

**California Department of Fish and Wildlife**  
**Ecosystem Priorities and Relative Environmental Values**

[DRAFT]

Proposition 1, the Water Quality, Supply, and Infrastructure Improvement Act of 2014, authorized \$2.7 billion dollars to the California Water Commission for public benefits associated with water storage projects that improve the operation of the state water system, are cost effective, and provide a net improvement in ecosystem and water quality conditions. Chapter 8 of Proposition 1 outlines the specific eligibility requirements for water storage projects to obtain Proposition 1 funds for their associated public benefits. (Water Code, §§ 79750-79760.) The California Water Commission (CWC) has named its competitive grant program to implement Chapter 8 the “Water Storage Investment Program” (WSIP).

Chapter 8 provides that the WSIP may only fund the public benefits portion of proposed water storage projects. Public benefits that may be funded are water quality improvements, flood control, emergency response, recreation, and ecosystem improvements. (Water Code, § 79753, subd. (a).) Water Code section 79756, subdivision (b), states that Chapter 8 funding will not be allocated to a project unless it is determined that at least 50 percent of the total public benefits funded for the project are ecosystem improvements; additionally, under Water Code, section 79752, projects may only receive funding if the project provides measurable improvements to the Delta ecosystem or to the tributaries to the Delta. Under Water Code, section 79753, subdivision (a)(1), ecosystem improvements may include, but are not limited to, changing the timing of water diversions, improvements in flow conditions, temperature, or other measurable improvements that help restore aquatic ecosystems and native fish and wildlife species. Consistent with direction in Water Code section 79754, the California Department of Fish and Wildlife (CDFW) is tasked with providing priorities and relative environmental values of ecosystem benefits to the CWC.

The ecosystem priorities and relative environmental values described in this document will support the evaluation of potential water storage projects. Projects with net improvements in ecosystem and water quality conditions will be considered in the review process.

**Ecosystem Priorities**

CDFW has jurisdiction over the conservation, protection and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species, and serves as the trustee for fish and wildlife resources. As such, CDFW manages California’s fish and wildlife resources for their ecological values as well as for their use and enjoyment by the public. CDFW bases its ecosystem priorities for the WSIP on existing environmental laws and regulations, species recovery plans and strategies, initiatives, and conservation plans.<sup>1</sup> These priorities address multiple levels of ecosystem

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<sup>1</sup> This includes but is not limited to the NOAA Fisheries Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead; State Wildlife Action Plan; Central Valley Joint Venture Implementation Plan, San Joaquin County Multi-Species Habitat Conservation Plan and Open

organization and processes including biotic and abiotic components of the environment. CDFW's highest priority species for the WSIP are species listed under the California or federal Endangered Species Act, as well as other sensitive or at-risk native species<sup>2</sup> that depend on the Delta and its tributaries for their survival. Fish species that meet one or more of these criteria include winter-run, spring-run, fall-run, and late-fall run Chinook salmon, Central Valley steelhead and rainbow trout, green sturgeon, white sturgeon, Delta smelt, longfin smelt, Pacific lamprey, and Sacramento splittail. In addition, aquatic, riparian, and wetland habitats that support migratory birds of the Pacific Flyway, neo-tropical migratory birds, and a variety of native reptiles, amphibians, mammals, and plants are also priorities for CDFW. Surface water and groundwater storage projects targeting these priorities will need to be implemented within an adaptive management framework that addresses species response to changing environmental conditions, including hydrologic variability and climate change.

- I. **Flow and Water Quality:** Impacts to native fish and wildlife species resulting from flow modifications and poor water quality are well-documented and can include adverse chemical, physical, and biological changes to water and habitat. More specifically, flow and water quality are major determinants of fish species abundance, distribution, and overall viability. As a result of the construction of dams, levees, and water diversions on major waterways, the historic natural hydrograph has been altered such that the magnitude, timing, duration, and stability of flows are insufficient to support native fishes in habitats that exist across the state, and degraded water quality conditions have impaired both the movement and health of now imperiled fish and wildlife species. Projects that produce a more natural hydrograph and provide appropriate water quality conditions will help support native fish and wildlife populations.

Listed below are essential ecosystem benefits that are associated with flow and water quality that could be realized by water storage projects:

- a) Provide cold water at times and locations to increase the survival of salmonid eggs and fry.
- b) Enhance flows to improve habitat conditions for in-river rearing and downstream migration of juvenile salmonids.
- c) Maintain flows and appropriate ramping rates at times and locations that will minimize dewatering of salmonid redds and prevent stranding of juvenile salmonids in side channel habitat.
- d) Increase flows to improve ecosystem water quality.
- e) Increase flows to support anadromous fish passage by providing adequate dissolved oxygen and lower water temperatures.
- f) Increase attraction flows during the upstream migration period to reduce straying of

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Space Plan, Draft Solano Multi-Species Habitat Conservation Plan, East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan, and Draft Recovery Plan for the Giant Garter Snake.

<sup>2</sup> This includes California Species of Special Concern, species proposed for listing or designated candidate species, U.S. Bureau of Land Management Sensitive, and U.S. Forest Service Sensitive.

anadromous species into non-natal tributaries.

- g) Increase Delta outflow to provide low salinity habitat for Delta smelt, longfin smelt and other estuarine fishes in the Delta, Suisun Bay, and Suisun Marsh.
- h) Maintain groundwater and surface water interconnections to support instream benefits and groundwater dependent ecosystems.

