

## **Introduction**

This section describes recent changes to the existing environmental conditions and regulatory setting of the Project area, summarizes the unchanged affected environment, and describes changed environmental effects related to wildlife for the Project. This section contains a review and update of the 1995 DEIR/EIS wildlife impact assessment, incorporated by reference in the 2001 FEIR. The wildlife impacts of the Project were analyzed most recently in the 2001 FEIS, which also served as a basis for this analysis. Fishery resources are discussed in Section 4.5.

The 2001 FEIR and 2001 FEIS concluded that impacts of the Project on wildlife were associated with the conversion of existing habitats (primarily agricultural) to reservoir uses on the Reservoir Islands or to habitat types managed specifically to provide high wildlife habitat values on the habitat islands.

Under Alternatives 1 and 2, the habitat islands (Bouldin Island and Holland Tract) would be managed primarily to offset wildlife impacts resulting from operation of the Reservoir Islands. Implementation of the HMP developed for the Habitat Islands would result in creation of seasonal managed wetlands, emergent marshes, seasonal ponds, lakes, herbaceous uplands, riparian woodland and scrub habitats, pastures, and corn and wheat fields that would be managed specifically to provide high wildlife habitat values. In addition to offsetting Project impacts on wildlife, implementation of the HMP was expected to benefit many special-status and other wildlife species. In general, flooding the Reservoir Islands was expected to result in a loss of habitat, and implementing the HMP would result in a gain in habitat.

Other impacts on wildlife from implementation of the Project alternatives included potential increased incidence of waterfowl disease; temporary construction impacts on state-listed species; disturbance of greater sandhill crane and waterfowl from use of the Bouldin Island airstrip; losses of upland habitats, foraging habitats for wintering waterfowl, upland game species habitats, foraging habitat for Aleutian Canada goose, and wintering habitat for tricolored blackbird; losses of riparian and herbaceous habitats; disruption of waterfowl use and of greater sandhill crane use of the Habitat Islands as a result of increased hunting; increases in waterfowl harvest mortality; potential changes in local and regional

waterfowl use patterns; and potential effects on wildlife and wildlife habitats resulting from Delta outflow changes.

New impacts are identified for western pond turtle, giant garter snake, several bird species, and bats. Implementation of the environmental commitments, including the final HMP, is expected to mitigate effects on these species. A substantial increase in the severity of impacts is not anticipated because the final HMP is still expected to mitigate Project effects.

## Summary of Impacts

Table 4.7-1 provides a summary and comparison of the impacts and mitigation measures for wildlife from the 2001 FEIR, 2001 FEIS, and this Place of Use EIR.

**Table 4.7-1.** Comparison between Delta Wetlands Project 2010 Place of Use EIR and 2001 FEIR and 2001 FEIS Impacts and Mitigation Measures for Wildlife

2001 FEIR and 2001 FEIS Impacts and Mitigation Measures	Differences between 2010 Place of Use EIR and 2001 FEIR and 2001 FEIS Impacts and Mitigation Measures
<b>ALTERNATIVES 1 AND 2</b>	
<b>Impact H-1:</b> Loss of Upland Habitats (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-6:</b> Loss of Upland Habitats (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-2:</b> Increase in Suitable Wetland Habitats for Nongame Water and Wading Birds (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-7:</b> Increase in Suitable Wetland Habitats for Nongame Water and Wading Birds (B and LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-3:</b> Loss of Foraging Habitats for Wintering Waterfowl (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-8:</b> Loss of Foraging Habitats for Wintering Waterfowl (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-4:</b> Increase in Suitable Breeding Habitats for Waterfowl (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-9:</b> Increase in Suitable Breeding Habitats for Waterfowl (B and LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-5:</b> Loss of Habitats for Upland Game Species (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-10:</b> Loss of Habitats for Upland Game Species (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-6:</b> Increase in Suitable Foraging Habitat for Greater Sandhill Crane (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-11:</b> Loss of Suitable Foraging Habitat for Greater Sandhill Crane (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-7:</b> Increase in Suitable Roosting Habitat for Greater Sandhill Crane (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-12:</b> Increase in Suitable Roosting Habitat for Greater Sandhill Crane (B and LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-8:</b> Increase in Suitable Foraging Habitat for Swainson’s Hawk (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-13:</b> Loss of Suitable Foraging Habitat for Swainson’s Hawk (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-9:</b> Increase in Suitable Nesting Habitat for Swainson’s Hawk (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-14:</b> Loss of Suitable Nesting Habitat for Swainson’s Hawk, Cooper’s Hawk, and White-Tailed Kite (LTS) <b>Mitigation:</b> No mitigation is required.

<b>2001 FEIR and 2001 FEIS Impacts and Mitigation Measures</b>	<b>Differences between 2010 Place of Use EIR and 2001 FEIR and 2001 FEIS Impacts and Mitigation Measures</b>
<b>Impact H-10:</b> Loss of Foraging Habitat for Aleutian Canada Goose (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-17:</b> Loss of Foraging Habitat for Cackling (Aleutian Canada) Goose (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-11:</b> Increase in Suitable Nesting Habitat for Northern Harrier (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-18:</b> Loss of Suitable Nesting and Foraging Habitat for Northern Harrier and Short-Eared Owl (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-12:</b> Loss of Wintering Habitat for Tricolored Blackbird (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-19:</b> Loss of Winter Foraging Habitat for Tricolored Blackbird (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-13:</b> Increase in Suitable Nesting Habitat for Tricolored Blackbird (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-20:</b> Change in Acreage of Suitable Nesting Habitat for Tricolored Blackbird (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-14:</b> Increase in Suitable Habitats for Special-Status Wildlife Species (B) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-21:</b> Increase in Suitable Habitats for Special-Status Bird Species (B and LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-15:</b> Temporary Construction Impacts on State-Listed Species (LTS-M) <b>Mitigation Measure H-1:</b> Develop and Implement a Construction Mitigation Plan for the Reservoir Islands	See analysis and mitigation for individual species effects.
<b>Impact H-16:</b> Disturbance to Greater Sandhill Cranes and Wintering Waterfowl from Aircraft Operations (LTS-M) <b>Mitigation Measure H-2:</b> Monitor Effects of Aircraft Flights on Greater Sandhill Cranes and Wintering Waterfowl and Implement Actions to Reduce Aircraft Disturbances of Wildlife	<b>Impact W-23:</b> Disturbance to Greater Sandhill Cranes and Wintering Waterfowl from Aircraft Operations (LTS-M) <b>Mitigation Measure W-MM-1:</b> Monitor Effects of Aircraft Flights on Greater Sandhill Cranes and Wintering Waterfowl and Implement Actions to Reduce Aircraft Disturbances of Wildlife
<b>Impact H-17:</b> Potential for Increased Incidence of Waterfowl Diseases (LTS-M) <b>Mitigation Measure H-3:</b> Monitor Waterfowl Populations for Incidence of Disease and Implement Actions to Reduce Waterfowl Mortality	<b>Impact W-24:</b> Potential for Increased Incidence of Waterfowl Diseases (LTS-M) <b>Mitigation Measure W-MM-2:</b> Monitor Waterfowl Populations for Incidence of Disease and Implement Actions to Reduce Waterfowl Mortality
<b>Impact H-18:</b> Potential Disruption of Waterfowl Use as a Result of Increased Hunting (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-25:</b> Potential Disruption of Waterfowl Use as a Result of Increased Hunting (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-19:</b> Potential Disruption of Greater Sandhill Crane Use of the Habitat Islands as a Result of Increased Hunting (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-26:</b> Potential Disruption of Greater Sandhill Crane Use of the Habitat Islands as a Result of Increased Hunting (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-20:</b> Increase in Waterfowl Harvest Mortality (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-27:</b> Increase in Waterfowl Harvest Mortality (LTS) <b>Mitigation:</b> No mitigation is required.
<b>Impact H-21:</b> Potential Changes in Local and Regional Waterfowl Use Patterns (LTS) <b>Mitigation:</b> No mitigation is required.	<b>Impact W-28:</b> Potential Changes in Local and Regional Waterfowl Use Patterns (LTS) <b>Mitigation:</b> No mitigation is required.

2001 FEIR and 2001 FEIS Impacts and Mitigation Measures	Differences between 2010 Place of Use EIR and 2001 FEIR and 2001 FEIS Impacts and Mitigation Measures
<p><b>Impact H-22:</b> Potential Effects on Wildlife and Wildlife Habitats Resulting from Delta Outflow Changes (LTS)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-29:</b> Potential Impacts on Wildlife and Wildlife Habitats Resulting from Delta Outflow Changes (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-1:</b> Potential Injury or Mortality of, and Potential Loss of Suitable Habitat for, Valley Elderberry Longhorn Beetle (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-2:</b> Potential Injury or Mortality of Western Pond Turtle (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-3:</b> Loss of Suitable Aquatic and Upland Habitat for Western Pond Turtle (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-4:</b> Potential Injury or Mortality of Giant Garter Snake (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-5:</b> Loss of Suitable Aquatic and Upland Habitat for Giant Garter Snake (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-15:</b> Loss of Suitable Breeding/Wintering Habitat for Western Burrowing Owl (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-16:</b> Loss of Suitable Foraging Habitat for Cooper’s Hawk, White-Tailed Kite, Western Burrowing Owl, and Loggerhead Shrike (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-22:</b> Potential Injury or Mortality of Northern Harrier, Cooper’s Hawk, Swainson’s Hawk, White-Tailed Kite, California Black Rail, Greater Sandhill Crane, Western Burrowing Owl, Short-Eared Owl, Loggerhead Shrike, and Non-Special-Status Migratory Birds (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-30:</b> Loss of Roost Sites and Foraging Habitat for and Potential Injury or Mortality of Bats (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
<b>ALTERNATIVE 3</b>	
<p><b>Impact H-23:</b> Loss of Upland Habitats (LTS-M)  <b>Mitigation Measure H-4:</b> Develop and Implement an Offsite Wildlife Habitat Mitigation Plan</p>	<p><b>Impact W-6:</b> Loss of Upland Habitats (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
<p><b>Impact H-24:</b> Loss of Foraging Habitats for Wintering Waterfowl (LTS-M)  <b>Mitigation Measure H-4:</b> Develop and Implement an Offsite Wildlife Habitat Mitigation Plan</p>	<p><b>Impact W-8:</b> Loss of Foraging Habitats for Wintering Waterfowl (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>

<b>2001 FEIR and 2001 FEIS Impacts and Mitigation Measures</b>	<b>Differences between 2010 Place of Use EIR and 2001 FEIR and 2001 FEIS Impacts and Mitigation Measures</b>
<p><b>Impact H-25:</b> Increase in Suitable Breeding Habitats for Waterfowl (B)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-9:</b> Increase in Suitable Breeding Habitats for Waterfowl (B and LTS)  <b>Mitigation:</b> No mitigation is required</p>
<p><b>Impact H-26:</b> Loss of Habitats for Upland Game Species (LTS-M)  <b>Mitigation Measure H-4:</b> Develop and Implement an Offsite Wildlife Habitat Mitigation Plan</p>	<p><b>Impact W-10:</b> Loss of Habitats for Upland Game Species (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
<p><b>Impact H-27:</b> Loss of Foraging Habitat for Greater Sandhill Crane  <b>Mitigation Measure H-4:</b> Develop and Implement an Offsite Wildlife Habitat Mitigation Plan</p>	<p><b>Impact W-11:</b> Loss of Suitable Foraging Habitat for Greater Sandhill Crane (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
<p><b>Impact H-28:</b> Loss of Foraging Habitat for Swainson’s Hawk (LTS-M)  <b>Mitigation Measure H-4:</b> Develop and Implement an Offsite Wildlife Habitat Mitigation Plan</p>	<p><b>Impact W-13:</b> Loss of Suitable Foraging Habitat for Swainson’s Hawk (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
<p><b>Impact H-29:</b> Loss of Foraging Habitat for Aleutian Canada Goose (LTS)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-14:</b> Loss of Suitable Nesting Habitat for Swainson’s Hawk, Cooper’s Hawk, and White-Tailed Kite (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
<p><b>Impact H-30:</b> Loss of Nesting Habitat for Northern Harrier (LTS-M)  <b>Mitigation Measure H-4:</b> Develop and Implement an Offsite Wildlife Habitat Mitigation Plan</p>	<p><b>Impact W-17:</b> Loss of Foraging Habitat for Cackling (Aleutian Canada) Goose (LTS)  <b>Mitigation:</b> No mitigation is required.</p> <p><b>Impact W-18:</b> Loss of Suitable Nesting and Foraging Habitat for Northern Harrier and Short-Eared Owl (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
<p><b>Impact H-31:</b> Loss of Wintering Habitat for Tricolored Blackbird (LTS)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-19:</b> Loss of Winter Foraging Habitat for Tricolored Blackbird (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
<p><b>Impact H-32:</b> Temporary Construction Impacts on State-Listed Species (LTS-M)  <b>Mitigation Measure H-1:</b> Develop and Implement a Construction Mitigation Plan for the Reservoir Islands</p>	<p><b>Impact W-20:</b> Change in Acreage of Suitable Nesting Habitat for Tricolored Blackbird (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p> <p>See analysis and mitigation for individual species effects.</p>

2001 FEIR and 2001 FEIS Impacts and Mitigation Measures	Differences between 2010 Place of Use EIR and 2001 FEIR and 2001 FEIS Impacts and Mitigation Measures
<p><b>Impact H-33:</b> Potential for Increased Incidence of Waterfowl Diseases (LTS-M)  <b>Mitigation Measure H-3:</b> Monitor Waterfowl Populations for Incidence of Disease and Implement Actions to Reduce Waterfowl Mortality</p>	<p><b>Impact W-24:</b> Potential for Increased Incidence of Waterfowl Diseases (LTS-M)  <b>Mitigation Measure W-MM-2:</b> Monitor Waterfowl Populations for Incidence of Disease and Implement Actions to Reduce Waterfowl Mortality</p>
<p><b>Impact H-34:</b> Potential Disruption of Waterfowl Use as a Result of Increased Hunting (LTS)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-25:</b> Potential Disruption of Waterfowl Use as a Result of Increased Hunting (LTS)  <b>Mitigation:</b> No mitigation is required</p>
<p><b>Impact H-35:</b> Increase in Waterfowl Harvest Mortality (LTS)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-27:</b> Increase in Waterfowl Harvest Mortality (LTS)  <b>Mitigation:</b> No mitigation is required</p>
<p><b>Impact H-36:</b> Potential Changes in Local and Regional Waterfowl Use Patterns (LTS)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-28:</b> Potential Changes in Local and Regional Waterfowl Use Patterns (LTS)  <b>Mitigation:</b> No mitigation is required</p>
<p><b>Impact H-37:</b> Potential Effects on Wildlife and Wildlife Habitats Resulting from Delta Outflow Changes (LTS)  <b>Mitigation:</b> No mitigation is required.</p>	<p><b>Impact W-29:</b> Potential Impacts on Wildlife and Wildlife Habitats Resulting from Delta Outflow Changes (LTS)  <b>Mitigation:</b> No mitigation is required.</p>
	<p><b>Impact W-1:</b> Potential Injury or Mortality of, and Potential Loss of Suitable Habitat for, Valley Elderberry Longhorn Beetle (LTS-M)  <b>Mitigation Measure W-MM-3:</b> Avoid or Compensate for the Loss of Habitat for the Valley Elderberry Longhorn Beetle</p>
	<p><b>Impact W-2:</b> Potential Injury or Mortality of Western Pond Turtle (LTS-M)  <b>Mitigation Measure W-MM-4:</b> Avoid and Minimize Injury and Mortality of Western Pond Turtle</p>
	<p><b>Impact W-3:</b> Loss of Suitable Aquatic and Upland Habitat for Western Pond Turtle (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
	<p><b>Impact W-4:</b> Potential Injury or Mortality of Giant Garter Snake (LTS-M)  <b>Mitigation Measure W-MM-6:</b> Avoid and Minimize Injury and Mortality of Giant Garter Snake</p>
	<p><b>Impact W-5:</b> Loss of Suitable Aquatic and Upland Habitat for Giant Garter Snake (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
	<p><b>Impact W-15:</b> Loss of Suitable Breeding/Wintering Habitat for Western Burrowing Owl (LTS-M)  <b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>

2001 FEIR and 2001 FEIS Impacts and Mitigation Measures	Differences between 2010 Place of Use EIR and 2001 FEIR and 2001 FEIS Impacts and Mitigation Measures
	<p><b>Impact W-16:</b> Loss of Suitable Foraging Habitat for Cooper’s Hawk, White-Tailed Kite, Western Burrowing Owl, and Loggerhead Shrike (LTS-M)</p> <p><b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p>
	<p><b>Impact W-22:</b> Potential Injury or Mortality of Northern Harrier, Cooper’s Hawk, Swainson’s Hawk, White-Tailed Kite, California Black Rail, Greater Sandhill Crane, Western Burrowing Owl, Short-Eared Owl, Loggerhead Shrike, and Non–Special-Status Migratory Birds (LTS-M)</p> <p><b>Mitigation Measure W-MM-7:</b> Prepare a Construction Implementation Plan to Avoid Impacts on Roosting and Nesting Birds</p>
	<p><b>Impact W-30:</b> Loss of Roost Sites and Foraging Habitat for and Potential Injury or Mortality of Bats (LTS-M)</p> <p><b>Mitigation Measure W-MM-5:</b> Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan</p> <p><b>Mitigation Measure W-MM-8:</b> Conduct Preconstruction Surveys for Roosting Bats and Compensate for Loss of Roosting Habitat If Bats Are Found</p>

Note: SU = Significant and unavoidable; LTS = Less than significant; LTS-M = Less than significant with mitigation; B = Beneficial.

