State and federal agencies should coordinate with the Delta Science Program to align resources for scientific support of restoration efforts, including adaptive management, data tools, monitoring, synthesis, and communication.

Policies and Recommendations

Core Strategy 1: Create More Natural Functional Flows

The volume, timing, and extent of freshwater flows through the Delta directly affect the reliability of water supplies and the health of the Delta ecosystem. More natural functional flows across a restored landscape can support native species recovery, while providing the flexibility needed for water supply reliability. Freshwater flows should be allocated and adaptively managed to more closely resemble the natural volume, timing, frequency, and duration to achieve the desired ecosystem functions.

Implement and Regularly Update Flow Guidance

Problem Statement

The best available science demonstrates that altered or reduced water flows strain the entire Delta ecosystem, as well as the rest of the estuary. The predictability of water exports cannot be improved, and restoration cannot be effectively implemented, without timely State Water Resources Control Board action to update flow objectives. Updates must consider and balance the agricultural, urban, and ecosystem beneficial uses of a finite water supply and use best available science to guide decision-making.

Policy

ER P1. Delta Flow Objectives (NO CHANGE)

(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.

Recommendation

ER R1. Update Delta Flow Objectives (REVISED)

The State Water Resources Control Board (SWRCB) should maintain a regular schedule of reviews of flow objectives to reflect changing conditions due to climate change. The SWRCB should consult with the Delta Science Program on adaptive management and the use of best available science.

Core Strategy 2: Restore Ecosystem Function

Achieving the Delta Reform Act vision for the Delta ecosystem requires the reestablishment of tens of thousands of acres of functional, diverse, and interconnected habitat. The magnitude of the need dictates a change in existing approaches to restoration in the Delta. State agencies will require new funding sources in order to implement large-scale restoration projects and support multi-benefit projects that go above and beyond mitigation of impacts. An integrated, adaptive approach to ecosystem restoration requires that restoration projects focus on ecosystem function and be designed and located to continue functioning under changing climate conditions. Restoration projects should also be compatible with adjacent land uses and support the cultural, recreational and natural resource values of the Delta as an evolving place.

Improve Project Design

Problem Statement

The loss of over 90 percent of wetlands greatly impacted the Delta ecosystem; further impacts across all ecosystem components (physical, chemical and biological) continue to severely stress the Delta ecosystem. Habitats and migration corridors in the Delta are already shifting with climate-driven impacts such as sea level rise and temperature changes, and these changes are likely to accelerate rapidly in coming decades. Restoration projects must be implemented at scales and in locations with sufficient opportunity to restore land-water connections in order to be resilient to these long-term trends. Currently, many restoration actions in the Delta are limited to single-species conservation, recovery, or mitigation projects. State agencies charged with stewardship and restoration of the Delta ecosystem have limited ability to change these practices due to permitting requirements and restrictions on the amount and use of public funds. Information gaps prevent more systematic planning and adaptive management of these activities and investments.

Policies

New ER Policy "A". Disclose Contributions to Restoring Ecosystem Function and Providing Social Benefits (NEW)

(a) The certification of consistency for a covered action described in Subsection (b) shall:

1. *Include completed Section 1 (Priority Attributes) of Appendix 3A (Disclosing Contributions to Restoring Ecosystem Function and Providing Social Benefits), and the documentation and information required by Appendix 3A, Section 1, to identify the priority attributes of the covered action and disclose its contribution to the restoration of a resilient, functioning Delta ecosystem, and to identify the ecosystem restoration tier associated with that covered action based on the identified priority attributes.*
2. *Include completed Section 2 (Social Benefits) of Appendix 3A (Disclosing Contributions to Restoring Ecosystem Function and Providing Social Benefits), and the documentation and information required by Appendix 3A, Section 2, to identify and disclose the covered action's cultural, recreational, agricultural, and/or natural resource attributes anticipated to result from project implementation.*

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy applies to a covered action that includes protection, enhancement, or restoration of the ecosystem.

