be funded by debt issued by local agencies. Depending on the type of project being financed, local agencies may issue debt based on increased revenue streams, or may establish improvement or assessment districts.

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