## Summary of Changes, New Circumstances, and New Information

### Substantial Changes in the Project

Since the 2001 FEIR and 2001 FEIS, there have been no substantial changes to the Project design regarding wildlife resources. Project operations have not substantially changed, although the diversion and discharge periods likely will change to be more protective of biological resources consistent with new circumstances and new information. The Project will obtain revised BOs from DFG, USFWS, and NMFS, and a Final Habitat Management Plan (HMP) is now included as an environmental commitment.

### New Circumstances

Since the 2001 FEIR and 2001 FEIS, several changes have occurred that have resulted in modifications to the affected environment and environmental effects on wildlife. Two species, bald eagle and cackling (Aleutian Canada) goose, have

been removed from the federal listing under the ESA, and two species (Cooper's hawk and ferruginous hawk) no longer are considered California species of special concern (California Department of Fish and Game 2009).

Regional conservation planning efforts have proceeded in urbanized areas of both counties and is currently occurring in the Delta related to fish, but the Project area is not included in these conservation plans. Otherwise, there are no new circumstances surrounding the Project.

## New Information

New information regarding the presence of special-status wildlife on the Project islands has been obtained through surveys conducted by the DWR during 2002–2003 and through a search of the current version of the CNDDDB (2009) (see Special-Status Species below). In addition, updated lists of Threatened and Endangered species that may occur in the Project area were obtained from the USFWS website (U.S. Fish and Wildlife Service 2009). Using this information, discussions for several special-status wildlife species (e.g., western pond turtle, giant garter snake) have been added to this report.

Habitat information in the 2001 FEIR and 2001 FEIS was based on 1988 conditions. Since 1988, the types and distribution of crops and distribution of wetlands on the islands have changed, with the greatest changes occurring on Holland Tract. Crop data from 2002–2008 (Table 4.6-4), information from DWR surveys (California Department of Water Resources 2003), aerial photo interpretation, and wetland mapping by ICF Jones & Stokes during a 2008 field survey were used where appropriate to revise the impacts and mitigation for impacts on particular special-status species.

The key sources of data and information used to assess changes in the environmental setting following the publication of the 2001 FEIR and 2001 FEIS that relate to wildlife are listed below.

- A CNDDDB records search within a 5-mile radius of the Project islands, which included all or a portion of the Woodward Island, Brentwood, Bouldin Island, Jersey Island, Rio Vista, Isleton, Thornton, Terminous, and Holt USGS 7.5-minute quadrangles (California Natural Diversity Database 2009).
- A USFWS list (dated June 3, 2009) of Endangered, Threatened, and candidate animal species for the Woodward Island, Bouldin Island, Jersey Island, Isleton, and Terminous USGS 7.5-minute quadrangles (U.S. Fish and Wildlife Service 2009).
- In-Delta Storage Program Draft Feasibility Study Report on Environmental Evaluations (California Department of Water Resources 2003).
- 2006 Supplemental Report to the 2004 Draft Feasibility Study In-Delta Storage Project (California Department of Water Resources 2006).

- The San Joaquin County Multi Species Habitat Conservation and Open Space Plan (SJMSCP) (San Joaquin Council of Governments 2000: 2-16–2-32).
- The Contra Costa County General Plan (Contra Costa County 2005: 8-12–8-16).

## Affected Environment

This section provides an overview of federal and state regulations and describes wildlife habitat conditions on the Project islands and discusses changes in the existing conditions or regulatory setting since the 2001 FEIR and 2001 FEIS. Wildlife habitat information is based in part on information collected for the 1995 Draft EIR/EIS and on the 2001 FEIR and 2001 FEIS, and has been updated to current conditions where these changes would affect the impact analysis.

As a result of land management decisions made since 1988, some changes in agricultural land use and wildlife habitat conditions on the islands have occurred. Some of these changes were made in response to annual fluctuations in agricultural market conditions. Between 1990 and 2001, some cropping decisions that changed agricultural land use on the Project islands were made in anticipation of Project implementation. Additional cropping decisions made since 2001 have resulted in further changes in agricultural land use on the Project islands. Existing wildlife habitat conditions are based on recent crop information from 2008 (Delta Wetlands Properties 2008), information from DWR's surveys of the Project islands in 2002–2003 (California Department of Water Resources 2003), and 2008 wetland mapping and aerial photo interpretation completed by ICF Jones & Stokes. These sources of information were used to determine the baseline conditions for assessing the impacts of the Project alternatives.

## Regulatory Setting

The following section describes regulations affecting wildlife relative to the Project.

### Federal

#### Federal Endangered Species Act

The ESA protects fish and wildlife species and their habitats identified by the USFWS and NMFS as Threatened or Endangered. *Endangered* refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range; *Threatened* refers to species, subspecies, or distinct population segments that are likely to become Endangered in the near future. The ESA is administered by the USFWS and NMFS. In

general, NMFS is responsible for protection of ESA-listed marine species and anadromous fishes, whereas other listed species are under USFWS jurisdiction.

## Endangered Species Act Prohibitions (Section 9)

Section 9 of the ESA prohibits the take of any fish or wildlife species listed under ESA as Endangered. Take of Threatened species is also prohibited under Section 9, unless otherwise authorized by federal regulations. *Take*, as defined by ESA, means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” (Section 3 of the ESA; 16 USC Section 1532(19)). *Harm* is defined by regulation as “any act that kills or injures the species, including significant habitat modification.” (50 CFR Sections 17.3; 222.102). In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction. Section 9 does not prohibit take of federally listed plants on sites not under federal jurisdiction. If the Project may result in take prohibited by Section 9, this take would need to be authorized through ESA Sections 7 or 10 (providing for the issuance of incidental take permits).

## Endangered Species Act Consultation Process (Section 7)

Section 7 consultation provides a means for authorizing take of listed species for actions by federal agencies. Federal agency actions include activities that are:

- on federal land,
- conducted by a federal agency,
- funded by a federal agency, or
- authorized by a federal agency (including issuance of federal permits and licenses).

Under Section 7, the federal agency conducting, funding, or permitting an action (the federal lead agency) must consult USFWS or NMFS, as appropriate, to ensure its proposed action would not jeopardize the continued existence of an Endangered or Threatened species or destroy or adversely modify designated critical habitat. If a proposed project “may affect” a listed species or designated critical habitat, the lead agency is required to prepare a BA evaluating the nature and severity of the expected effect. The BA is prepared for the proposed action, and is submitted to USFWS and/or NMFS to initiate consultation. In response to a BA, USFWS and/or NMFS issues a BO, with a determination that the proposed action either:

- may jeopardize the continued existence of one or more listed species (jeopardy finding) or result in the destruction or adverse modification of critical habitat (adverse modification finding) or

- will not jeopardize the continued existence of any listed species (no jeopardy finding) or result in adverse modification of critical habitat (no adverse modification finding).

The BO issued by USFWS and/or NMFS may stipulate discretionary “reasonable and prudent” conservation measures. If the proposed action would not jeopardize a listed species, USFWS and/or NMFS may issue an incidental take statement to authorize the proposed activity and may include appropriate measures to offset the impacts of take.

### **Summary of Project Endangered Species Act Compliance**

A BA was prepared for the Project that addressed valley elderberry longhorn beetle (VELB), bald eagle, American peregrine falcon, Aleutian Canada goose, and giant garter snake (Jones & Stokes Associates 1995a). The BO issued in May 1997 concluded that the Project would not have significant effects on bald eagle, California clapper rail, salt marsh harvest mouse, VELB, and giant garter snake (U.S. Fish and Wildlife Service 1997a: 1). Since the receipt of the BO, bald eagle and Aleutian Canada goose have been delisted.

ESA compliance for fish is discussed in Section 4.5, and ESA compliance for special-status plants is discussed in Section 4.6.

### **Migratory Bird Treaty Act**

The federal Migratory Bird Treaty Act (MBTA) (16 USC 703) authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 CFR 21, 50 CFR 10). Most actions that result in taking or in permanent or temporary possession of a protected species constitute violations of MBTA. Examples of permitted actions that do not violate MBTA are the possession of a hunting license to pursue specific gamebirds, legitimate research activities, display in zoological gardens, banding, and other similar activities. USFWS is responsible for overseeing compliance with MBTA, and the U.S. Department of Agriculture’s Animal Damage Control Officer makes recommendations on related animal protection issues.

Executive Order 13186 (January 10, 2001) directs each federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with USFWS to develop a memorandum of understanding (MOU) to promote the conservation of migratory bird populations. Protocols developed under the MOU must include the following agency responsibilities:

- avoid and minimize, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions;
- restore and enhance habitat of migratory birds, as practical; and

- prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practical.

The executive order is designed to assist federal agencies in their efforts to comply with MBTA and does not constitute any legal authorization to take migratory birds.

## Bald Eagle Protection Act

Under the Bald Eagle Protection Act, it is illegal to import, export, take (which includes molest or disturb), sell, purchase, or barter any bald eagle or golden eagle or part thereof.

## State

### California Endangered Species Act

CESA generally parallels the main provisions of the ESA and is administered by the DFG.

Under CESA, *Endangered species* is defined as a species of plant, fish, or wildlife that is “in serious danger of becoming extinct throughout all, or a significant portion of its range” and is limited to species or subspecies native to California (CA Fish & Game Code Section 2062). *Threatened species* is defined as a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an Endangered species in the foreseeable future in the absence of the special protection and management efforts (California Fish and Game Code Section 2062).

Section 2080 of CESA prohibits the take of Endangered and Threatened species, except as otherwise provided under Fish and Game Code Section 2080.1. Habitat destruction, however, is not included in the state’s definition of *take* (CA Fish & Game Code Section 86; 2080). The California Fish and Game Code defines *take* as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” DFG authorizes take through a variety of sections in the CA Fish & Game Code. If the species is listed under both ESA and CESA and take authorization has already been provided through the ESA, under Section 2080.1 of CESA, DFG can write a consistency determination where it determines that the avoidance, minimization, and compensation measures are consistent with the provisions of CESA. DFG may issue a take permit under 2081(b) of CEQA where DFG makes findings that, among other things, the impacts of take are minimized and fully mitigated and that the take would not lead to jeopardy. DFG may also authorize take per Section 2835 of the CA Fish & Game Code, as part of the Natural Communities Conservation Planning Act, where it has been covered under an approved Natural Communities Conservation Plan. Unlike its

federal counterpart, CESA also applies the take prohibitions to species petitioned for listing (state candidates).

### **Summary of Project CESA Compliance**

DFG issued a no-jeopardy opinion in 1998 for Project effects on state-listed fish and wildlife species. The 1998 DFG BO stated that the Project would not jeopardize the continued existence of greater sandhill crane, Swainson's hawk, and other terrestrial listed species with full implementation and adherence to the HMP (California Department of Fish and Game 1998: 38–39).

## **Other Provisions of the California Fish and Game Code**

### **Fully Protected Species**

In addition to CESA, the California Fish and Game Code provides protection from take for a variety of species, referred to as *fully protected species*. Section 5050 lists protected amphibians and reptiles. Birds that are fully protected are listed under Section 3511, and mammals that are fully protected are included in Section 4700. Except for take related to scientific research, all take of fully protected species is prohibited. Three fully protected species (greater sandhill crane, white-tailed kite, and California black rail) have the potential to occur in the Project area.

### **Sections 3503, 3513, and 3800**

Section 3503 of the California Fish and Game Code prohibits the killing, possession, or destruction of bird eggs or of bird nests. Sections 3503.5 and 3513 prohibit the killing, possession, or destruction of all nesting birds (including raptors and passerines). Section 3513 prohibits the take or possession of any migratory non-game birds designated under the federal MBTA. Section 3800 prohibits take of non-game birds. These sections do not provide for the issuance of an incidental take permit.

### **Species of Special Concern**

DFG maintains lists for candidate Endangered species and candidate Threatened species. California candidate species are afforded the same level of protection as listed species. California also designates species of special concern, which are species of limited distribution, declining populations, diminishing habitat, or of unusual scientific, recreational, or educational value. These species do not have the same legal protection as listed species or fully protected species, but may be added to official lists in the future. DFG intends the species of special concern list to be a management tool for consideration in future land use decisions.

## **Local**

Bacon and Bouldin Islands are in San Joaquin County and Webb and Holland Tracts are in Contra Costa County. The local regulations established by San Joaquin and Contra Costa Counties that pertain to the islands that fall within their respective boundaries are described below.

## **San Joaquin County Multi-Species Habitat and Open Space Conservation Plan**

The SJMSCP was adopted in 2001 and covers all of San Joaquin County. Permit holders under the SJMSCP include the county; the cities of Escalon, Lodi, Manteca, Stockton, Lathrop, Ripon, and Tracy; the San Joaquin Council of Governments (SJCOG); and others. The SJMSCP is designed to provide a regional approach to mitigating development impacts on the 97 listed and non-listed plant, fish, and wildlife species covered by the SJMSCP and compensating for the conversion of open space to non-open space uses. The plan provides compensation for habitat losses through collection of fees that are used to preserve habitats elsewhere.

## **East Contra Costa County Habitat Conservation Plan**

The East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCCHCP/NCCP) was adopted in January 2008. Permit holders under the ECCCHCP/NCCP include the County; the cities of Brentwood, Clayton, Oakley, and Pittsburg; and Contra Costa County Flood Control and Water Conservation District and the East Bay Regional Park District. The ECCCHCP/NCCP is designed to provide a regional approach to mitigating housing, transportation, and growth impacts on the 28 covered species. The plan provides compensation for habitat losses through collection of fees that are used to preserve and restore habitats and natural communities in the County as well as a framework to pursue other conservation efforts in the County. It does not include Delta lands, and therefore does not affect the Project.

## **Contra Costa County General Plan**

The goals and policies of the Contra Costa County General Plan that are relevant to wildlife on the Project islands are summarized below (Contra Costa County 2005: 8-15, 8-16).

### **Goals**

- To protect ecologically significant lands, wetlands, plants and wildlife habitats.
- To protect Rare, Threatened, and Endangered species of fish, wildlife, and plants, significant plant communities, and other resources that stand out as unique because of their scarcity, scientific value, aesthetic quality or cultural significance. Attempt to achieve a significant net increase in wetland values and functions within the County over the life of the General Plan. The definition of Rare, Threatened, and Endangered species includes those definitions provided by ESA, CESA, the California Native Plant Protection Act, and CEQA.
- To encourage the preservation and restoration of the natural characteristics of the San Francisco Bay/Delta estuary and adjacent lands, and recognize the

role of Bay vegetation and water area in maintaining favorable climate, air and water quality, and fisheries and migratory waterfowl.