ER P4. Expand Floodplains and Riparian Habitats in Levee Projects (REVISED)

(a) Certifications of consistency for levee projects must provide an evaluation of, and where feasible the levee project must incorporate, alternatives to increase floodplains and riparian habitats.

1. *Levee projects located in the following areas (as depicted in Appendix 8A): (1) The Sacramento River between the Deepwater Ship Channel and Steamboat Slough, the San Joaquin River from the Stanislaus River confluence to Rough and Ready Island, the Stanislaus River, the Cosumnes River, Middle River, Old River, Paradise Cut, Elk 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, shall evaluate alternatives which remove all or a portion of the original levee prism in order to physically expand the width of the channel.*

2. *All levee projects located in whole or in part in the Delta shall evaluate alternatives to increase levee waterside habitat.*

   (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 a new flood control work or make capital improvements to an existing flood control work.*

Recommendations

New ER Recommendation "A". Increase Public Funding for Restoring Ecosystem Function (NEW)

New funding sources are needed to achieve the scale of ecosystem restoration envisioned by the Delta Reform Act. Future State funding opportunities for implementing restoration projects in the Delta, including grant and loan programs, should be directed to projects that would achieve Ecosystem Restoration Tier 1 or 2, as defined in Appendix 3A.

New ER Recommendation "B". Use Good Neighbor Checklist to Coordinate Restoration with Adjacent Uses (NEW)

Restoration project managers should use the Department of Water Resources' Good Neighbor Checklist when planning and designing restoration projects, in order to demonstrate that the project avoids or reduces conflicts with existing uses.

ER R4. Exempt Delta Levees from the U.S. Army Corps of Engineers' Vegetation Policy (NO CHANGE)

Considering the ecosystem value of remaining riparian and shaded riverine aquatic habitat along Delta levees, the U.S. Army Corps of Engineers should agree with the California Department of Fish and Wildlife and the California Department of Water Resources on a variance that exempts Delta levees from the U.S. Army Corps of Engineers' levee vegetation policy where appropriate.

Core Strategy 3: Protect Land for Restoration and Safeguard Against Land Loss

As sea levels rise, opportunities for intertidal and floodplain restoration are shifting inland, toward the upland edges of the Delta. Restoration of tidal wetlands should focus on opportunities to create interconnected habitats, where elevations will support intertidal habitats into the future. Lands at elevations suitable for current and future restoration must be protected from development, and restoration projects must be designed and located with rising sea levels in mind. Consistent with State law, local and regional plans in the Delta must consider sea level rise as well as the loss of lands suitable for ecosystem restoration and the need to accommodate these landscape changes. State agencies must take action to reduce, halt, or reverse subsidence; and incentivize agricultural land management practices that support native wildlife and counter subsidence.

Protect Opportunities for Restoration

Problem Statement

The loss of lands suitable for restoration due to sea level rise and development jeopardizes efforts to restore ecosystem functions in the Delta. Levees, roads, and other infrastructure prevent wetland migration, threatening the ability of existing channel margin wetlands to adapt to rising sea levels. The expansion of development and infrastructure in the Delta will constrain opportunities to reconfigure and reconnect floodplains to their channels. Over time, these forces will continue to diminish the extent of land suitable for restoration projects at intertidal elevations, reducing future opportunities to create land-water connections and restore ecosystem function.

Policies

ER P2. Restore Habitats at Appropriate Elevations (REVISED)

(a) The certification of consistency for a covered action described in Subsection (d) must be carried out in a manner consistent with Appendix 4A, which provides guidance on appropriate elevations for particular ecosystem types within the Sacramento-San Joaquin Delta and Suisun Marsh.