**II. Physical Processes and Habitat:** The alteration of the Delta watershed has fundamentally changed the physical, chemical, and biological characteristics of ecosystems in which native species have evolved. Over 80 percent of the Central Valley's historical floodplains, riparian, and wetland habitats have been lost in the past 150 years in part due to the construction of dams, levees, and water diversions as part of flood control and water delivery systems. These human activities have altered natural flow regimes, greatly reduced access to spawning and rearing habitats of native fish species, and increased competition between native and non-native species for food, space, and other resources. These human activities have impacted native fish and wildlife populations. Furthermore, loss of wetlands has reduced the quantity and quality of habitats for migratory birds and other species. Listed below are essential ecosystem benefits that are associated with physical processes and habitat that could be realized by water storage projects:

- a) Enhance flow regimes to improve the quantity and quality of riparian and floodplain habitats for aquatic and terrestrial species.
- b) Enhance floodplains by increasing the frequency, magnitude, and duration of floodplain inundation to enhance primary and secondary productivity and the growth and survival of fish.
- c) Enhance the temporal and spatial distribution and diversity of habitats to support all life stages of fish and wildlife species.
- d) Enhance access to fish spawning, rearing, and holding habitat by eliminating barriers to migration.
- e) Remediate unscreened or poorly screened diversions to reduce entrainment of fish.
- f) Provide water to enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species on state and federal wildlife refuges and on other public and private lands managed for ecosystem values.
- g) Develop and implement non-native invasive species management plans utilizing proven methods to enhance habitat and increase the survival of native species.
- h) Enhance habitat for native species that have commercial, recreational, scientific, and educational value.

### **Relative Environmental Values**

While the ecosystem priorities stated above are intended to be of equivalent importance, the extent to

which projects contribute to the desired ecosystem benefits may vary greatly. Project proposals should describe specific information such as number, magnitude, mix, location, duration, and timing of benefits. Project proposals should also include clearly stated goals and objectives for ecosystem improvements, including programs for monitoring and adaptive management and strategies for resilience in the face of climate change. The criteria listed below will be helpful to determine net ecosystem improvements.

- a) Number of ecosystem priorities addressed by the project.
- b) Magnitude and certainty of ecosystem improvements.
- c) Spatial and temporal scale of ecosystem improvements.
- d) Inclusion of an adaptive management and monitoring program that includes measurable objectives, performance measures, thresholds and triggers for managing ecosystem benefits.
- e) Immediacy of ecosystem improvement actions and realization of benefits.
- f) Duration of ecosystem improvements.
- g) Consistency with species recovery plans and strategies, initiatives, and conservation plans.
- h) Location of ecosystem improvements and connectivity to areas already being protected or managed for conservation values.
- i) Efficient use of water to achieve multiple ecosystem benefits.
- j) Resilience of ecosystem improvements to the effects of climate change.

## Definitions

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

- (a) “Adaptive management” as defined in Water Code 85052 means 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.
- (b) “Attraction flow” means water with appropriate chemistry, velocity, quantity, and location to attract fish migrating upstream.
- (c) “Certainty of ecosystem improvement” means the degree of confidence that the ecosystem improvement will benefit a species or habitat.
- (d) “Duration of ecosystem improvement” means the length of time an ecosystem improvement is expected to exist.
- (e) “Entrainment” means fish being transported along with the flow of water into unnatural or harmful environments.
- (f) “Groundwater dependent ecosystem” means communities of plants and animals dependent on groundwater emerging from aquifers and water tables.
- (g) “Immediacy of ecosystem improvement action” means how quickly an ecosystem improvement will be implemented in the project timeline.
- (h) “Magnitude of ecosystem improvement” means the quantifiable size and scale of the ecosystem improvement.
- (i) “Non–natal tributary” means any waterway that is not the stream or river where an anadromous fish was born.
- (j) “Delta outflow” as defined by the State Water Resources Control Board<sup>3</sup> means the Net Delta Outflow Index.

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<sup>3</sup> State Water Resources Control Board Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, December 2006.

- (k) "Ramping rate" means a progressive change in the discharge of water to a stream or river channel, measured as flow per unit time.
- (l) "Realization of benefit" means the expected time that a particular ecosystem improvement will achieve measurable and quantifiable outcomes.
- (m) "Resilience to the effects of climate change" means the flexibility a project will have through operations or other means to adapt to climate change, in order to maintain its ecosystem improvements.
- (n) "Spatial distribution" means the geographical arrangement of a habitat, phenomenon, or species in a given area.
- (o) "Spatial scale" means the geographical dimensions of an ecosystem improvement.
- (p) "Straying" means an anadromous fish migrating into a non-natal waterway.
- (q) "Temporal distribution" means the time of year or season in which an ecosystem improvement will occur.
- (r) "Temporal scale" means the scheduled time in which an ecosystem improvement action will be implemented such as a specific calendar date or after the achievement of a specific project landmark.
- (s) "Threshold" means, in the context of adaptive management, the magnitude or intensity of a specific metric that must be exceeded for a certain reaction, result, or condition to occur or be manifested.
- (t) "Trigger" means, in the context of adaptive management, an event or situation that occurs or exists that will require a management action.