### **Policies**

- Significant trees, natural vegetation, and wildlife populations generally shall be preserved.
- Important wildlife habitats that would be disturbed by major development shall be preserved, and corridors for wildlife migration between undeveloped lands shall be retained.
- Areas determined to contain significant ecological resources, particularly those containing Endangered species, shall be maintained in their natural state and carefully regulated to the maximum legal extent.
- Any development located or proposed within significant ecological resource area shall ensure the resource is protected.
- The County shall utilize performance criteria and standards which seek to regulate uses in and adjacent to significant ecological resource areas.
- Natural woodlands shall be preserved to the maximum extent possible in the course of land development.
- The critical ecological and scenic characteristics of rangelands, woodlands, and wildlands shall be recognized and protected.
- Existing vegetation, both native and nonnative, and wildlife habitat areas shall be maintained in the major open space areas sufficient for the maintenance of a healthy balance of wildlife populations.
- The ecological value of wetlands areas, especially the salt marshes and tidelands of the Bay and Delta, shall be recognized. Existing wetlands in the county shall be identified and regulated. Restoration of degraded wetland areas shall be encouraged and supported whenever possible.
- Fish, shellfish, and waterfowl management shall be considered the appropriate land use for marshes and tidelands, with recreation being allowed as a secondary use in limited locations, consistent with the marshland and tideland preservation policies of the General Plan.
- The planting of native trees and shrubs shall be encouraged in order to preserve the visual integrity of the landscape, provide habitat conditions suitable for native wildlife, and ensure that a maximum number and variety of well-adapted plants are sustained in urban areas.
- The County shall strive to identify and conserve remaining upland habitat areas that are adjacent to wetlands and are critical to the survival and nesting of wetland species.
- The County shall protect marshes, wetlands, and riparian corridors from the effects of potential industrial spills.
- The environmental impacts of using poisons to control ground squirrel populations in grasslands shall be thoroughly evaluated by the County.

- Efforts shall be made to identify and protect the County's mature native oak, bay, and buckeye trees.

## Environmental Setting

### Changes since the 2001 FEIR and 2001 FEIS

#### Habitat Types

As mentioned previously, the types and coverage of crops on some of the islands have changed since 1988 (the year that baseline conditions were based on for the 2000 FEIR). Changes in the types of crops present could result in a change in the composition of bird species using the islands for foraging. In addition, changes in the amount of various crops could result in modification of impact acreages for species using the particular crop type. On Bacon Island, corn and alfalfa were the majority of crops in 2008, whereas potatoes and asparagus were the primary crops reported in the 2001 FEIR and 2001 FEIS. Crops on Webb Tract have remained relatively the same, with corn being the main crop in 1988 and 2008. The 2001 FEIR and 2001 FEIS reports corn, wheat, and sunflowers as the primary crops on Bouldin Island in 1988. The major crops on Bouldin Island in 2008 were corn, wheat, rice, and tomatoes. Whereas there were 2,208 acres of agriculture and 542 acres of pasture lands on Holland Tract in 1988, there were 1,160 acres of agriculture (all fallow land) and 1,672 acres of exotic grassland and exotic marsh in 2008 (pasture was mapped as fallow and exotic marsh by ICF Jones & Stokes in 2008). The increase in grassland and marsh could result in an increase in the number or diversity of species occurring on this island because these areas have not been intensively managed as agriculture in recent years. The 2008 crop information (Delta Wetlands Properties 2008), information from DWR surveys (California Department of Water Resources 2003; Patterson pers. comm.), aerial photo interpretation, and wetland mapping by ICF Jones & Stokes during a 2008 field survey were used to update the island descriptions in the Summary of Setting from the 2001 FEIR and 2001 FEIS section below.

#### Special-Status Species

Special-status species include species that are state or federally listed as Threatened or Endangered, proposed and candidates for federal listing, DFG species of special concern, and species fully protected under the California Fish and Game Code. Fourteen special-status wildlife species originally were identified as occurring or potentially occurring on the Project islands. Of these 14 species, two species (cackling [Aleutian Canada] goose and bald eagle) have been removed from the ESA list and two species (Cooper's hawk and ferruginous hawk) are no longer California species of special concern (California Department of Fish and Game 2009). Bald eagle is still listed by the state as a Threatened species and is protected by the Bald and Golden Eagle Protection Act, so it is still considered a special-status species. Because the federal status of cackling goose was the only status that this species had, it is no longer considered a special-

status species. Similarly, the species of special concern status was the only status that Cooper's hawk and ferruginous hawk had, and therefore these species are no longer considered special-status species. However, discussions of these species are still included within this document.

Based on a review of the CNDDDB (California Natural Diversity Database 2009) and the USFWS (2009) list for the quadrangles listed above under Sources of Information, and previous documents prepared for the Project, 39 special-status (or former special-status) wildlife species have the potential to occur in the Project vicinity (Table 4.7-2). Seventeen of these species would not occur or are unlikely to occur in the Project area because suitable habitat is not present or the Project area is outside of the species historical and/or current range (see Table 4.7-2 for the rationale for why each species would not occur). Three species (golden eagle, mountain plover, and bank swallow) from the CNDDDB and USFWS lists occasionally may forage in the Project area but would not be affected by the Project. The remaining 19 species have the potential to occur in the Project area and may be affected by the Project. These species are listed below.

- valley elderberry longhorn beetle
- western pond turtle
- giant garter snake
- cackling (Aleutian Canada) goose
- northern harrier
- bald eagle
- Cooper's hawk
- Swainson's hawk
- ferruginous hawk
- white-tailed kite
- American peregrine falcon
- California black rail
- greater sandhill crane
- western burrowing owl
- short-eared owl
- loggerhead shrike
- tricolored blackbird
- western red bat
- pallid bat

The geographic distribution, habitat requirements, and potential for occurrence in the Project area for all special-status wildlife species identified as occurring in

the Project vicinity are provided in Table 4.7-2. All of the species listed above were addressed in the 2001 FEIR and 2001 FEIS except for white-tailed kite, loggerhead shrike, western red bat, and pallid bat. New CNDDDB records for white-tailed kite, loggerhead shrike, western red bat, and pallid bat have been added since the analysis for the 2001 FEIR and 2001 FEIS (California Natural Diversity Database 2009). In addition, since the 2001 FEIR and 2001 FEIS, several new occurrences of western pond turtle, giant garter snake, Swainson's hawk, and California black rail have been reported in and along the edges of the islands or in the immediate vicinity of the islands (California Natural Diversity Database 2009).

**Table 4.7-2. Special-Status Wildlife Species with Potential to Occur in the Vicinity of the Project Study Area**

Common and Scientific Name	Status <sup>a</sup> Fed/State	California Distribution	Habitats	Occurrence in the Study Area
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>	E/-	Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County; disjunct population in Madera County	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools	Would not occur—suitable habitat not present
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	E/-	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands	Would not occur—suitable habitat not present
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	T/-	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	Would not occur—suitable habitat not present
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	E/-	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds	Would not occur—suitable habitat not present
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	T/-	Stream side habitats below 3,000 feet throughout the Central Valley	Riparian and oak savanna habitats with elderberry shrubs; elderberries are the host plant	Suitable habitat present—one large cluster of elderberry shrubs on Holland Tract; no VELB observed during surveys in 2002 and 2003.
Delta green ground beetle <i>Elaphrus viridus</i>	T/-	Restricted to Olcott Lake and other vernal pools at Jepson Prairie Preserve, Solano County	Sparsely vegetated edges of vernal lakes and pools; occur up to 250 feet from pools	Would not occur—suitable habitat not present
California tiger salamander <i>Ambystoma californiense</i>	T/C	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to Santa Barbara County	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy	Would not occur—not known to occur in the Delta area currently or historically (Jennings and Hayes 1994; CNDDDB 2009).
California red-legged frog <i>Rana aurora draytonii</i>	T/SSC	Found along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County	Permanent and semipermanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation. May estivate in rodent burrows or cracks during dry periods	Would not occur—not known to occur in the Delta area currently or historically (Jennings and Hayes 1994; CNDDDB 2009).

Common and Scientific Name	Status <sup>a</sup> Fed/State	California Distribution	Habitats	Occurrence in the Study Area
Western pond turtle <i>Actinemys marmorata</i>	-/SSC	The range of the northwestern subspecies extends from Oregon border of Del Norte and Siskiyou Counties south along coast to San Francisco Bay, inland through Sacramento Valley, and on the western slope of Sierra Nevada; the southwestern subspecies occurs along the central coast of California east to the Sierra Nevada and along the southern California coast inland to the Mojave and Sonora Deserts; the subspecies' range overlaps through the Delta and Central Valley to Tulare County	Woodlands, grasslands, and open forests; occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation	Ditches and blowout ponds provide suitable aquatic habitat; may occur in grassland and along edges of islands; several observed on islands during 2002 surveys (DWR 2003) and many known occurrences in waterways surrounding the four islands (CNDDDB 2009)
California horned lizard <i>Phrynosoma coronatum frontale</i>	-/SSC	Sacramento Valley, including foothills, south to southern California; Coast Ranges south of Sonoma County; below 4,000 feet in northern California	Grasslands, brushlands, woodlands, and open coniferous forest with sandy or loose soil; requires abundant ant colonies for foraging	Would not occur—not known to occur in the Delta area currently or historically (Jennings and Hayes 1994; CNDDDB 2009).
Silvery legless lizard <i>Anniella pulchra pulchra</i>	-/SSC	Along the Coast, Transverse, and Peninsular Ranges from Contra Costa County to San Diego County with spotty occurrences in the San Joaquin Valley	Habitats with loose soil for burrowing or thick duff or leaf litter; often forages in leaf litter at plant bases; may be found on beaches, sandy washes, and in woodland, chaparral, and riparian areas	Unlikely to occur because of the amount of disturbance from agricultural activities on the islands.
Giant garter snake <i>Thamnophis gigas</i>	T/T	Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno	Sloughs, canals, low gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	Ditches and canals on the islands provide suitable aquatic habitat; ungrazed pasture and riparian areas provide suitable upland habitat; one known occurrence at Webb Tract and one occurrence northeast of Bacon Island (CNDDDB 2009)
Alameda whipsnake <i>Masticophis lateralis euryxanthus</i>	T/T	Restricted to Alameda and Contra Costa Counties	Valleys, foothills, and low mountains associated with northern coastal scrub or chaparral habitat; requires rock outcrops for cover and foraging	Would not occur—suitable habitat not present

Common and Scientific Name	Status <sup>a</sup> Fed/State	California Distribution	Habitats	Occurrence in the Study Area
San Joaquin whipsnake <i>Masticophis flagellum ruddocki</i>	-/SSC	From Colusa County in the Sacramento Valley southward to the grapevine in the San Joaquin Valley and westward into the inner coast ranges. An isolated population occurs at Sutter Buttes. Known elevation range from 20 to 900 meters	Occurs in open, dry, vegetative associations with little or no tree cover. It occurs in valley grassland and saltbush scrub associations. Often occurs in association with mammal burrows	Would not occur—suitable habitat not present
Cackling (Aleutian Canada) goose <i>Branta hutchinsii leucopareia</i>	D/-	The entire population winters in Butte Sink, then moves to Los Banos, Modesto, the Delta, and East Bay reservoirs; stages near Crescent City during spring before migrating to breeding grounds	Roosts in large marshes, flooded fields, stock ponds, and reservoirs; forages in pastures, meadows, and harvested grainfields; corn is especially preferred	Suitable habitat present; no longer a federally listed species.
Northern harrier <i>Circus cyaneus</i>	-/SSC	Occurs throughout lowland California. Has been recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands	Suitable nesting and foraging habitat present. Many harriers observed during 1988 surveys.
Golden eagle <i>Aquila chrysaetos</i>	PR/FP	Foothills and mountains throughout California. Uncommon nonbreeding visitor to lowlands such as the Central Valley	Nest on cliffs and escarpments or in tall trees overlooking open country. Forages in annual grasslands, chaparral, and oak woodlands with plentiful medium and large-sized mammals	Would not nest in Project area; could occasionally forage in Project area but would not be affected by Project
Bald eagle <i>Haliaeetus leucocephalus</i>	D, PR/E	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin. Reintroduced into central coast. Winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierra Nevada, and east of the Sierra Nevada south of Mono County	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, reservoir, stream, or the ocean	Would not nest but may forage in Project area
Cooper's hawk <i>Accipiter cooperii</i>	-/-	Throughout California except high altitudes in the Sierra Nevada. Winters in the Central Valley, southeastern desert regions, and plains east of the Cascade Range	Nests in a wide variety of habitat types, from riparian woodlands and digger pine-oak woodlands through mixed conifer forests	Could nest in riparian habitat or forage in the Project area; observed on all islands during 2002–2003 surveys (DWR 2003).

Common and Scientific Name	Status <sup>a</sup> Fed/State	California Distribution	Habitats	Occurrence in the Study Area
Swainson's hawk <i>Buteo swainsoni</i>	-/T	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields	Documented nesting on Webb Tract and Bacon Island during 2002 surveys (DWR 2003). Suitable nesting and foraging habitat present on all islands. Also known to nest adjacent to islands (CNDDDB 2009).
Ferruginous hawk <i>Buteo regalis</i>	-/-	Does not nest in California; winter visitor along the coast from Sonoma County to San Diego County, east-ward to the Sierra Nevada foothills and south-eastern deserts, the Inyo-White Mountains, the plains east of the Cascade Range, and Siskiyou County	Open terrain in plains and foothills where ground squirrels and other prey are available	Would not nest but may forage in Project area. Only observed on Holland Tract during 2002–2003 surveys.
White-tailed kite <i>Elanus leucurus</i>	-/FP	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands	Suitable nesting and foraging habitat present. Known to nest near the Project area (CNDDDB 2009). Many kites observed during 1988 surveys and were suspected to nest on islands. Observed on all islands in 2002–2003.
American peregrine falcon <i>Falco peregrinus anatum</i>	-/E, FP	Permanent resident along the north and south Coast Ranges. May summer in the Cascade and Klamath Ranges and through the Sierra Nevada to Madera County. Winters in the Central Valley south through the Transverse and Peninsular Ranges and the plains east of the Cascade Range	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes that support large prey populations	Would not nest but may forage in Project area. Observed on all islands during 2002–2003 surveys.
California clapper rail <i>Rallus longirostris obsoletus</i>	E/E, FP	Marshes around the San Francisco Bay and east through the Delta to Suisun Marsh	Restricted to salt marshes and tidal sloughs; usually associated with heavy growth of pickleweed; feeds on mollusks removed from the mud in sloughs	Project area is outside of species known range; suitable habitat not present.

Common and Scientific Name	Status <sup>a</sup> Fed/State	California Distribution	Habitats	Occurrence in the Study Area
California black rail <i>Laterallus jamaicensis coturniculus</i>	-/T, FP	Permanent resident in the San Francisco Bay and east-ward through the Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties	Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations	Lower-quality habitat present on Webb Tract and Holland Tract. Surveys conducted around Bacon Island in 2002 and none were heard (DWR 2003). Known to nest immediately adjacent to all islands except Webb Tract (CNDDDB 2009).
Greater sandhill crane <i>Grus canadensis tabida</i>	-/T, FP	Breeds in Siskiyou, Modoc, Lassen, Plumas, and Sierra Counties. Winters in the Central Valley, southern Imperial County, Lake Havasu National Wildlife Refuge, and the Colorado River Indian Reserve	Summers in open terrain near shallow lakes or freshwater marshes. Winters in plains and valleys near bodies of fresh water	Islands provide wintering habitat; observed on Bouldin Island during 1988 surveys; observed on all islands during 2002–2003 surveys (DWR 2003).
Mountain plover <i>Charadrius montanus</i>	-/SSC	Does not breed in California; in winter, found in the Central Valley south of Yuba County, along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego Counties; parts of Imperial, Riverside, Kern, and Los Angeles Counties	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grainfields	Would not nest in Project area; may occasionally forage but would not be affected by Project.
Western burrowing owl <i>Athene cunicularia hypugaea</i>	-/SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Rare along south coast	Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows	Suitable breeding and foraging habitat present. No owls were observed during 2002–2003 surveys (DWR 2003); 1 owl was observed on Bacon Island during the 1988 surveys.
Short-eared owl <i>Asio flammeus</i>	-/SSC	Permanent resident along the coast from Del Norte County to Monterey County although very rare in summer north of San Francisco Bay, in the Sierra Nevada north of Nevada County, in the plains east of the Cascades, and in Mono County; small, isolated populations	Freshwater and salt marshes, lowland meadows, and irrigated alfalfa fields; needs dense tules or tall grass for nesting and daytime roosts	Limited suitable nesting habitat present; may forage in the Project area; not observed during 1988 or 2003 surveys.

