Performance Measure 4.16: Acres of Natural Communities Restored

Performance Measure (PM) Component Attributes

Type: Outcome Performance Measure

Delta Plan Description

Restoring large areas of natural communities to provide for habitat connectivity and crucial ecological processes, along with supporting viable populations of native species.

Expectation

Increase of acres of natural communities for providing suitable habitat to fish and other wildlife.

Metric

Acres of natural communities restored. Evaluated every five years.

Baseline

Acres of natural communities from the California Department Fish and Wildlife (CDFW) Vegetation and Land Use Classification and Map of the Sacramento-San Joaquin River Delta and Suisun Marsh (VegCAMP 2007):

Riparian and Wetland Ecosystems	Existing Acres
Seasonal Wetland/Wet Meadow	5,029
Willow Riparian Scrub/Shrub Valley Foothill Riparian	14,167
Emergent Tidal Marsh	19,892

Upland Ecosystems	Existing Acres
Stabilized Interior Dune Vegetation	19
Oak Woodland/Savanna	0
Grassland	32,994
Vernal Pool Complex	5,029
Alkali Seasonal Wetland Complex	698

Target

Target acres of natural communities by 2050:

Riparian and Wetland Ecosystems	Target Acres (net increase from baseline)	Total Acres by 2050 (net increase and baseline acres)
Seasonal Wetland/Wet Meadow	19,000	24,029
Willow Riparian Scrub/Shrub Valley Foothill Riparian	16,300	30,467
Emergent Tidal Marsh	32,500	52,392

Upland Ecosystems	Target Acres (net increase from baseline)	Total Acres by 2050 (net increase and baseline acres)
Stabilized Interior Dune Vegetation	640	659
Oak Woodland/Savanna	13,000	13,000
Grassland	0	32,994
Vernal Pool Complex	670	5,699
Alkali Seasonal Wetland Complex	230	928

Basis for Selection

The wetland and riparian ecosystems of the Delta once supported productive food webs and rich arrays of native plant and animal species that contributed to exceptional biological diversity at a global scale (Myers et al. 2000). Historically, the Delta and Suisun Marsh supported more than 650,000 acres of natural communities including riparian, wetland, and oak savanna. More than 90% of those ecosystems have been lost through reclamation and land cover conversion to agriculture and urban land uses (Bay Institute 1998, Robinson et al. 2014). Re-establishment of some of these natural communities on the landscape as the result of process-based restoration—improving ecosystem processes such as primary production and energy transfer—is a critical step in native species recovery. Natural community restoration will provide the physical space, connectivity, and habitat structure that species populations currently lack, as well as providing critical ecological functions such as aquatic primary production and vegetation community succession. Multiple, interacting components of functional

landscape will foster resilient and enduring restoration and management outcomes that benefit both people and wildlife (Wiens at al. 2016).

Recovery goals and biodiversity targets play a key role in translating ecological science and policy into on the ground action (Tear et al. 2005). Science-based objectives are often used to provide a unified understanding of conservation objectives among stakeholders and to make progress toward measurable goals (Dybala et al. 2017a, Dybala et al. 2017b). Recovery plans provide comprehensive guidance on the restoration and management of ecosystems based on the biology of the most threatened and endangered species (USFWS 2013).

Planning and management efforts, such as recovery plans, species-specific resiliency strategies, and conservation strategies identify specific actions for ecosystem preservation and restoration to meet species needs. Most of these efforts are focused on benefiting a single species or suite of similar species (e.g., riparian birds), but collectively, these plans provide valuable insight into the scale of ecosystem preservation, enhancement, and restoration necessary to benefit the multitude of species which rely upon the Delta ecosystem. At least 11 recovery and conservation plans exist which have geographic coverage in the Delta and Suisun Marsh (DSC 2018). These plans identify restoration and management actions needed to achieve recovery of 35 species of special status plants and 86 fish and wildlife species of conservation concern (DSC 2013, Delta Plan Chapter 4 Appendix 4 Conservation and Recovery Plan Target Species). Nearly half of these species of conservation concern are endemic to the California floristic province, heightening the importance of recovering and conserving their populations in alignment with global conservation priorities (Wilson et al. 2006, Brum et al. 2017).

Restoration targets put forward by recovery and conservation plans are organized by the historical natural community types outlined in the Sacramento-San Joaquin Delta Historical Ecology Investigation: Exploring Pattern and Process (Whipple et al. 2012).