1. *The certification of consistency must include a completed Appendix 4A and all of the documentation and information required by Appendix 4A.*
2. *If a covered action is not consistent with the Table 1.1 in Appendix 4A, the certification of consistency shall provide, based on best available science, the rationale for any inconsistency with Table 1.1 and how it is nonetheless consistent with this policy.*

(b) The certification of consistency for a covered action that takes place, in whole or in part, in the Intertidal Elevation Band and Sea Level Rise Accommodation Band shall, based on best available science:

1. *Explain, how the action is designed to accommodate each of the following:*
   - *i. future marsh migration;*
   - *ii. anticipated sea level rise; and*
   - *iii. tidal inundation; and*
2. *If the action does not implicate one or more of the elements set forth in subsection (1) of section (b) of this regulation, for each such element, explain why it does not.*
3. *The information required by this regulation may be included in an adaptive management plan, where required by section 5002 of this Chapter.*

(c) The certification of consistency for a covered action that takes place, in whole or in part, in the Shallow Subtidal Elevation Band or the Deep Subtidal Elevation Band shall explain, based on best available science, how the action is designed to safeguard against levee failure over the design life of the project. This information may be included in an adaptive management plan, where required by section 5002 of this Chapter.

(d) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy applies to a covered action that includes protection, restoration, or enhancement of the ecosystem.

ER P3. Protect Opportunities to Restore Habitat (REVISED)

(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 of this Chapter, 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 of this Chapter.

(c) If the impacts referenced in subsection (a) are mitigated (rather than avoided), they must be mitigated to the extent that the project has no significant impact on the opportunity to restore habitat as described in section 5006 of this Chapter.

(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.*

Recommendation

ER R5. Update the Suisun Marsh Protection Plan (REVISED)

The San Francisco Bay Conservation and Development Commission should update the Suisun Marsh Protection Plan to adapt to sea level rise and ensure consistency with the Suisun Marsh Preservation Act, the Delta Reform Act, and the Delta Plan, and support local government and districts with jurisdiction in the Suisun Marsh in amending their components of the Suisun Marsh Local Protection Program accordingly.

Safeguard Against Land Loss

Problem Statement

Agriculture has shaped the rich economy and rural culture of the Delta, although it has come at a cost: the loss of land-water connections. Without regular inundation, peat-rich Delta lands experience soil carbon loss and subsidence. The 2018 Natural and Working Lands Inventory attributed the majority of soil carbon loss in California to oxidation of organic soils in the Delta. The ongoing loss of land due to subsidence threatens the Delta Reform Act's vision for a restored Delta ecosystem, the livelihoods of those who live and work in the Delta, and statewide water supply reliability. Urgent action is needed to halt the current rapid pace of subsidence and to promote subsidence reversal activities. Reaching a holistic balance between agriculture and a functioning ecosystem will require working landscapes – agricultural lands managed to support biodiversity and provide habitat resources – as an important part of achieving ecosystem goals in the Delta. State agencies own more than 35,000 acres on deeply subsided lands in the Delta and Suisun Marsh and thus have a critical role to play in halting and reversing subsidence.

Recommendations

New ER Recommendation "C". Fund Targeted Subsidence Reversal Actions (NEW)

(a) *The Delta Conservancy should develop incentive programs for public and private land owners that encourage land management practices that stop subsidence on deeply subsided lands in the Delta and Suisun Marsh.*

(b) *In order to ensure the long-term durability of state investments in restoration, State agencies that fund ecosystem restoration in subsided areas should direct investments to areas that have opportunities to both reverse subsidence and restore intertidal marsh habitat.*

New ER Recommendation "D". Enhance Working Landscapes through Resource Conservation Districts (NEW)

State agencies should be provided with funding in order to provide resources and support to Resource Conservation Districts (RCDs), and other local agencies and districts, in their efforts to improve agricultural land management practices that support native species. State agencies should work with RCDs, and other local agencies and districts, to adaptively manage agricultural land management practices to improve habitat conditions for native species.

New ER Recommendation "E". Develop and Update Management Plans to Halt or Reverse Subsidence on Public Lands (NEW)

For all publicly-owned lands in the Delta or Suisun Marsh, State and local agencies should develop or update plans that identify land management goals; identify appropriate public or private uses for that property; and describe the operation and maintenance requirements needed to implement management goals. These plans should address subsidence and consider the feasibility of subsidence reversal.