Common and Scientific Name	Status <sup>a</sup> Fed/State	California Distribution	Habitats	Occurrence in the Study Area
Bank swallow <i>Riparia riparia</i>	-/T	Occurs along the Sacramento River from Tehama County to Sacramento County, along the Feather and lower American Rivers, in the Owens Valley; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou Counties. Small populations near the coast from San Francisco County to Monterey County	Nests in bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam	Suitable nesting habitat may be present adjacent to islands but species would not nest on islands; may occasionally forage in Project area but would not be affected by Project.
Loggerhead shrike <i>Lanius ludovicianus</i>	-/SSC	Resident and winter visitor in lowlands and foothills throughout California. Rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	Suitable breeding and foraging habitat may be present on islands; many shrikes observed during surveys in 1988 and 2002–2003 (DWR 2003).
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	-/SSC	Found only in the San Francisco Bay Area in Marin, Napa, Sonoma, Solano, San Francisco, San Mateo, Santa Clara, and Alameda Counties	Breeds in fresh and brackish marsh associated with and close to Bay wetlands. Freshwater marshes are used in summer and salt or brackish marshes in fall and winter; requires tall grasses, tules, and willow thickets for nesting and cover	Project area is outside of the subspecies known range.
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	-/SSC	Restricted to the extreme western edge of the Delta, between the cities of Vallejo and Pittsburg near Suisun Bay	Brackish and tidal marshes supporting cattails, tules, various sedges, and pickleweed	Project area is outside of the subspecies known range.
Tricolored blackbird <i>Agelaius tricolor</i>	-/SSC	Permanent resident in the Central Valley from Butte County to Kern County. Breeds at scattered coastal locations from Marin County south to San Diego County; and at scattered locations in Lake, Sonoma, and Solano Counties. Rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields. Habitat must be large enough to support 50 pairs. Probably requires water at or near the nesting colony	Suitable nesting and foraging habitat present. No nesting colonies observed during 2002 surveys. Observed foraging on Bacon Island and Webb tract during 2002–2003 surveys (DWR 2003).
Western red bat <i>Lasiurus blossevillii</i>	-/SSC	Scattered throughout much of California at lower elevations	Found primarily in riparian and wooded habitats. Occurs at least seasonally in urban areas. Day roosts in trees within the foliage. Found in fruit orchards and sycamore riparian habitats in the central valley	Could roost in riparian areas and forage over or near the islands. Three occurrences within 5 miles of the Project (CNDDDB 2009).

Common and Scientific Name	Status <sup>a</sup> Fed/State	California Distribution	Habitats	Occurrence in the Study Area
Pallid bat <i>Antrozous pallidus</i>	-/SSC	Occurs throughout California except the high Sierra from Shasta to Kern County and the northwest coast, primarily at lower and mid elevations.	Occurs in a variety of habitats from desert to coniferous forest. Most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California. Relies heavily on trees for roosts.	Could roost in riparian areas or forage over or near the islands; no occurrences within 5 miles of the Project (CNDDDB 2009).
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	E/E, FP	San Francisco, San Pablo, and Suisun Bays; the Delta	Salt marshes with a dense plant cover of pickleweed and fat hen; adjacent to an upland site	Suitable habitat not present in the Project area.
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	E/T	Principally occurs in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, oak, savanna, and freshwater scrub	Unlikely to occur—may occasionally move through Project area but unlikely due to limited access/being surrounded by waterways.
American badger <i>Taxidea taxus</i>	-/SSC	Throughout California, except for the humid coastal forests of northwestern California in Del Norte County and the northwestern portion of Humboldt County	Requires sufficient food, friable soils, and relatively open uncultivated ground. Preferred habitat includes grasslands, savannas, and mountain meadows near timberline	Would not occur- marginally suitable foraging habitat present and water surrounding islands likely excludes presence.

<sup>a</sup> Status explanations:

**Federal**

- E = listed as Endangered under the federal Endangered Species Act.
- T = listed as Threatened under the federal Endangered Species Act.
- PR = protected by the Bald and Golden Eagle Protection Act proposed
- D = delisted; species that are delisted are monitored for 5 years after delisting.
- = no listing.

**State**

- E = listed as Endangered under the California Endangered Species Act.
- T = listed as Threatened under the California Endangered Species Act.
- C = candidate for listing under the California Endangered Species Act.
- FP = fully protected under the California Fish and Game Code.
- SSC = species of special concern in California.
- = no listing.

Sources: California Department of Fish and Game 2009; California Department of Water Resources 2003; Jennings and Hayes 1994.

## Existing Environment

General habitat information present in the 2001 FEIR and 2001 FEIS has been updated in this section where changes in crop types or other habitat changes have occurred. Information on trends for waterfowl abundance in the Delta region is similar to that reported in 2001 but has been updated with current data. For the most part, information on specific birds or groups of birds observed on the islands has been removed from this discussion since these data were collected 20 years ago. The sections related to special-status species have been revised substantially to include new information and information lacking from the 2001 FEIR and 2001 FEIS.

### Waterfowl and Other Birds

The size of waterfowl populations wintering in the Delta fluctuates between years because of changes in weather, habitat conditions, and flyway populations. Despite annual fluctuation, large populations of waterfowl had used the Delta area in most years until the early 1980s. Between 1970 and 1982, wintering waterfowl populations in the Delta declined by approximately 83% (Weaver pers. comm.). The decline was most pronounced for ducks, but declines were also evident for swans and geese.

Population declines in the Delta during the 1980s reflect the larger waterfowl population decline that occurred in the Central Valley and Pacific Flyway. The decline was attributable to a variety of factors, the most important of which was probably the prolonged drought in northern breeding areas that resulted in unfavorable land use changes (i.e., intensified farming of former wetland areas and adjacent nesting habitats). Loss of winter habitat also was considered an important factor that contributed to the population reduction (Implementation Board of the Central Valley Habitat Joint Venture 1990). Duck and goose populations began to recover in the 1990s. The wet years of 1993 through 1995 in northern breeding areas provided favorable breeding conditions that resulted in substantially higher production of ducks and geese. From 1992 to 2008, the average number of waterfowl recorded in the Delta was 156,203 during midwinter surveys (Weaver pers. comm.). Although this is still substantially lower than the number of waterfowl observed in the 1970s, the data suggest that populations are slowly increasing in the Delta.

Specific information on types and numbers of waterfowl and other birds (piscivorous [fish-eating] birds, wading birds, shorebirds, gulls and terns, swallows, blackbirds and starlings, bird species typically associated with riparian woodland and scrub, and bird species typically associated with grassland and agricultural habitats) on the Project islands was provided in the 2001 FEIR and 2001 FEIS. In general, habitats on the islands have remained relatively the same since the 1988 surveys were conducted (Tables 4.7-3 and 4.7-4). Although some of the changes in habitat between 1988 and 2008 may appear quite large in Tables 4.7-3 and 4.7-4, the changes relative to the amount of each habitat type on

the islands in 1988 and 2008 are not substantially different. For example, on the Reservoir Islands (Bacon Island and Webb Tract), there was an 84% decrease in marsh between 1988 and 2008; however, the relative loss of this habitat was 3.8% (Table 4.7-3). In addition, differences in mapping techniques and habitat categories between 1988 and 2008 data may inflate the differences in acreages of habitat between the two years. Differences in habitat types and quantities between 1988 and 2008 and corresponding expected changes in waterfowl and other birds based on these changes are described for each island below.

**Table 4.7-3.** Changes in Land Use/Habitats on the Reservoir Islands between 1988 and 2008

	1988 (acres)	2008 (acres)	Difference (acres)	% Change	1988 % Relative <sup>1</sup>	2008 % Relative <sup>2</sup>	% Relative Change <sup>3</sup>
Agriculture	8187.90	9164.47	976.57	12	37.4	41.8	4.4
Herbaceous uplands	1,367.20	1,201.67	-165.53	-12	6.2	5.5	-0.8
Marsh	988.40	158.97	-829.43	-84	4.5	0.7	-3.8
Open water	249.90	145.81	-104.09	42	1.1	0.7	-0.5
Riparian	109.10	188.61	79.51	73	0.5	0.9	0.4
Developed	105.90	193.22	87.32	82	0.5	0.9	0.4

<sup>1</sup> 1988 % relative was calculated by dividing the acres of the particular land use/habitat by the total acres in 1988.

<sup>2</sup> 2008 % relative was calculated by dividing the acres of the particular land use/habitat by the total acres in 2008.

<sup>3</sup> % relative change was calculated by subtracting 1988% relative from 2008 % relative.

**Table 4.7-4.** Changes in Land Use/Habitats on the Habitat Islands between 1988 and 2008

	1988 (acres)	2008 (acres)	Difference (acres)	% Change	1988 % Relative	2008 % Relative	% Relative Change
Agriculture	8,026.10	6,219.14	-1,806.96	-23	44.8	34.5	-10.3
Herbaceous uplands	349.10	856.08	506.98	145	1.9	4.7	2.8
Marsh	359.00	1,709.97	1,350.97	76	2	9.5	7.5
Open Water	184.30	85.23	-99.07	-54	1	0.5	-0.5
Riparian	122.0	137.54	15.54	13	0.7	0.8	0.1
Developed	74.80	79.71	4.91	7	0.4	0.4	0

<sup>1</sup> 1988 % relative was calculated by dividing the acres of the particular land use/habitat by the total acres in 1988.

<sup>2</sup> 2008 % relative was calculated by dividing the acres of the particular land use/habitat by the total acres in 2008.

<sup>3</sup> % relative change was calculated by subtracting 1988% relative from 2008 % relative.

### Bacon Island

Bacon Island is 5,500 acres and is the most intensively farmed of the four Project islands. Between 1988 and 2008, an additional 123 acres has gone into agricultural production. The primary crops grown have shifted from potatoes, asparagus, and corn in 1988 to corn and alfalfa in 2008. The amount of corn on the island has increased from 776 acres in 1988 to approximately 1,920 acres in 2008; median corn production from 1988 and 2002 to 2008 was 1,914 acres. The greater amount of corn provides additional foraging habitat for wintering

waterfowl. In addition, the presence of alfalfa may provide nesting opportunities for waterfowl. Although the types of crops grown have changed somewhat, the overall amount of land in agricultural production has been relatively the same. Therefore, types and numbers of other bird species on the island are expected to be similar to those reported in the 2001 FEIR and 2001 FEIS.

#### **Waste Grain Availability**

In 1988, approximately 82,000 pounds of corn was estimated to be available immediately after harvest, but postharvest disking for planting to winter wheat on approximately half the corn acreage reduced the availability to approximately 67,500 pounds (see Appendix H2, "Wildlife Inventory Methods and Results," in the 1995 EIR/EIS). The amount of waste corn is likely greater in 2008 since the amount of corn planted on Bacon Island has increased since 1988 (Delta Wetland Properties 2008).

#### **Hunting Harvest**

No waterfowl or upland game is harvested on Bacon Island.

#### **Webb Tract**

Webb Tract is 5,450 acres and is less intensively farmed than Bacon Island. Approximately 103 acres of open water habitat consisting of permanent ponds, canals, and ditches are present on the island. There are also 183 acres of riparian woodland and scrub and 51 acres of freshwater marsh on Webb Tract. Between 1988 and 2008, approximately 853 acres of additional crops have been established. Corn and wheat were the primary crops in 1988 and 2008. The amount of corn on the island has increased from 2,223 acres in 1988 to approximately 4,178 acres in 2008; median corn production from 1988 and 2002 to 2008 was 3,282 acres. The greater amount of corn provides additional foraging habitat for wintering waterfowl. The diversity and numbers of other bird species on the island may have declined from what was reported in the 2001 FEIR and 2001 FEIS as the amount of corn has nearly doubled since surveys initially were conducted.

#### **Waste Grain Availability**

In 1988, approximately 567,000 pounds of waste corn were produced on Webb Tract and were available for waterfowl and other wildlife (see Appendix H2, "Wildlife Inventory Methods and Results," in the 1995 EIR/EIS). The amount of waste corn is likely greater in 2008 as the amount of corn planted on Webb Tract has increased since 1988 (Delta Wetland Properties 2008). Wheat also provides seed following harvest in summer and green forage for geese and other wintering birds during late fall and winter.

#### **Hunting Harvest**

Harvest rates of ducks and geese are highest on Webb Tract among the four Project islands. The harvest represents a small proportion of the total numbers of birds that use the island.

#### **Bouldin Island**

Bouldin Island is 5,957 acres, the majority of which is agricultural lands. Smaller amounts of other habitats exist, including herbaceous upland. Between 1988 and

2008, approximately 218 acres have been taken out of agricultural production. Corn and wheat were the primary crops in 1988, and corn was the primary crop in 2008. Sunflower was also a main crop in 1988, and this was shifted to rice and tomatoes in 2008. The amount of corn on the island has increased from 2,459 acres in 1988 to approximately 4,149 acres in 2008; median corn production from 1988 and 2002 to 2008 was 3,153 acres. The greater amount of corn provides additional foraging habitat for wintering waterfowl. Therefore, the number of waterfowl on the island may have increased. The types and numbers of other bird species on the island are expected to be similar to those reported in the 2001 FEIS.

#### **Waste Grain Availability**

In 1988, approximately 214,000 pounds of waste corn were produced and available for waterfowl use on Bouldin Island (see Appendix H2, "Wildlife Inventory Methods and Results," in the 1995 EIR/EIS). Average corn availability shortly after harvest was 87 pounds per acre. Field measurements on the island yielded an average of 106 pounds per acre of grain left in the half of the cornfields that were not disked after harvest, and 68 pounds per acre in remaining areas disked prior to the planting of winter wheat (Jones & Stokes Associates Inc. 1989). The amount of waste corn on Bouldin Island was likely greater in 2008 as the amount of corn planted on the island has increased since 2008 (Delta Wetland Properties 2008).

Approximately 1,200 acres of wheat, another important source of waste grain for waterfowl, was grown on the island in 1988. Waterfowl, especially Canada and white-fronted geese, graze extensively on green wheat foliage during winter and early spring (Fredrickson et al. 1988; Miller pers. comm.). Wheat was not grown on the island in 2007 or 2008 (Delta Wetland Properties 2008a).

#### **Hunting Harvest**

Small numbers of ducks and geese are harvested annually by hunters on Bouldin Island. Harvested birds represent only a small proportion of the total number of birds that use the island.

#### **Holland Tract**

Holland Tract is 4,053 acres and currently is grazed but not farmed. In 1988, approximately 2,750 acres were agricultural lands consisting of wheat, asparagus, corn, fallow, and pasture. In 2008, approximately 1,161 acres of fallow land and 1,507 acres of exotic marsh were mapped on the island. In addition, the island contains 127 acres of woody riparian vegetation. Given the increase in exotic marsh habitat on Holland Tract, the number of shorebirds, wading birds, and wetland songbirds using the island for foraging and/or breeding is probably greater than in 1988. Types and numbers of other birds using the island are probably similar to those in 1988.

#### **Waste Grain Availability**

In 1988, Holland Tract produced approximately 61,000 pounds of waste corn for waterfowl (Jones & Stokes Associates Inc. 1989). Since at least 2002, no corn or wheat has been grown on Holland Tract and the majority of the island has been

pasture/exotic marsh (Delta Wetland Properties 2008). Therefore, no or low amounts of waste grain are available for waterfowl on this island.