The historical natural community types are classified by plant community structure and physical characteristics such as hydrology and landscape position. Similarly, modern habitat types use the same classification by plant communities (Robinson et al. 2014). Importantly, the natural communities described in both Whipple (2012) and Robinson et al. (2014) are derived from VegCAMP, which uses the National Vegetation Classification System to organize species assemblages (Hickson & Keeler-Wolf 2007).

Restoration of complex ecosystems will require re-establishment of native vegetation communities, and the underlying processes that support their recruitment, disturbance regimes, and community succession. Restoring a variety of native vegetation cover types can promote ecological resilience and enhance native biodiversity by providing a range of habitat options for species, thus expanding the types and numbers of species that a landscape can support. It can take many years for a restored habitat to establish.

Linkage to Delta Reform Act and the Coequal Goals

Delta Reform Act: WC 85302(c)(1), WC 85302(c)(3), WC 85302(c)(4), WC 85302(c)(5)

This performance measure tracks the acres of natural communities as a measure of the status and trend of the health of the Delta's estuary and wetland ecosystem for supporting viable populations, habitats, and processes (WC 85211(a)).

Achieving the target acres of the natural communities would provide diverse and functional habitats that support the following characteristics of a healthy Delta ecosystem:

- "Viable populations of native and resident and migratory species" ((WC 85302(c)(1)). Native resident and migratory species rely on natural habitats for their life cycle and the ecosystem functions they provide.

- "Diverse and biologically appropriate habitats and ecosystem processes" (WC 85302(c)(3)); Restored and large areas of natural communities provide diverse habitats and ecosystem processes such as primary production and energy transfer.

- "Reduced threats and stresses on the Delta Ecosystem" (WC 85302(c)(4)); Large areas of restored natural communities support native species capacity to respond to changing environmental conditions.

- "Conditions conducive to meeting or exceeding the goals in existing species recovery plans and state and federal goals with respect to doubling salmon populations" (WC 85302(c)(5)). Target acres for seasonal floodplain and tidal marsh support rearing habitat needs to help recover wild salmon to meet the 1992 CVPIA salmon doubling goal.

Delta Plan Core Strategy: 4.2 Restore Ecosystem Function, 4.4 Protect Native Species and Reduce the Impact of Nonnative Invasive Species

Methods

Baseline Methods

Acres of the natural communities were derived from CDFW VegCAMP (2007) and an application of a crosswalk method described in the Central Valley Flood Protection Plan (CVFPP 2017) and Robinson et al. (2014). The VegCAMP maps vegetation in the Delta from field observations and high-resolution digital imagery, and classifies the vegetation based on the [National Vegetation Classification Standard](http://usnvc.org) (http://usnvc.org). Vegetation classification (pickleweed, broadleaf-cattail, etc.) from the VegCAMP was crosswalked to community types (i.e., alkali seasonal wetland complex, valley foothill riparian, etc.) found in Robinson et al. (2014, Appendix A, pages 102 – 105).

Target and Analysis Methods

Targets for each natural community type are derived from conservation and restoration targets identified in conservation and recovery plans within the Delta and Suisun Marsh (DSC 2013, Delta Plan Chapter 4 Appendix 4, Conservation and Recovery Plan Target Species). These conservation and recovery plans include duplicative actions (e.g., Central Valley Flood Protection Plan, Giant Garter Snake Recovery Plan, and Tidal Marsh Recovery Plan include targets for emergent tidal marsh).

Riparian and Wetland Ecosystems	Target Acres (net increase)	Plan
Seasonal Wetland/Wet Meadow	19,000	Central Valley Flood Protection Plan (CVFPP 2017b)
Willow Riparian Scrub/Shrub Valley Foothill Riparian	16,300	Central Valley Joint Venture Implementation Plan (Dybala et al. 2017b)
Emergent Tidal Marsh	32,500	Central Valley Flood Protection Plan (CVFPP 2017b)*

Upland Ecosystems	Target Acres (net increase)	Plan
Stabilized Interior Dune Vegetation	640	A Delta Transformed (SFEI-ASC 2014)
Oak Woodland/Savanna Grassland	13,000	Central Valley Joint Venture Implementation Plan (DiGaudio et al. 2017b)
Vernal Pool Complex	670	Conservation Measure 9, Bay Delta Conservation Plan (CDWR 2013)
Alkali Seasonal Wetland Complex	230	Conservation Measure 9, Bay Delta Conservation Plan (CDWR 2013)

Table of net increase of target acres (net increase) and associated planning documents. Targets from recovery and conservation plans with geographically larger footprint than the Delta and Suisun Marsh, such as the Central Valley, have been proportionally downscaled.