Core Strategy 4: Protect Native Species and Reduce the Impact of Nonnative Invasive Species

While large-scale ecosystem restoration is the priority approach to support native species recovery, some stressors require more focused interventions. In particular, management actions continue to be necessary to avoid introductions of, and reduce the spread of, nonnative invasive species. In managing native fish populations, reestablishing riparian habitat and in-stream connectivity along migratory corridors supports the reproductive success and survival of native fish. Hatcheries and harvest regulation should employ adaptive management strategies to predict and evaluate outcomes and minimize risks.

Prevent Introduction of Nonnative Species and Manage Nonnative Species Impacts

Problem Statement

Nonnative invasive species are both a symptom of a highly degraded ecosystem and a major obstacle to successful restoration of the Delta ecosystem because they can affect the survival, health, and distribution of native Delta plants and wildlife. Native species are impacted by nonnative invasive species through competition, predation, disease and other interactions. The establishment of new nonnative invasive species is likely within the highly altered landscape of the Delta and could result in further ecosystem effects. Native species are also impacted by ongoing activities that improve habitat conditions for existing nonnative invasive species.

Policy

ER P5. Avoid Introductions of and Habitat Improvements for Invasive Nonnative Species (NO CHANGE)

(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.

Recommendation

ER R7. Prioritize and Implement Actions to Control Nonnative Invasive Species (REVISED)

The Delta Conservancy, Delta Science Program, California Department of Fish and Wildlife, California Department of Food and Agriculture, and other State and federal agencies should develop and implement communication and funding strategies for rapid response to new introductions of nonnative invasive species, based on scientific expertise and research.

Improve Fisheries Management

Problem Statement

Fish migration is impaired by barriers and unscreened diversions within and upstream of the Delta, and these impacts will be compounded with a rapidly changing climate. Aquatic habitat conditions within the Delta support nonnative, predatory fish species, further reducing native fish survival. Hatcheries and harvest regulation are important tools in fisheries management, but they also pose genetic and ecological risks to wild salmon runs, other native species, and the Delta ecosystem. These practices need to employ adaptive management strategies to predict and evaluate outcomes and minimize risks.

Recommendations

New ER Recommendation "H." Improve Fish Migration within the Delta and Sacramento – San Joaquin Watershed (NEW)

State and federal agencies should implement priority actions to remove barriers to fish migration.

New ER Recommendation "I". Fund Projects to Improve Survival of Juvenile Salmon (NEW)

Public agencies should fund and implement projects that improve aquatic habitat conditions and reduce predation risk for juvenile salmon along the priority migration corridors identified in Chapter 4, Figure 4-7. Projects that could improve survival of juvenile salmon include levee setbacks and waterside habitat improvements, placement of fish guidance structures, and nonnative aquatic weed management.

ER R8. Manage Hatcheries to Reduce Genetic Risk (NO CHANGE)

As required by the National Marine Fisheries Service, all hatcheries providing listed fish for release into the wild should continue to develop and implement scientifically sound Hatchery and Genetic Management Plans (HGMPs) to reduce risks to those species. The California Department of Fish and Wildlife should provide annual updates to the Delta Stewardship Council on the status of HGMPs within its jurisdiction.

ER R9. Coordinate Acoustic Telemetry Program (REVISED)

The California Department of Fish and Wildlife, in cooperation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, should seek coordination among researchers conducting acoustic telemetry within the Delta waterways to identify fish migration pathways, and survival.

Core Strategy 5: Improve Institutional Coordination to Support Implementation of Ecosystem Protection, Restoration, and Enhancement

A large and diverse array of public agencies and private organizations are engaged in ecosystem protection, enhancement, restoration, and mitigation in the Delta, with roles ranging from regulatory oversight to project implementation and long-term monitoring and management. Improving the efficiency and effectiveness of these efforts will require institutional commitment to a single, consolidated restoration forum with agency support and discretion to guide restoration strategies, plan investments, align individual agency plans and actions, and resolve barriers to implementation.