### **Hunting Harvest**

Few ducks, geese, and pheasants are harvested annually by hunters on Holland Tract. The estimated harvest represents only a small proportion of the total numbers that use the island.

## **Upland Game**

Because the amounts of agriculture on Bacon Island, Webb Tract, and Bouldin Island in 2008 are similar to those in 1988, populations of upland game species (ring-necked pheasant, mourning dove, California quail, and desert cottontail) are expected to be unchanged. The change in crops since at least 2002 on Holland Tract may have resulted in an increase in local populations of upland game species (e.g., pheasants, quail, mourning doves).

## **Special-Status Species**

As described in the Environmental Setting of this document, 19 special-status (or former special-status) wildlife species have the potential to occur in the Project area. A list of all wildlife species evaluated for this report is in Table 4.7-2. The following sections summarize information from surveys conducted by Jones & Stokes in 1987–1988 and by DWR in 2002–2003 for the presence of special-status wildlife and/or suitable habitat on the Project islands. In addition, Eric Hansen, an expert on giant garter snake was contacted for information on habitat for this species and his opinion of the potential presence of this species on the islands.

### **Bacon Island**

Five western pond turtles were observed on the exterior levee of Bacon Island, and one was observed on the interior of the island during 2002 surveys by DWR (California Department of Water Resources 2003). However, the interior of the island was not formally surveyed for this species. The CNDDDB contains four records for western pond turtles observed in the waterways along the west and north sides of the island (California Natural Diversity Database 2009). Based on information from DWR (2003), the canals and associated banksides on Bacon Island provide approximately 86 acres of suitable aquatic habitat for western pond turtle. In addition, 70 acres of suitable upland habitat for western pond turtle is present on the island.

According to a habitat evaluation and surveys conducted in 2002 and 2003, Bacon Island has a total of 223 acres of suitable giant garter snake aquatic habitat, consisting of canals, ditches, and a small borrow pit (California Department of Water Resources 2003 and 2006). Most of this habitat was rated as low and moderate quality that would be used as transit corridors or provide only temporary habitat. Approximately 217 acres of suitable upland habitat for

giant garter snake, which consisted of a large fallow field and a riparian area, is present on the island. (California Department of Water Resources 2003, 2006.) The Project islands do not support a resident/breeding population of giant garter snakes, and individual snakes found in the Delta are likely snakes that were displaced by flood events (Hansen pers. comm.)

Northern harrier was observed on Bacon Island during the 1987–1988 Jones & Stokes surveys and during 2002 surveys by DWR (California Department of Water Resources 2003). Suitable nesting and foraging habitat for this species is present on this island. Harriers are not known to nest on Bacon Island; nearly all the island is cultivated, and suitable nesting sites are limited.

Bacon Island provides suitable nesting and foraging habitat for Swainson's hawks. Two nest sites and two nest territories were found on or immediately adjacent to Bacon Island during 2002–2003 DWR surveys (California Department of Water Resources 2003). There are numerous (more than 15) known Swainson's hawk nests within 5 miles of the Project (California Department of Water Resources 2003; California Natural Diversity Database 2009). Bacon Island has an estimated 5,334 acres of suitable foraging habitat for Swainson's hawks.

Greater sandhill cranes were observed on Bacon Island during DWR's 2002–2003 surveys. There were fewer cranes on Bacon Island and Holland Tract than Webb Tract and Bouldin Island, most likely because Bacon Island and Holland Tract are farther away from traditional crane roosting sites at Staten Island and in the Thornton area. (California Department of Water Resources 2003.)

Although suitable nesting habitat for California black rail is not present on the interior of the island, suitable nesting habitat is present along the waterways surrounding the island. There are six records of observations of California black rails along the waterways surrounding the island (California Natural Diversity Database 2009).

Suitable nesting and wintering habitat for western burrowing owls is present on Bacon Island. In 2002–2003, there were extensive California ground squirrel burrows along the interior side of the levees on Bacon Island; however, the locations of these burrows are not ideal because they are on exposed levee slopes in which vegetation is intensely managed. No burrowing owls were observed during any of the bird surveys conducted during 2002–2003, and there were no signs of burrowing owls using abandoned ground squirrel burrows or artificial burrows on Bacon Island during nesting and wintering periods in 2002–2003; levee vegetation management was intensive on Bacon Island in 2002 (California Department of Water Resources 2003). One burrowing owl was observed on Bacon Island during the 1987–1988 surveys.

Loggerhead shrikes were observed on all Project islands through the spring, summer, fall, and winter during 2002–2003 surveys conducted by DWR. The primary loggerhead shrike habitat is on interior levees that contain utility lines or fences. Loggerhead shrikes were observed only in areas with aboveground utility

lines located near levees on Bacon Island, where they move up and down the levees hunting for prey. (California Department of Water Resources 2003.)

Suitable nesting habitat for tricolored blackbirds, consisting of emergent marsh, willow scrub, riparian woodlands, Himalayan blackberry brambles, and grain crops, was present on all Project islands in 2002. No nesting tricolored blackbirds were observed on Bacon Island during 2002 surveys. Suitable foraging habitat is also present on all Project islands. Tricolored blackbirds were observed foraging on Bacon Island during the 2002–2003 fall and winter surveys. (California Department of Water Resources 2003.)

Bacon Island also provides suitable nesting and foraging habitat for Cooper's hawk, white-tailed kite, and short-eared owl. It provides suitable foraging/wintering habitat for ferruginous hawk, bald eagle, and American peregrine falcon. Cooper's hawk, white-tailed kite, and American peregrine falcon were observed on Bacon Island during 2002–2003 surveys (California Department of Water Resources 2003).

Special-status and other bat species could roost or forage on all Project islands. Suitable roosting sites consist of crevices and cavities of trees and structures, and among foliage of trees. Potential roosting habitat is available on the islands in vegetation and in numerous structures (abandoned homes and sheds, barns, warehouses, and pump housings). (California Department of Water Resources 2003.)

### **Webb Tract**

Six western pond turtles were observed on the exterior levee of Webb Tract, and one was observed on the interior of the island during 2002 surveys by DWR (California Department of Water Resources 2003). The CNDDDB (2009) contains one record for five western pond turtles observed in the waterway on the west side of the island. There are also two records of occurrences in the San Joaquin River, just southeast of the island (California Natural Diversity Database 2009). Based on information from DWR (2003), the canals and associated banksides and the blow-out ponds, and borrow pit on Webb Tract provide approximately 175 acres of suitable aquatic habitat for western pond turtle. In addition, 347 acres of suitable upland habitat for western pond turtle are present on the island.

A giant garter snake was observed on Webb Tract in 2002 (California Natural Diversity Database 2009). According to a habitat evaluation and surveys conducted in 2002 and 2003, Webb Tract has a total of 286 acres of suitable giant garter snake aquatic habitat, consisting of canals, ditches, blow-out ponds, and borrow pits (California Department of Water Resources 2003). More than one-third of this habitat was rated as moderate and high quality. While the lower-quality habitats on the island would provide transit corridors or temporary habitat, Webb Tract had a greater number of wide canals with persistent water relative to the other islands. In particular, the main north-south and east-west canals possessed all the characteristics necessary to support a permanent population of giant garter snakes (e.g., permanent water, aquatic and terrestrial vegetation, prey, subterranean retreats, a wide upland shelf between the canal and agricultural activity). Approximately 226 acres of suitable upland habitat for

giant garter snake consisted of riparian vegetation surrounding the blow-out ponds and patches of fallow land that could provide basking, aestivation, and overwintering habitat. (California Department of Water Resources 2003.) As mentioned above, currently there is no resident/breeding population of giant garter snakes on the islands (Hansen pers. comm.).

Suitable nesting and foraging habitat is present for northern harrier on Webb Tract. Northern harriers were observed on Webb Tract during the 1987–1988 Jones & Stokes surveys and during 2002 surveys by DWR (California Department of Water Resources 2003). Webb Tract supported a high number of harriers during the winter in 1987–1988. Harriers could nest in densely vegetated wetlands or fallow fields on the island.

Suitable nesting and foraging habitat for Swainson's hawk is present on Webb Tract. Three nest sites and two nest territories were found on Webb Tract during DWR's 2002–2003 surveys (California Department of Water Resources 2003). There are more than 15 known Swainson's hawk nests within 5 miles of the Project (California Department of Water Resources 2003; California Natural Diversity Database 2009). Approximately 5,098 acres of suitable foraging habitat for Swainson's hawks are on Webb Tract.

Greater sandhill cranes were observed on Webb Tract during DWR's 2002–2003 surveys (California Department of Water Resources 2003). Although Webb Tract is not considered an important greater sandhill crane area by Pogson and Lindstedt (1988), it supports suitable foraging habitat, including grainfields, fallow fields, pastures, exotic marshes, and herbaceous uplands. DFG has designated Webb Tract as a greater sandhill crane wintering area.

Suitable nesting and wintering habitat for the western burrowing owls is present on Webb Tract. No burrowing owls were observed during any of the bird surveys conducted in 2002–2003. (California Department of Water Resources 2003.)

Loggerhead shrikes were observed on all Project islands through the spring, summer, fall, and winter during 2002–2003 surveys conducted by DWR. The primary loggerhead shrike habitat is on interior levees that contain utility lines or fences. Loggerhead shrikes were observed only in areas with aboveground utility lines located near levees on Webb Tract, where they move up and down the levees hunting for prey. (California Department of Water Resources 2003.)

Suitable nesting habitat for tricolored blackbirds, consisting of emergent marsh, willow scrub, riparian woodlands, Himalayan blackberry brambles, and grain crops, was present on all Project islands in 2002. No nesting tricolored blackbirds were observed on Webb Tract during 2002 surveys. Suitable foraging habitat is also present on all Project islands. Tricolored blackbirds were observed foraging on Webb Tract during the 2002–2003 fall and winter surveys. (California Department of Water Resources 2003.)

Webb Tract also provides suitable nesting and foraging habitat for Cooper's hawk, white-tailed kite, and short-eared owl. It provides suitable foraging/wintering habitat for ferruginous hawk, bald eagle, American peregrine

falcon, and California black rail. Cooper's hawk, white-tailed kite, and American peregrine falcon were observed on Webb Tract during 2002–2003 surveys (California Department of Water Resources 2003). Many white-tailed kites were observed during the 1987–1988 surveys on Webb Tract.

Special-status and other bat species could roost or forage on all Project islands. Suitable roosting sites consist of crevices and cavities of trees and structures, and among foliage of trees. On Webb Tract, the principal roosting and foraging habitat components are riparian and mixed woodland habitat surrounding the two lake features (California Department of Water Resources 2003).

### **Bouldin Island**

Fourteen western pond turtles were observed on the exterior levee of Bouldin Island, and three were observed on the interior of the island during 2002 surveys by DWR (California Department of Water Resources 2003). The CNDDDB contains five records for occurrences of western pond turtles in the waterways surrounding the island and one record for a western pond turtle on the interior of the island (California Natural Diversity Database 2009). Based on information from DWR (2003), the canals and associated banksides and the borrow pits/emergent marsh on Bouldin Island provide approximately 173 acres of suitable aquatic habitat for western pond turtle. In addition, 153 acres of suitable upland habitat for western pond turtle are present on the island.

According to habitat evaluations conducted in 2002 and 2003, Bouldin Island has a total of 269 acres of moderate and high-quality giant garter snake aquatic habitat, consisting of canals, ditches, and borrow pits (California Department of Water Resources unpublished data). Areas of high-quality aquatic habitat consisted of a larger canal that meandered through part of the island, a few wider canals that held water throughout the year, and borrow pits with marsh and riparian habitat (California Department of Water Resources 2003). Bouldin Island has a total of 59 acres of moderate- and high-quality habitat giant garter snake upland habitat (California Department of Water Resources unpublished data). As mentioned above, there is no resident/breeding population of giant garter snakes currently on the islands (Hansen pers. comm.).

Suitable nesting and foraging habitat is present for northern harrier on Bouldin Island. Northern harriers were observed on Bouldin Island during the 1987–1988 Jones & Stokes surveys and during 2002 surveys by DWR (California Department of Water Resources 2003). Bouldin Island supported moderate numbers of harriers during winter and early spring during 1987–1988. Harriers are not known to nest on Bouldin Island.

Bouldin Island provides suitable foraging habitat for Swainson's hawks. One was observed flying over the island during surveys conducted in May 1988, and Swainson's hawks have been observed foraging on Bouldin Island during the breeding season and winter. Pasture, fallow fields, and agricultural fields provide suitable foraging habitat; vegetation in some fallow areas, however, may be too tall and dense to be used for foraging by Swainson's hawks. There are approximately 5,797 acres of suitable foraging habitat for Swainson's hawks on Bouldin Island. The nearest known Swainson's hawk nest site is approximately

1.5 miles from Bouldin Island (California Natural Diversity Database 2009). There are more than 15 known Swainson's hawk nests within 5 miles of the Project (California Department of Water Resources 2003; California Natural Diversity Database 2009).

Greater sandhill cranes were observed on Bouldin Island during DWR's 2002–2003 surveys (California Department of Water Resources 2003). During 1987–1988 surveys, 95% of the birds identified to subspecies in February–March were greater sandhill cranes. DFG has designated Bouldin Island as a greater sandhill crane wintering area.

Although suitable nesting habitat for California black rail is not present on the interior of the island, suitable nesting habitat may be present along the waterways surrounding the island. There is one record of an occurrence of a California black rail along one of the waterways surrounding the island (California Natural Diversity Database 2009).

Suitable nesting and wintering habitat for the western burrowing owls is present on Bouldin Island. No burrowing owls were observed during any of the bird surveys conduct in 2002–2003. (California Department of Water Resources 2003.)

Loggerhead shrikes were observed on all Project islands through the spring, summer, fall, and winter during 2002–2003 surveys conducted by DWR. The primary loggerhead shrike habitat is on interior levees that contain utility lines or fences. Loggerhead shrikes were observed only in areas with aboveground utility lines located near levees on Bouldin Island, where they move up and down the levees hunting for prey. (California Department of Water Resources 2003.)

Suitable nesting and foraging habitat for tricolored blackbirds, consisting of emergent marsh, willow scrub, riparian woodlands, Himalayan blackberry brambles, and grain crops, was present on all Project islands in 2002. No tricolored blackbirds were observed nesting or foraging on Bouldin Island during 2002–2003 surveys. (California Department of Water Resources 2003.)

Bouldin Island also provides suitable foraging and/or wintering habitat for Cooper's hawk, ferruginous hawk, bald eagle, white-tailed kite, American peregrine falcon, and short-eared owl. Cooper's hawk, white-tailed kite, and American peregrine falcon were observed on Bouldin Island during 2002–2003 surveys (California Department of Water Resources 2003). Since the 1987–1988 surveys Jones & Stokes biologists also have observed peregrine falcon, Cooper's hawk, ferruginous hawk, and short-eared owl on the island.

Special-status and other bat species could roost or forage on all Project islands. Potential roosting habitat on Bouldin Island is limited and consists of a few abandoned buildings and a few small stands of large, mature cottonwoods (California Department of Water Resources 2003).

### **Holland Tract**

A large cluster of elderberry shrubs, habitat for VELB, is present on Holland Tract. These shrubs were surveyed by DWR in 2002–2003 and no evidence of VELB was found (California Department of Water Resources 2003).

Nine western pond turtles were observed on the exterior levee of Holland Tract, and three were observed in canals and other aquatic habitat on the island during 2002 surveys by DWR (California Department of Water Resources 2003). The CNDDDB contains four records for western pond turtles in the waterways adjacent to the island and one record for an occurrence on the interior of the island (California Natural Diversity Database 2009). Based on information from DWR (2003), the canals and associated banksides and the blow-out pond on Holland Tract provide approximately 71 acres of suitable aquatic habitat for western pond turtle. In addition, 167 acres of suitable upland habitat for western pond turtle is present on the island.