*Emergent Tidal Marsh targets identified in Giant Garter Snake Recovery Plan (USFWS 2017), Tidal Marsh Recovery Plan (USFWS 2013), Suisun Marsh Habitat Management Plan (USBR, USFWS, CDFW 2013), Fish Restoration Program Agreement (CDWR, CDFW 2008) are included within the 32,500 target from the Central Valley Flood

Protection Plan.

The conservation and restoration targets for Seasonal Wetland/Wet Meadow and Emergent Tidal Marsh are based on quantitative goals in the 2017 Central Valley Flood Protection Program (CVFPP), Appendix H, pg. H-4-6 to H-4-8. The CVFPP identified numeric targets for Central Valley floodplain and tidal marsh. These targets were identified based on the modeled estimation of rearing habitat area required to help recover spring and fall-run Chinook salmon to meet the 1992 CVPIA salmon doubling goal. These Central Valley numeric target values were downscaled to Delta and Suisun Marsh (52% of the Lower Sacramento Conservation Planning Area and 67% of the Lower San Joaquin Conservation Planning Area fall within the Delta) for this performance measure.

The conservation targets of the Willow Riparian Scrub/Shrub and Valley Foothill Riparian habitat types, and the Oak Woodland Savanna are based on population and habitat objectives for avian conservation in the Delta region of the Central Valley Joint Venture (Dybala et al. 2017b). The Willow Riparian Scrub/Shrub and Valley Foothill Riparian target of 16,300 was proportionally scaled for the Delta from the Central Valley (27.62% in Delta out of the total Central Valley acres).

Data Sources

Primary Data Sources

1. VegCAMP. Delta Vegetation and Land Use [ds292]. Biogeographic Information and Observation System (BIOS). California Department of Fish and Wildlife. https://data.ca.gov/dataset/delta-vegetation-and-land-use-ds292

    a) Content: The VegCAMP data set has taxonomy for vegetation that is then assigned to appropriate habitat types in the Delta.

    b) Update frequency: Every 5 years. Current update for 2016 vegetation map data to be available in 2019.

2. VegCAMP. Vegetation - Suisun Marsh [ds2676]. Biogeographic Information and Observation System (BIOS). California Department of Fish and Wildlife. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=149178&inline

    a) Content: 2015 Suisun Marsh vegetation map.

    b) Update frequency: Every 5 years.

Alternative Data Sources

Alternative data sources will be used if the primary data sources become unavailable or insufficient. Alternative data sources can be used concurrently with the primary data sources depending on best available science and the availability of the primary source.

3. San Francisco Estuary Institute (SFEI). 1998. [Bay Area EcoAtlas V1.50b4 1998](): Geographic Information System of wetland habitats past and present. https://www.ecoatlas.org/regions/ecoregion/bay-delta.

   a) Content: EcoAtlas is a mapping tool for restoration projects and provides access to acres of habitat types to be restored by a project (Project Tracker).

   b) Update frequency: Frequency of restoration project updates varies.

Process

Data Collection

Data is collected from VegCAMP updates and crosswalked to the natural community types. The Delta VegCAMP and Suisun Marsh VegCAMP are updated every five years. DSC will process the data every five years. Afterwards, acres of each community will be mapped and calculated.

VegCAMP updates follow a consistent vegetation mapping and classification methodology. A VegCAMP update based on the 2016 National Agricultural Imagery Program dataset is to be completed in 2019.

Reporting

Reporting of this performance measure will include maps comparing the acres of natural community restoration progress from the baseline to the current status. Maps will be linked to the tables that indicate the change of acres of each community compared to the baseline.

References

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Central Valley Flood Plain Protection Plan. 2017b. Appendix H. Central Valley Chinook Salmon Rearing Habitat Required to Satisfy the Anadromous Fish Restoration Program Doubling Goal. http://cvfpb.ca.gov/wp-content/uploads/2017/08/ConservStrat-App-H-Chinook-Salmon-Rearing-Habitat.pdf

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Appendices

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