Increase Interagency Coordination and Support for Restoration Projects

Problem Statement

Broad, landscape scale changes are necessary to restore ecosystem functions in the Delta and Suisun Marsh. While coordination between State, federal and local agencies on ecosystem restoration has dramatically improved through forums such as the Delta Plan Interagency Implementation Committee and the Interagency Adaptive Management and Integration Team, slow progress in protecting and restoring the Delta ecosystem reveals an ongoing need to better coordinate plans and actions that contribute to ecosystem restoration.

Recommendations

New ER Recommendation "F". Support Implementation of Ecosystem Restoration (NEW)

Local, State and federal agencies should coordinate to support implementation of ecosystem restoration, and the Delta Plan Interagency Implementation Committee (DPIIC) should:

(a) Consider establishing an ecosystem restoration subcommittee.

(b) Develop strategies for acquisition and long-term ownership and management of lands necessary to achieve ecosystem restoration consistent with the guidance in Appendix Q2.

(c) Develop a funding strategy that identifies a portfolio of approaches to remove institutional barriers and fund Ecosystem Restoration Tier 1 or 2 actions within the Delta.

(d) Establish program-level endangered species permitting mechanisms that increase efficiency for Ecosystem Restoration Tier 1 or 2 actions within the Delta and its watershed.

(e) Coordinate with the Delta Science Program to align State, federal, and local resources for scientific support of restoration efforts, including adaptive management, data tools, monitoring, synthesis, and communication.

(f) *Develop a landscape-scale strategy for recreational access to existing and future restoration sites, where appropriate and while maintaining ecological value.*

New ER Recommendation "G". Align State Restoration Plans and Conservation Strategies with the Delta Plan (NEW)

Agencies should coordinate, and the Delta Plan Interagency Implementation Committee (DPIIC) should consider establishing a subcommittee, to align State, local, or regional restoration strategies, plans or programs in the Delta to be consistent with the priority attributes described in Appendix Q2. These include:

(a) The Delta Conservation Framework;

(b) The CVFPP Conservation Strategy;

(c) The Public Lands Strategy;

(d) Regional Conservation Investment Strategies;

(e) *Regional Conservation Strategies or Partnerships; and.*

(f) *San Francisco Bay and Suisun Marsh Conservation Strategies, Investments and Partnerships, as appropriate.*

Performance Measures

<<See Appendix E>>

References

Anderson, L. 2005. California's reaction to Caulerpa taxifolia: a model for invasive species rapid response. *Biological Invasions 2005(7):* 1003–1016.

Araki, H., B.A. Berejikian, M.J. Ford, and M.S. Blouin. 2008. Fitness of hatchery-reared salmonids in the wild. *Evolutionary Applications*, *1*(2): 342-355.

Beechie, T.J., D.A. Sear, J.D. Olden, R.G. Pess, J.M. Buffington, H. Moir, P. Roni, and M.M. Pollock. 2010. Process-based Principles for Restoring Ecosystems. *BioScience* 60(3): 209-222.

Blank, R.R., and J.A. Young. 2002. Influence of the exotic invasive crucifer, Lepidium latifolium, on soil properties and elemental cycling. *Soil Science*, *167*(12), 821-829.

Breitburg, D.L., B.C. Crump, J.O. Dabiri, and C.L. Gallegos. 2010. Ecosystem engineers in the pelagic realm: alteration of habitat by species ranging from microbes to jellyfish. *Integrative and Comparative Biology*, *50*(2): 188-200.

Buchanan, R.A., J. Skalski, P. Brandes, and A. Fuller. 2013. Route use and survival of juvenile Chinook salmon through the San Joaquin River Delta. *North American Journal of Fish Management* 33(1): 216-229.