According to habitat evaluations conducted in 2002 and 2003, Holland Tract has a total of 188 acres of moderate and high-quality giant garter snake aquatic habitat, consisting of canals, ditches, a blow-out pond, and borrow pits (California Department of Water Resources 2003 and unpublished data). Most of this habitat was determined likely to provide only temporary and/or transit corridor habitat. Holland Tract has 267 acres of moderate- and high-quality giant garter snake upland habitat. Suitable upland habitat on the island excludes areas grazed by cattle (California Department of Water Resources 2003). As mentioned above, there currently is no resident/breeding population of giant garter snakes on the islands (Hansen pers. comm.).

Northern harrier was observed on Holland Tract during the 1987–1988 Jones & Stokes surveys and during 2002 surveys by DWR (California Department of Water Resources 2003). Suitable nesting and foraging habitat is present on this island for this species.

One adult Swainson's hawk was observed during the 1987–1988 Jones & Stokes surveys of Holland Tract. Suitable nesting habitat is present on the island (trees older than 25 years), but no nests were found during 1987–1988 or 2002–2003 surveys. Fallow areas, pasture, grassland, and agricultural fields are suitable for foraging use by Swainson's hawks. The nearest known nest site is just east of Holland Tract on Bacon Island (California Department of Water Resources 2003). There are more than 15 known Swainson's hawk nests within 5 miles of the Project (California Department of Water Resources 2003; California Natural Diversity Database 2009). Holland Tract has approximately 2,832 acres of suitable foraging habitat for Swainson's hawks.

Greater sandhill cranes were observed on Holland Tract during DWR's 2002–2003 surveys (California Department of Water Resources 2003). Holland Tract provides suitable crane foraging habitat, although the amount of forage is expected to be smaller because of the conversion of corn and wheat fields in 1987 to pasture in 2002–2008.

Although suitable nesting habitat for California black rail is not present on the interior of the island, suitable nesting habitat may be present along the waterways surrounding the island. There are two records of occurrences of California black rails along waterways on the east and west sides of the island (California Natural Diversity Database 2009).

Suitable nesting and wintering habitat for the western burrowing owls is present on Holland Tract. In 2002–2003, there were extensive California ground squirrel burrows along the interior side of the levees on Holland Tract; however, the locations of these burrows are not ideal because they are on exposed levee slopes in which vegetation is intensely managed. No burrowing owls were observed during any of the bird surveys conducted during 2002–2003, and there were no signs of burrowing owls using abandoned ground squirrel burrows or artificial burrows on Holland Tract during nesting and wintering periods in 2002–2003; however, levee vegetation management was intensive on Holland Tract in 2002. (California Department of Water Resources 2003.)

Loggerhead shrikes were observed on all Project islands through the spring, summer, fall, and winter during 2002–2003 surveys conducted by DWR. The pasture (with fences and utility lines), riparian habitat, rows of trees and blackberry shrubs provide foraging and nesting habitat on Holland Tract. (California Department of Water Resources 2003.)

Suitable nesting and foraging habitat for tricolored blackbirds, consisting of emergent marsh, willow scrub, riparian woodlands, Himalayan blackberry brambles, and grain crops, was present on all Project islands in 2002. No tricolored blackbirds were observed nesting or foraging on Holland Tract during 2002–2003 surveys. (California Department of Water Resources 2003.)

Holland Tract also provides suitable nesting and foraging habitat for Cooper's hawk, white-tailed kite, and short-eared owl. It provides suitable foraging/wintering habitat for ferruginous hawk, bald eagle, American peregrine falcon, and California black rail. Cooper's hawk and white-tailed kite were observed on Holland Tract during 2002–2003 surveys (California Department of Water Resources 2003). Many white-tailed kites were observed during the 1987–1988 surveys on Holland Tract and were suspected to have nested on the island.

Special-status and other bat species could roost or forage on all Project islands. Various structures and mature willow trees and cottonwoods provide suitable roosting habitat on Holland Tract (California Department of Water Resources 2003).

## Environmental Commitments

Several changes in Project design and many prior agreements with Delta water rights holders or agencies have resulted in the Project environmental commitments. One of the environmental commitments, the HMP described here, will reduce or eliminate impacts of the original Project design and operation on wildlife.

## Habitat Management Plan

The Project applicant, in collaboration with DFG, State Water Board, and others, prepared a final HMP to describe how Bouldin Island and Holland Tract, the Habitat Islands, will be managed to offset Project impacts on state-listed Threatened and Endangered species, wintering waterfowl, and jurisdictional wetlands (Jones & Stokes Associates 1995). Land management practices to benefit other wildlife species also were incorporated into the plan. The HMP specifically describes:

- goals and objectives for wildlife habitat management,
- design and functions of habitats,
- management guidelines for habitat and recreation,
- island infrastructure and levee maintenance,
- procedures for ensuring the short- and long-term success of Project compensation, and
- a process for addressing changes in island management.

The HMP was prepared with the intent of integrating final permit conditions and agreements that affect management of the Habitat Islands. Three management goals for the Habitat Islands were identified by the HMP team. The HMP team designed island habitats, habitat juxtaposition, and habitat management criteria to achieve these goals, which are listed in order of descending priority:

- **Compensation goals.** Compensate for Project impacts on species listed as Threatened or Endangered under CESA; wintering waterfowl habitat; and jurisdictional wetlands, including riparian habitats. Compensation goals must be achieved to offset Project impacts.
- **Species goals.** Without compromising compensation goals, implement land management practices to provide the greatest benefit to upland wildlife species; enhance breeding habitat for waterfowl, roosting habitat for greater sandhill cranes, and nesting habitat for Swainson's hawks; and provide potential habitats for other special-status species. Species goals should be implemented to enhance overall wildlife values associated with compensation habitats.
- **Other important goals.** Implement best land management practices that do not detract from compensation and priority species goals to enhance habitat conditions for other important species or species groups, such as migratory shorebirds, nongame water birds, and species associated with riparian habitats.

Management prescriptions for habitat types and acreages of habitat types to be developed with implementation of the HMP will depend on the preparation of a final HMP that is subject to agency review and approval. As USFWS, DFG, Corps, and State Water Board permitting proceeds, the Project applicant will update the draft HMP to reflect the current environmental conditions and ensure that the Project's effects are fully mitigated. The HMP also includes a provision

for the development of a Construction Implementation Plan to protect sensitive resources; this plan will be finalized. Environmental commitments specific to wildlife that will be included in the final HMP include those following.

- Compensate for the loss of riparian and pond habitats by preserving or creating a minimum of 339 acres of riparian woodland habitat, a minimum of 150 acres of riparian scrub habitat, and 76 acres of permanent pond habitat on the Habitat Islands.
- Compensate for the loss of aquatic and upland habitats for western pond turtle by preserving or creating a minimum of 305 acres of aquatic habitat and 417 acres of upland habitat on the Habitat Islands, including creating additional suitable upland (herbaceous upland and riparian) around the lakes, ponds, and emergent marsh on the Habitat Islands.
  - Consider reconfiguring the three proposed north-south blocks of herbaceous upland on Bouldin Island so that they run east-west and construct each block to have a low to moderate slope. This would improve the chances of western pond turtles successfully nesting on the Habitat Islands by creating a south-facing slope, which has the potential to be used by nesting turtles.
  - Include a measure to place logs around the perimeters of lakes, ponds, and emergent marsh to create basking habitat for western pond turtles.
  - Include a Best Management Practice Guideline to conduct maintenance of the levees after the western pond turtle hatchlings have emerged but before the females are attempting to nest (i.e., activities would be conducted before April 1).
- Compensate for the loss of aquatic and upland habitat for giant garter snake by preserving or creating a minimum of 509 acres of aquatic habitat and 443 acres upland habitat on the Habitat Islands.
- Compensate for the loss of foraging habitat for greater sandhill crane by preserving or creating between 7,673 and 10,071 acres of suitable foraging habitat.
- Compensate for the loss of foraging habitat for Swainson's hawk by preserving or creating a minimum of 6,929 acres of suitable foraging habitat. Ensure that preserved/created foraging habitat is higher quality than habitat lost on Reservoir Islands.
- Compensate for the loss of suitable breeding/wintering habitat for western burrowing owl by preserving or creating a minimum of 747 acres of suitable breeding/wintering habitat for western burrowing owl.
- Revise the Construction Implementation Plan described in the HMP to include additional special-status species (western pond turtle, giant garter snake, Cooper's hawk, white-tailed kite, western burrowing owl, short-eared owl, loggerhead shrike, nesting migratory birds, and bats). The Construction Implementation Plan will identify methods to avoid impacts on roosting greater sandhill cranes and on nesting northern harriers, Cooper's hawks, Swainson's hawks, white-tailed kites, western burrowing owls, short-eared owls, loggerhead shrikes, California black rails, and bats. These methods will

include conducting preconstruction surveys to locate nesting and roosting sites of these species and may include measures such as avoiding construction during sensitive use periods.

Additional elements of the Construction Implementation Plan will include:

- The Project applicant will avoid removal and maintain a 100-foot buffer around the cluster of elderberry shrubs on Holland Tract when working in the vicinity of the shrubs.
- The construction area will be clearly defined using orange barrier fencing to minimize disturbance to riparian vegetation and western pond turtle habitat.
  - A preconstruction survey for western pond turtles will be conducted by a qualified biologist within 24 hours of the start of construction activities in suitable aquatic habitat. If a turtle is located within the construction area, the turtle will be relocated out of this area, and exclusion fence will be installed to prevent the movement of turtles back into the construction area. If construction will occur in suitable upland habitat between April 1 and September 1, a survey for nests sites will be conducted within 24 hours prior to ground-disturbing activities in suitable upland habitat.
  - Grading and construction activities along ponds, borrow pits, ditches, and canals, and within 1,000 feet of these areas will be minimized between October 15 and April 15 to reduce potential mortality to hibernating turtles.
  - If a turtle becomes trapped during construction activities within aquatic habitat, the turtle will be removed from the work area by a qualified biologist with a valid scientific collecting permit and an MOU from DFG and placed downstream from the construction area or in adjacent suitable aquatic habitat outside the construction area.
- The take of giant garter snake will be minimized or avoided by:
  - Conducting a preconstruction survey in accordance with USFWS and DFG specifications. This could include visual surveys of suitable habitat within 24 hours of construction, or trapping of affected canals with suitable habitat within several weeks of construction. If giant garter snakes are detected, USFWS and DFG will be notified, and the snakes will be captured and relocated by individuals with valid 10(a)(1)(A) permits from USFWS.
  - Clearing of wetland vegetation will be confined to the minimal area necessary.

Also included will be:

- preconstruction survey protocols to locate Swainson's hawk nest sites and greater sandhill crane roosts on Reservoir Islands and nesting California black rails on the water side of perimeter levees;
- preconstruction survey protocols to locate nests of northern harrier, Cooper's hawk, white-tailed kite, western burrowing owl, short-eared owl, loggerhead shrike and other migratory birds;

- measures that would be instituted to avoid affecting state-listed wildlife species, including restriction of construction activities to areas at least 600 feet from nesting California black rails;
- establishment of protective buffers around active bird nests;
- preconstruction surveys by a qualified biologist to examine structures and trees that provide suitable roosting habitat for bats prior to their demolition or removal.

If no bats are detected during the preconstruction survey, structure and tree removal should be conducted during the month of September to ensure that breeding and hibernating bats are avoided. If bats are observed, demolition and tree removal will be delayed until the bats leave the roosting sites or until DFG authorizes building demolition/ tree removal. In addition, bat boxes or other suitable roosting habitat should be constructed, per DFG recommendations, to mitigate the loss of roosting habitat on the Reservoir Islands.

- construction monitoring methods and schedule to be implemented to ensure compliance with the construction mitigation plan; and
- potential remedial measures to compensate for impacts incurred during construction that are not identified in the HMP.

Following construction, the Project applicant will submit a report describing success of construction impact avoidance measures to the State Water Board Chief of the Division of Water Rights and DFG.

## Reservoir Island Construction Monitoring

The following environmental commitments will also occur on the Reservoir Islands.

- The take of giant garter snake will be minimized or avoided by:
  - Conducting a preconstruction survey in accordance with USFWS and DFG specifications. This could include visual surveys of suitable habitat within 24 hours of construction, or trapping of affected canals with suitable habitat within several weeks of construction. If giant garter snakes are detected, USFWS and DFG will be notified, and the snakes will be captured and relocated to the habitat islands by individuals with valid 10(a)(1)(A) permits from USFWS.
  - Clearing of wetland vegetation will be confined to the minimal area necessary.
- Impacts to avian species will be minimized or avoided by:
  - preconstruction survey protocols to locate Swainson's hawk nest sites and greater sandhill crane roosts and nesting California black rails on the water side of perimeter levees;

- ❑ preconstruction survey protocols to locate nests of northern harrier, Cooper’s hawk, white-tailed kite, western burrowing owl, short-eared owl, loggerhead shrike and other migratory birds;
- ❑ measures that would be instituted to avoid affecting state-listed wildlife species, including restriction of construction activities to areas at least 600 feet from nesting California black rails; and
- ❑ establishment of protective buffers around active bird nests.

## Environmental Effects

### Methods

Impacts on wildlife were evaluated through comparison of wildlife values associated with habitat conditions predicted under the Project alternatives with existing habitat conditions. Existing wildlife habitats would change as a result of construction of facilities, upgrading of levees, inundation of Reservoir Islands during water storage and shallow-water management periods, and implementation of the HMP (see Appendix G3, “Habitat Management Plan for the Delta Wetlands Habitat Islands,” in the 1995 EIR/EIS). For impacts on special-status species that were not addressed in the 1995 DEIR/EIS or the 2001 FEIR or 2001 FEIS (e.g., VELB, western pond turtle, giant garter snake, burrowing owl, several other bird species), an impact discussion has been added to this section based on information provided in reports prepared by DWR for the Project islands (California Department of Water Resources 2003 and 2006) and on wetland mapping conducted by ICF Jones & Stokes in 2008.

### Analysis of Alternatives

The analysis of impacts of the Project alternatives on the Reservoir Islands was based on the amounts of Delta water that would be available for storage. The estimated amounts are based on the historical 1922–2003 monthly runoff for the Central Valley tributaries to the Delta and modeling based on the 2008 CVP–SWP OCAP evaluations (see Section 4.1, Water Supply).

A detailed description of the approach used to analyze future habitat conditions on the Project Reservoir Islands was presented in Appendix G2, “Prediction of Vegetation on the Delta Wetlands Reservoir Islands,” in the 1995 DEIR/EIS. Although Reservoir Islands would support wildlife habitat, the actual duration and frequency of habitat conditions that would occur on Reservoir Islands is unpredictable. Because future habitat conditions are unpredictable and cannot be quantified, Reservoir Islands were assumed in this impact assessment to provide no wildlife values that would offset Project impacts. Therefore, for the impact analysis, operation of the Reservoir Islands was not used to offset or compensate for impacts of the Project on wildlife values.

In addition, there is potential for some level of continuing subsidence on the Project islands even with the cessation of farming activities. As a result, the water storage capacity of the Reservoir Islands could increase in future years. The rate of subsidence, however, would be substantially less than under existing conditions. Reduced rates of subsidence and increased water storage capacity on the Reservoir Islands would not be expected to substantially increase or decrease wildlife habitat impacts analyzed in this chapter.

Analysis of future vegetation conditions on Habitat Islands under Alternatives 1 and 2 is based on habitat types and acreages described in the draft HMP (see Appendix G3, "Habitat Management Plan for the Delta Wetlands Habitat Islands," in the 1995 EIR/EIS). Under Alternative 3 the development of the HMP would be precluded because all islands would be used as reservoirs. Because the draft HMP is based on the habitat evaluation procedures (HEP) analysis, this analysis is described below.

## **Habitat Evaluation Procedures Analysis**

This section describes the HEP methods used to identify pre-Project and Project habitat conditions on the Project islands under the 1990 and 1992 versions of the Project. The HEP analysis was performed by a team consisting of representatives of State Water Board, USFWS, DFG, and Jones & Stokes. HEP methods were not used to evaluate the current Project. As with the 2001 FEIR and 2001 FEIS, the HMP team consulted the HEP results for the earlier versions of the Project and conducted an informal, modified HEP evaluation of the current Project to assist in identifying habitat types, acreages, and management required on the Project Habitat Islands to offset impacts on waterfowl.

