

Attachment 3. Study Needs For At Risk Species From Multi-species Conservation Strategy.

<b>Essential Studies and Surveys Needed to Achieve Recovery Goals<sup>a</sup></b>
<p><b>Riparian Brush Rabbit (“r”).</b> Identify appropriate methods for implementing a captive breeding program, capturing and handling individuals from wild populations, and reintroducing individuals to establish new populations in suitable existing or restored habitat areas within the riparian brush rabbit’s historic range. Coordinate with the California Department of Parks and Recreation to develop an emergency plan and monitoring system to quickly save individuals and habitat at Caswell Memorial State Park in the event of flooding, wildfire, or epidemic.</p>
<p><b>San Joaquin Valley Woodrat (“r”).</b> Map suitable habitat, and locate woodrat populations along portions of the San Joaquin River and its major tributaries within its historic range. Identify appropriate methods for implementing a captive breeding program, capturing and handling individuals from wild populations, and reintroducing individuals to establish new populations within its historic range in suitable existing or restored habitat areas.</p>
<p><b>Giant Garter Snake (“r”).</b> Conduct research to better determine the giant garter snake’s ecological requirements. Locate species populations, and determine distribution in the Delta Region to help identify additional actions that should be implemented to recover Delta populations. Research the feasibility of reintroducing the giant garter snake into suitable unoccupied existing and restored habitats in the Delta, Sacramento River, and San Joaquin River Regions.</p>
<p><b>Central Valley Fall-/Late-Fall-Run Chinook Salmon ESU (“R”).</b> Identify methods for conducting a population census and determining the distribution of spawning fish in Central Valley streams.</p>
<p><b>Green Sturgeon (“R”).</b> Continue to conduct research on the species’ ecological needs, focusing primarily on addressing appropriate harvest levels, and to analyze the operations of upstream migration barriers such as Red Bluff Diversion Dam.</p>
<p><b>Delta Green Ground Beetle (“r”).</b> Survey suitable habitat, including large pools associated with pescadero soils, to establish the current species range. Conduct research to develop a greater understanding of the species’ life history, including larval requirements and the ecology of prey species (especially springtail). Use the results of the research to understand habitat requirements and develop management prescriptions to promote and ensure population viability. Identify appropriate methods for reintroduction to establish new populations within the species’ historic range.</p>
<p><b>Lange’s Metalmark (“R”).</b> Identify appropriate methods for propagating the Lange’s metalmark butterfly’s host plant, a subspecies of the naked buckwheat (<i>Eriogonum nudum</i> var. <i>auriculatum</i>), and for establishing host plant populations in enhanced and restored habitat.</p>
<p><b>Alkali Milkvetch (“r”).</b> Conduct inventory and surveys to determine species status and distribution, and define restoration needs.</p>
<p><b>Antioch Dunes Evening-Primrose (“R”).</b> Identify appropriate methods for propagating the plant and for establishing species populations in enhanced and restored habitat.</p>
<p><b>Suisun Thistle (“R”).</b> Research habitat requirements and reasons for rarity. Determine microhabitat requirements and habitat management needs necessary to design and implement habitat enhancement and management measures.</p>
<p><b>Soft Bird’s-Beak (“R”).</b> Research habitat requirements and reasons for rarity. Determine microhabitat requirements, including salinity, and other habitat management needs.</p>

Conditional Studies and Surveys<sup>a, b</sup>

**Salt Marsh Harvest Mouse (“r”).** Conduct research to better determine the salt marsh harvest mouse’s ecological requirements. Use the results of the research when designing and managing restored and enhanced habitat areas to benefit the species. Identify feasible methods for controlling invasive non-native marsh plants and reintroducing the salt marsh harvest mouse into unoccupied suitable enhanced habitats and restored habitat areas.

**San Pablo California Vole (“r”).** Identify feasible methods for controlling invasive non-native marsh plants and reintroducing the San Pablo California vole into unoccupied suitable enhanced habitats and restored habitat areas.

**Suisun Ornate Shrew (“R”).** Conduct research to better determine the Suisun ornate shrew’s ecological requirements. Use the results of the research when designing and managing restored and enhanced habitat areas.

**Delta Smelt (“R”).** Determine appropriate methods for rearing delta smelt in captivity; evaluate the need to acquire rearing facilities if delta smelt populations continue to decline after restoration actions begin

**Sacramento Perch (“r”).** Determine appropriate methods for rearing Sacramento perch in captivity; evaluate the need to acquire rearing facilities to provide fish for introductions if Sacramento perch populations continue to decline after restoration actions begin. Determine methods for reestablishing populations in habitats not populated by non-native predators and identify suitable locations for establishing additional populations.

**Valley Elderberry Longhorn Beetle (“R”).** Determine the maximum distance the species can disperse from occupied habitat to colonize suitable unoccupied habitat.

**Alkali Milkvetch (“r”).** Research applicable reintroduction techniques so that the species can be reintroduced to portions of its historic range where it is extirpated.

**Bristly Sedge (“r”).** Research habitat requirements and potential conservation measures. Design conservation measures based on the results of the research.

**Delta Coyote-Thistle (“r”).** Research the species’ ecology to formulate strategies for recovery.

**Delta Mudwort (“r”).** Research the extent and physical and biological qualities of existing habitat and populations prior to levee or restoration actions.

**Mason’s Lilaopsis (“R”).** Conduct research into the extent and physical and biological qualities of existing habitat and populations before levee or restoration actions begin.

**Northern California Black Walnut (“r”).** Research species ecology (such as dispersal mechanisms and use by other species). Use the results of the research to form restoration, protection, and management strategies for contributing to species recovery.

**Suisun Thistle (“R”).** Study vulnerability to hybridization with non-native *Cirsium* species, and design measures to control non-native *Cirsium* where hybridization is likely to occur. Study vulnerability to agents for biological control of non-native thistles, and design actions to reduce the effects of these agents when effects are likely.

Notes:

<sup>a</sup> Species goals shown in parentheses.

<sup>b</sup> To be implemented if conservation measures not to produce expected levels of species