### **Habitat Evaluation Procedure Methods**

HEP is a habitat-based approach for assessing environmental impacts of proposed water and land resource development projects. The method can be used to document the quality and quantity of available habitat for selected wildlife species. The procedures provide information for two general types of wildlife habitat comparisons: the relative value of different areas at the same point in time; and the relative value of the same areas at future points in time. By combining the two types of comparisons, the impact of proposed or anticipated land and water use changes on wildlife habitat can be quantified (U.S. Fish and Wildlife Service 1980). Additional information on the HEP analysis can be found in the 1995 EIR/EIS.

## **Habitat Management Plan Development**

### **Habitat Management Plan Objectives**

The HMP team's (formerly the HEP team's) primary objectives were to design the Habitat Islands to:

- compensate for the loss of foraging habitat on the Reservoir Islands for Swainson's hawk and greater sandhill crane, which are protected under

CESA (see Appendix H4, “California Endangered Species Act Biological Assessment: Impacts of the Delta Wetlands Project on Swainson’s Hawk and Greater Sandhill Crane,” in the 1995 DEIR/EIS);

- compensate for loss of foraging habitat for wintering waterfowl; and
- mitigate Project impacts on jurisdictional waters of the United States, pursuant to Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899.

The HMP team’s secondary planning objectives included creating habitats for upland wildlife species; enhancing habitat for waterfowl breeding, greater sandhill crane roosting, and Swainson’s hawk nesting; and providing habitat for other special-status species.

The HMP will be revised and updated to reflect current habitat conditions, address special-status species not covered in the draft HMP, and if needed, revise quantities of habitat as recommended by USFWS and DFG.

## Significance Criteria

The wildlife impact analysis considered several criteria for determining the significance of impacts related to this resource. The analysis took into account both relevant criteria contained in Appendix G of the State CEQA Guidelines (Association of Environmental Professionals 2009) and Project-specific criteria developed by the lead agency to address potential impacts unique to the Project’s location and elements.

For this analysis, an alternative would be considered to have a significant adverse impact on wildlife if it would:

- substantially decrease the acreage of herbaceous upland habitats in the Delta region,
- decrease the acreage of wetland and riparian habitats on the Project islands,
- decrease forage quality or quantity available to wintering waterfowl on the Project islands,
- substantially disrupt wildlife use patterns in the Delta,
- increase the potential for outbreaks of wildlife diseases, or
- result in permanent loss of occupied special-status species habitat or direct mortality of special-status species.

An alternative would be considered to have a beneficial impact if it would result in a substantial increase in the quantity or quality of herbaceous upland, wetland, riparian woodland and scrub, wintering waterfowl, or special-status species habitat.

# Impacts and Mitigation Measures

## Proposed Project (Alternative 2)

### Bacon Island and Webb Tract

If the Project is implemented, agricultural lands and natural habitat on Bacon Island and Webb Tract would be converted to reservoir. As indicated above, the analysis of impacts is based on the reservoirs at full storage conditions and assumes that no wildlife value would be retained.

### Special-Status Species

**Valley Elderberry Longhorn Beetle.** There is no suitable habitat (elderberry shrubs) on Bacon Island or Webb Tract (California Department of Water Resources 2003). Consequently, there would be no impacts on VELB from the conversion of these islands for water storage.

This conclusion is unchanged from the 2001 FEIR and 2001 FEIS.

**Western Pond Turtle.** Suitable aquatic and upland habitat for western pond turtle is present on Bacon Island and Webb Tract, and western pond turtles were observed on both islands during 2002 surveys for this species (California Department of Water Resources 2003). Although some aquatic habitat could be maintained (in existing canals, ditches, or borrow pits) or created as reservoirs, it is assumed for this impact analysis that aquatic and upland habitat on the Reservoir Island would be lost and compensation would be required. In addition, construction and operation of the Project could result in the injury or mortality of individual turtles, which could decrease the population of turtles in the general area. Measures would be required to minimize injury and mortality of turtles during construction and operation activities.

**Giant Garter Snake.** A giant garter snake was observed on Webb Tract in 2002 (California Natural Diversity Database 2009). However, subsequent extensive surveys during 2003 and 2004 by Eric Hansen did not result in any confirmed individuals (Hansen pers. comm.) Suitable aquatic and upland habitat is present for this species on both Bacon Island and Webb Tract (California Department of Water Resources 2003). Loss of aquatic and upland habitat for giant garter snake would occur as a result of flooding the islands for water storage. Although some aquatic habitat could be maintained (in existing canals, ditches, or borrow pits) or created as reservoirs, it is assumed for this impact analysis that aquatic and upland habitat on the Reservoir Islands would be lost and compensation would be required. In addition, construction and operation of the Project could result in the injury or mortality of individual snakes. Measures would be required to minimize injury and mortality of giant garter snakes during construction and operation activities.

**Cackling (Aleutian Canada) Goose.** The cackling goose no longer is listed as Threatened under the ESA. Over 50% of the world's population of cackling

geese uses the Delta during wintering (Rosen pers. comm.). Specific information on the presence of cackling goose on the Project islands could not be found. The overall availability of foraging habitat would decline with the loss of corn and other crops of high forage value with implementation of Alternative 2.

**Bald Eagle.** Bald eagles do not occur regularly in the Delta, and none were observed on Project islands during surveys. The Reservoir Islands currently support low-quality foraging habitat for bald eagle. Water storage on the Reservoir Islands would result in low-quality foraging habitat along reservoir shorelines, where diving ducks and resting coots typically would congregate (see Appendix H3 of the 1995 DEIR/EIS).

**Northern Harrier.** Both Bacon Island and Webb Tract provide suitable nesting and foraging habitat for northern harrier, although the amount of suitable nesting habitat on Bacon Island is limited. Potential prey populations for harriers would be largely eliminated because of the conversion of upland habitat to reservoir. Harriers are wide-ranging and would move to other areas to forage. Conversion of habitat to reservoir also could remove suitable nesting habitat, and construction activities could disturb or cause the mortality of individual birds.

**Swainson's Hawk.** Suitable nesting and foraging habitat for Swainson's hawks is present on Bacon Island and Webb Tract. Two nest sites and two nest territories were found on or immediately adjacent to Bacon Island, and three nest sites and two nest territories were found on Webb Tract during DWR's 2002–2003 surveys (California Department of Water Resources 2003). Agricultural, fallow, and herbaceous upland habitats present on the islands provide suitable foraging habitat for Swainson's hawk. Under implementation of Alternative 2, inundated portions of Reservoir Islands would be unsuitable as Swainson's hawk foraging habitat (i.e., foraging habitat would be lost), and rodent populations would be substantially reduced as a result of inundation. Conversion of habitat to reservoir also could remove suitable nesting habitat, and construction activities could disturb or cause the mortality of individual birds.

**American Peregrine Falcon.** Suitable foraging/wintering habitat for American peregrine falcon is present on Bacon Island and Webb Tract. American peregrine falcons were observed on both islands during 2002–2003 surveys (California Department of Water Resources 2003). Flooding of the Reservoir Islands would attract diving ducks and thus provide low- to moderate-quality foraging habitat. Because peregrine falcons mainly eat birds, foraging opportunities likely would decrease with conversion of islands to water storage as the variety and numbers of birds are likely to decrease on the Reservoir Islands.

**California Black Rail.** Webb Tract provides suitable foraging habitat for California black rail. Additionally, occupied nesting habitat exists on small islands supporting marsh vegetation adjacent to Bacon Island (California Natural Diversity Database 2009). If present, California black rails nesting adjacent to Bacon Island could be affected by construction activities (e.g., levee refurbishment, siphon construction) on the water side of Reservoir Islands, which could decrease the population of rails in the general area.

**Greater Sandhill Crane.** Greater sandhill cranes were observed on Bacon Island and Webb Tract during DWR's 2002–2003 surveys (California Department of Water Resources 2003). Information from these surveys suggests that sandhill cranes were roosting on Webb Tract during the winter of 2002–2003. Corn and wheat fields provide suitable foraging habitat for this species. Storage of water on the Reservoir Islands would result in the loss of foraging habitat for greater sandhill cranes.

**Western Burrowing Owl.** Suitable nesting and wintering habitat for western burrowing owls is present on Bacon Island and Webb Tract. A burrowing owl was observed on Bacon Island during 1987–1988 surveys. Individual burrowing owls (if present) could be disturbed or killed by construction activities (e.g., levee refurbishment, siphon construction) on the land side of Reservoir Islands. Most of the habitat conditions associated with flooding of the islands for water storage would result in unsuitable foraging habitat for western burrowing owl (e.g., removal of foraging habitat).

**Tricolored Blackbird.** Suitable nesting and foraging habitat for tricolored blackbird is present on Bacon Island and Webb Tract. Tricolored blackbirds were observed foraging on both islands during the 2002–2003 fall and winter surveys (California Department of Water Resources 2003). Storage of water on the Reservoir Islands would result in the loss of foraging habitat for tricolored blackbirds. In addition, suitable nesting habitat could be removed during construction activities and flooding of islands.

**Other Special-Status Birds.** Bacon Island and Webb Tract provide suitable nesting and foraging habitat for Cooper's hawk, white-tailed kite, and loggerhead shrike. The islands also provide suitable foraging/wintering habitat for ferruginous hawk and short-eared owl. Storage of water on the Reservoir Islands would result in the loss of foraging habitat for white-tailed kite, ferruginous hawk, and short-eared owl. Flooded conditions could result in an increase of foraging opportunities for loggerhead shrike (from an increase in insects and amphibians) and a limited impact on Cooper's hawk because of its varied diet. Conversion of habitat to reservoir also could remove suitable nesting habitat and construction activities could disturb or cause the mortality of individual birds.

**Bats.** Bacon Island and Webb Tract provide suitable roosting and foraging habitat for special-status and other bat species. Bats that forage or roost on the islands could be affected by the conversion of the island to reservoir. The number of bats could decrease because the Project could remove suitable roosting habitat, and construction activities could disturb or cause the mortality of individual bats. However, the number of bats also could increase after Project completion because the number of insects likely would be greater over the inundated areas, which would attract more bats to the islands.

### **Other Wildlife**

**Waterfowl.** Habitat conditions under Alternative 2 would substantially alter waterfowl populations and seasonal use patterns on Reservoir Islands. Habitat quality on Reservoir Islands would decrease substantially for swans, geese,

dabbling ducks, and coots during water storage periods. However, dabbling ducks would make extensive use of the reservoir water surfaces for resting. Diving ducks make little use of Bacon Island and Webb Tract because little suitable habitat exists. Diving species, including scaup, ring-necked duck, ruddy duck, redhead, and canvasback, likely would increase on these islands once they are reservoirs.

**Piscivorous Birds.** Use of the Reservoir Islands by piscivorous birds (e.g., grebes, cormorants, and pelicans) would be expected to increase from implementation of the Project. These species would feed in the reservoirs, but little or no nesting of most of these species would occur on the Reservoir Islands.

**Wading Birds.** Water storage would reduce use of the Reservoir Islands by wading birds such as herons and egrets because shallow-flooded feeding areas on the islands would become inundated.

**Raptors.** Raptor use of the Reservoir Islands would decrease because of habitat changes caused by water storage operations. Most raptors are found on the islands in winter, when they forage for rodents and large insects in fallow grassland and agricultural habitats. Winter flooding of the islands would force most wintering raptors to forage elsewhere. Although most migratory raptors are adapted to moving in winter to locate adequate prey populations, it is uncertain whether displacement during winter would increase raptor mortality (Newton 1979). Rodent populations would be largely eliminated during full-storage periods.

**Shorebirds.** Water storage on the Reservoir Island would reduce the number of shorebirds because shallow-flooded feeding areas on the islands would become inundated. It is expected that no shorebird habitat would exist on the Reservoir Islands during full-storage periods.

**Gulls and Terns.** Gull and tern feeding on the Reservoir Islands probably would decline because of the loss of agricultural waste grain, but resting use would probably continue on the Reservoir Islands on calm days or in areas protected from wind.

**Blackbirds and Starlings.** Water storage on the Reservoir Islands would reduce use of the islands by blackbirds because shallow-water wetlands and agricultural areas on the islands would become inundated and would not be available for foraging.

Populations of the introduced European starling, a species that is more closely associated with agricultural lands than blackbirds, are expected to decline because of the loss of agricultural foods. The starling decline would be beneficial to native wildlife because it would reduce competition with native cavity-nesting birds (Remsen 1978; Weitzel 1988).

**Riparian and Marsh Birds.** Existing riparian woodland and scrub and freshwater marsh habitat on Reservoir Islands would be eliminated by Project construction and inundation under Project operations. Riparian shrubs and trees

would not be expected to colonize interior levee slopes because interior levee slopes would be ripped. Therefore, numbers of riparian and marsh birds on the islands would be expected to decline.

**Grassland and Agricultural Birds.** All species in the grassland and agricultural bird group are regionally common. Bird species that nest in grassland and agricultural habitats on the Reservoir Islands could be displaced by the Project. In addition to western meadowlarks, blackbirds, starlings, pheasants, and waterfowl, several species that use grassland and agricultural lands during migration and in winter, including California horned lark, American crow, yellow-billed magpie, and water pipit, would use these lands less because of habitat loss resulting from operation of the Reservoir Islands for water storage.

### **Upland Game**

The breeding population of ring-necked pheasants on the Reservoir Islands would decline substantially as a result of inundation of the Reservoir Islands. Water storage would reduce the amount of available foraging habitat and cover for pheasants.

Quail populations on the Reservoir Islands would decline, and the species may become extirpated from the Reservoir Islands. Mourning dove populations would also decrease because of the loss of seasonal wetland and grassland habitat.

## **Bouldin Island and Holland Tract**

### **Habitat Management Plan Implementation**

If the proposed Project is implemented, various types of agriculture and habitats would be planted and created, respectively, on Bouldin Island and Holland Tract. These Habitat Islands would be managed primarily to offset impacts on wildlife associated with operation of the Reservoir Islands under Alternative 2. Because of changes in acreage of habitats and new information on species presence (e.g., Swainson's hawks nesting on the islands, presence of western pond turtle), the 1995 draft HMP will need to be revised to fully offset impacts on special-status wildlife. Implementation of the final HMP also would provide benefits to wildlife for which compensation is not required for Project impacts, including development of waterfowl nesting habitat and greater sandhill crane roosting habitat.

The primary goals of the draft HMP were to describe the Habitat Island habitats and management requirements necessary to offset impacts of Reservoir Island operations on state-listed Threatened species (i.e., impacts on Swainson's hawk and greater sandhill crane foraging habitat), wintering waterfowl foraging habitat, and jurisdictional wetlands pursuant to Section 404 of the CWA. Major elements of the draft HMP included:

- creation of approximately 9,010 acres of agricultural and nonagricultural habitats for species that would be affected by the Project;
- creation of Section 404 jurisdictional riparian woodland and scrub and wetland habitats;

- implementation of special habitat management practices that would increase wildlife habitat values beyond those typically associated with created habitats (e.g., specified flooding schedules for seasonal wetlands);
- regulation of hunting and other recreational activities to reduce the effects of human disturbance of wildlife;
- establishment of a closed hunting zone on Bouldin Island to provide greater sandhill crane foraging areas free from hunter disturbance;
- establishment of two additional closed hunting zones (one on each island) to provide waterfowl foraging and resting areas free from hunter disturbance; and
- establishment of a Habitat Island management oversight committee empowered to consult with the Project applicant and DFG to review monitoring data and develop recommendations for changes in Habitat Island management in future years as long as the primary goals of the HMP are not compromised.

Table 4.7-5 summarizes the acreages of habitats that would be preserved or created on the Habitat Islands under Alternative 2. Fields of corn rotated with wheat, mixed agriculture/seasonal wetlands, seasonal managed wetlands, and pasture/hay fields would be managed during fall and winter specifically to provide high-quality swan, goose, and duck foraging habitat. Seasonal ponds, some seasonal managed wetland, and small grain fields would be managed specifically to provide high-quality duck nesting and brood habitat.

Agricultural lands, seasonal wetland habitats, and herbaceous uplands would be managed during spring, summer, and fall to provide suitable Swainson's hawk habitat.

Habitats managed specifically to provide winter waterfowl foraging habitat and herbaceous uplands also would provide high-quality greater sandhill crane foraging habitat during winter. A portion of seasonal managed wetlands and cornfields on Bouldin Island would be managed specifically to provide crane roosting habitat and high-quality foraging habitat, respectively.

Riparian woodland and scrub habitats established to offset impacts on jurisdictional wetlands under Section 404 of the CWA (see Section 4.6, Vegetation and Wetlands) would provide habitat for a wide diversity of wildlife associated with riparian vegetation, including cavity-nesting bird species.

To offset the impact of hunting disturbance on foraging waterfowl and greater sandhill cranes, three closed hunting zones, totaling approximately 2,000 acres, would be established on the Habitat Islands.

**Table 4.7-5.** Acreages of Habitats to Be Created/Managed on the Habitat Islands under Alternative 2

Habitat Type <sup>a</sup>	Bouldin Island		Holland Tract		Habitat Island Totals	
	Total Acres	Percentage of Total Acres	Total Acres	Percentage of Total Acres	Total Acres <sup>b</sup>	Percentage of Total Acres
Corn/wheat	1,629	27	955	31	2,584	29
Small grains	106	2	152	5	258	3
Mixed agriculture/seasonal wetland	1,014	17	631	21	1,645	18
Seasonal managed wetland	1,723	29	393	13	2,116	23
Seasonal pond	66	1	68	2	134	1
Pasture/hay	132	2	72	2	204	2
Emergent marsh <sup>c</sup>	208	3	194	6	402	4
Riparian	170	3	217	7	387	4
Lake <sup>c</sup>	111	2	33	1	144	2
Herbaceous upland <sup>c</sup>	479	8	253	8	732	8
Developed	177	3	58	2	235	3
Canal <sup>c</sup>	70	1	10	0	80	1
Borrow pond	89	1	0	0	89	1
Total	5,974	100	3,036	100	9,010	100

Note: Minor inconsistencies in totals are the result of rounding.

<sup>a</sup> Habitat types and habitat management prescriptions are described in the draft Habitat Management Plan (HMP).

<sup>b</sup> These acreages are based on the draft HMP and may be revised in the final HMP.

<sup>c</sup> Includes existing acres of habitat unaffected by the Project.

**Airstrip and Aircraft Restrictions.** The Bouldin Island airstrip is located in the easternmost closed hunting zone on the island. Restrictions have been placed on use of the airstrip and aircraft on the Habitat Islands from September 1 through March 31 to reduce disturbance from airstrip and aircraft operations on waterfowl and greater sandhill cranes using closed hunting zones and other portions of the island. As described in the draft HMP, restrictions include limiting use of the airstrip and island overflights for farming and habitat management operations during the waterfowl hunting season to nonhunt days to prevent disturbance in closed hunting zones during periods of hunter disturbance.

Use of the airstrip and aircraft overflights of the islands for recreation and other uses also is restricted from September 1 through March 31. Restrictions include limiting use of the airstrip to 100 landings and takeoffs during the waterfowl use season. Use of the airstrip for landings and takeoffs of fixed-winged aircraft, however, is permitted during hunt days. Consequently, waterfowl, greater sandhill cranes, and other wildlife using Bouldin Island on hunt days could be disturbed periodically by aircraft during periods of hunter disturbance.

### Special-Status Species

A summary of the habitats that would be created for special-status species on the Habitat Islands is provided in Table 4.7-6.

**Valley Elderberry Longhorn Beetle.** Suitable habitat for VELB (elderberry shrubs) is present on Holland Tract. Although no evidence of VELB was found by DWR during 2002–2003 surveys (California Department of Water Resources 2003), these shrubs still provide habitat for this Threatened species. In addition, surveys for VELB are valid only for a period of 2 years, and the shrubs would need to be resurveyed to ensure that VELB are not present. Planting elderberry shrubs within the 387 acres of riparian habitat to be planted on the Habitat Islands would expand the amount of suitable habitat available to this species.

**Western Pond Turtle.** Suitable aquatic and upland habitat for western pond turtle is present on Bouldin Island and Holland Tract, and western pond turtles were observed on both islands during 2002 surveys for this species (California Department of Water Resources 2003). Approximately 313 acres of suitable aquatic (lake, canals, borrow ponds) and 1,119 acres of suitable upland habitat (grassland and riparian) would be available to western pond turtle on the Habitat Islands with implementation of the final HMP. During habitat creation and improvements, individual turtles could be harmed or killed. Measures would be required to minimize injury and mortality of turtles during habitat creation and modification activities.

**Giant Garter Snake.** Approximately 313 acres of suitable aquatic (lake, canals, borrow ponds) and 1,119 acres (grassland and riparian) of suitable upland habitat would be available to giant garter snake on the Habitat Islands with implementation of the final HMP. During habitat creation and improvements, individual snakes could be harmed or killed. Measures would be required to minimize injury and mortality of giant garter snakes during habitat creation/improvement activities.

**Northern Harrier.** Implementation of the HMP would provide 3,250 acres of suitable nesting habitat and 7,941 acres of suitable foraging habitat for northern harriers on the Habitat Islands. During habitat creation and improvements, individual harriers could be disturbed, harmed, or killed if these activities occur during the nesting season. Measures would be required to minimize disturbance, injury, and mortality of northern harrier during habitat creation/modification activities.

**Swainson's Hawk.** As described in the draft HMP, approximately 387 acres of existing and created riparian woodland and scrub habitats would provide suitable Swainson's hawk nesting habitat. In addition, a total of 7,539 acres of suitable spring, summer, and fall foraging habitat for Swainson's hawks of poor, fair, and good quality would be created or maintained on the Habitat Islands. Suitable Swainson's hawk foraging habitat will include cornfields, wheat fields, and small grain fields, mixed agriculture/ seasonal wetlands, seasonal managed wetlands, pasture/hay fields, and herbaceous uplands. Portions of nonagricultural habitats also would be mowed to enhance foraging habitat quality.

**Greater Sandhill Crane.** As described in the draft HMP, a total of 7,673 acres of suitable winter foraging habitat for greater sandhill crane of poor, fair, and good quality would be developed on the Habitat Islands. Suitable habitat would include corn, wheat, and small grain fields; mixed agriculture/seasonal wetlands;

seasonal managed wetlands; seasonal ponds; pasture/hay fields; and herbaceous uplands.

Three closed hunting zones, totaling 2,008 acres, would be established on the Habitat Islands (two on Bouldin Island and one on Holland Tract) and would provide greater sandhill crane foraging areas that are free from hunter disturbance during hunt days. A portion of seasonal managed wetlands in one Bouldin Island closed hunting zone would be managed specifically to provide crane roosting habitat. A portion of cornfields near wetlands managed as roosts would be harvested in a manner that would provide optimum crane foraging habitat.

**Western Burrowing Owl.** Implementation of the HMP would provide 3,250 acres of suitable breeding/wintering habitat, and 7,941 acres of suitable foraging habitat for western burrowing owl are present on the Habitat Islands. During habitat creation and modification, individual owls could be disturbed, harmed, or killed if these activities occur during the nesting or wintering periods. Measures would be required to minimize disturbance, injury, and mortality of western burrowing owls during habitat creation/modification activities.

**Other Special-Status Birds.** Implementation of the HMP would provide suitable nesting and/or foraging/wintering habitat on Bouldin Island and Holland Tract for a number of special-status bird species, including Cooper's hawk, white-tailed kite, ferruginous hawk, bald eagle, American peregrine falcon, California black rail, short-eared owl, loggerhead shrike, and tricolored blackbird. Habitat creation and improvements likely would result in an increase in suitable breeding and foraging/wintering habitat for special-status birds and would benefit those species affected. However, special-status birds that may nest on these islands (Cooper's hawk, white-tailed kite, short-eared owl, loggerhead shrike, and tricolored blackbird) could be disturbed, harmed, or killed during habitat creation and improvement activities if these activities occur during the nesting period. Measures would be required to minimize disturbance, injury, and mortality of nesting special-status birds during habitat creation/modification activities.

**Bats.** Bouldin Island and Holland Tract provide suitable roosting and foraging habitat for special-status and other bat species. Habitat creation and modification could result in an increase in suitable roosting and foraging habitat for bats. However, bats could be disturbed, harmed, or killed during habitat creation and improvement activities if these activities remove or disturb occupied roost sites. Measures would be required to minimize disturbance, injury, and mortality of bats during habitat creation/modification activities.

**Table 4.7-6. Suitable Habitat to Be Created or Managed on Habitat Islands for Special-Status Wildlife**

Special-Status Species and Habitat Use	Habitat Type	Corn/ Wheat	Small Grains	Mixed Ag/ Seasonal Wetland	Seasonal Managed Wetland	Seasonal Pond	Pasture/ Hay	Emergent Marsh	Riparian	Lake	Herbaceous Upland	Developed	Canal	Borrow Pond	Total
Western Pond Turtle	Aquatic									144			80	89	313
	Upland								387		732				1,119
Giant Garter Snake	Aquatic									144			80	89	313
	Upland								387		732				1,119
Northern Harrier	Nesting				2,116			402			732				3,250
	Foraging	2,584	258	1,645	2,116		204	402			732				7,941
Swainson's Hawk	Nesting								387						387
	Foraging	2,584	258	1,645	2,116		204				732				7,539
Greater Sandhill Crane	Foraging	2,584	258	1,645	2,116	134	204				732				7,673
Western Burrowing Owl	Nesting/ Wintering										732				732
	Foraging	2,584	258	1,645			204				732				5,423
Cooper's Hawk	Foraging								387						387
White-Tailed Kite	Nesting								387						387
	Foraging	2,584	258	1,645			204				732				5,423
Loggerhead Shrike	Foraging	2,584	258	1,645			204				732				5,423
Short-Eared Owl	Nesting				2,116		204	402			732				3,250
	Foraging	2,584	258	1,645	2,116		204	402			732				7,941
Tricolored Blackbird	Nesting							402		144				89	635
	Foraging	2,584	258	1,645	2,116		204	402			732				7,941

**Table 4.7-7. Expected Use of Habitats by Wildlife on the Habitat Islands**

Species Group	Representative Species	Foraging Habitats	Breeding Habitats
Raptors	Red-tailed hawk American kestrel Great horned owl	<ul style="list-style-type: none"> <li>• Unflooded corn and wheat</li> <li>• Small grains</li> <li>• Unflooded mixed agriculture/seasonal wetland</li> <li>• Unflooded seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Herbaceous upland</li> <li>• Riparian woodland</li> <li>• Riparian scrub</li> </ul>	<ul style="list-style-type: none"> <li>• Riparian woodland</li> <li>• Riparian scrub</li> </ul>
Grassland and agricultural birds	Ring-necked pheasant Western meadowlark	<ul style="list-style-type: none"> <li>• Unflooded corn and wheat</li> <li>• Small grains</li> <li>• Unflooded mixed agriculture/seasonal wetland</li> <li>• Unflooded seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Herbaceous upland</li> </ul>	<ul style="list-style-type: none"> <li>• Small grains</li> <li>• Unflooded mixed agriculture/seasonal wetland</li> <li>• Unflooded seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Herbaceous upland</li> </ul>
Small mammals	California vole Deer mouse	<ul style="list-style-type: none"> <li>• Unflooded corn and wheat</li> <li>• Small grains</li> <li>• Unflooded mixed agriculture/seasonal wetland</li> <li>• Unflooded seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Herbaceous upland</li> <li>• Riparian woodland</li> <li>• Riparian scrub</li> <li>• Developed</li> </ul>	<ul style="list-style-type: none"> <li>• Unflooded corn and wheat</li> <li>• Small grains</li> <li>• Unflooded mixed agriculture/seasonal wetland</li> <li>• Unflooded seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Herbaceous upland</li> <li>• Riparian woodland</li> <li>• Riparian scrub</li> <li>• Developed</li> </ul>

Species Group	Representative Species	Foraging Habitats	Breeding Habitats
Furbearers	Raccoon Striped skunk	<ul style="list-style-type: none"> <li>• Corn and wheat</li> <li>• Small grains</li> <li>• Mixed agriculture/seasonal wetland</li> <li>• Seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Emergent marsh</li> <li>• Permanent lake shoreline</li> <li>• Herbaceous upland</li> <li>• Riparian woodland</li> <li>• Riparian scrub</li> <li>• Canals</li> <li>• Developed</li> </ul>	<ul style="list-style-type: none"> <li>• Riparian woodland</li> <li>• Riparian scrub</li> <li>• Developed</li> </ul>
Migrating and wintering shorebirds	Western sandpiper Dowitcher Long-billed curlew Dunlin	<ul style="list-style-type: none"> <li>• Shallow-flooded corn and wheat</li> <li>• Shallow-flooded mixed agriculture/seasonal wetland</li> <li>• Shallow-flooded seasonal managed wetland</li> <li>• Seasonal pond</li> <li>• Shallow-flooded and dry pasture/hay</li> <li>• Shallow-flooded emergent marsh</li> <li>• Permanent lake shoreline</li> </ul>	<ul style="list-style-type: none"> <li>• Not applicable</li> </ul>
Breeding shorebirds	American avocet Black-necked stilt	<ul style="list-style-type: none"> <li>• Shallow-flooded corn and wheat</li> <li>• Shallow-flooded seasonal managed wetland</li> <li>• Seasonal pond</li> <li>• Shallow-flooded emergent marsh</li> <li>• Permanent lake shoreline</li> </ul>	<ul style="list-style-type: none"> <li>• Shallow-flooded seasonal wetland</li> <li>• Seasonal pond</li> <li>• Emergent marsh</li> </ul>
Cavity-nesting birds	Nuttall's woodpecker House wren	<ul style="list-style-type: none"> <li>• Riparian woodland</li> <li>• Riparian scrub</li> </ul>	<ul style="list-style-type: none"> <li>• Riparian woodland</li> <li>• Riparian scrub</li> </ul>

Species Group	Representative Species	Foraging Habitats	Breeding Habitats
Wading birds	Great blue heron Great egret Black-crowned night heron	<ul style="list-style-type: none"> <li>• Corn and wheat</li> <li>• Small grains</li> <li>• Mixed agriculture/seasonal wetland</li> <li>• Seasonal managed wetland</li> <li>• Seasonal pond</li> <li>• Pasture/hay</li> <li>• Emergent marsh</li> <li>• Permanent lake shoreline</li> <li>• Herbaceous upland</li> </ul>	<ul style="list-style-type: none"> <li>• Seasonal managed wetland</li> <li>• Emergent marsh</li> <li>• Riparian woodland</li> <li>• Riparian scrub</li> </ul>
Migratory and resident songbirds	White-crowned sparrow Yellow warbler Yellow-rumped warbler Savannah sparrow Plain titmouse Bushtit	<ul style="list-style-type: none"> <li>• Small grains</li> <li>• Unflooded mixed agriculture/seasonal wetland</li> <li>• Unflooded seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Herbaceous upland</li> <li>• Riparian woodland</li> <li>• Riparian scrub</li> </ul>	<ul style="list-style-type: none"> <li>• Small grains</li> <li>• Unflooded mixed agriculture/seasonal wetland</li> <li>• Unflooded seasonal managed wetland</li> <li>• Pasture/hay</li> <li>• Herbaceous upland</li> <li>• Riparian woodland</li> <li>• Riparian scrub</li> </ul>
Wetland songbirds	Marsh wren Red-winged blackbird Yellow-headed blackbird	<ul style="list-style-type: none"> <li>• Mixed agriculture/seasonal wetland</li> <li>• Seasonal managed wetland</li> <li>• Seasonal pond</li> <li>• Pasture/hay</li> <li>• Emergent marsh</li> <li>• Herbaceous upland</li> <li>• Canals</li> </ul>	<ul style="list-style-type: none"> <li>• Seasonal managed wetland</li> <li>• Seasonal pond</li> <li>• Emergent marsh</li> <li>• Canals</li> </ul>

### **Waterfowl**

Approximately 8,219 acres of suitable agricultural, wetland, and upland habitats would be created and/or managed on the Habitat Islands for waterfowl (Table 4.7-7). Fields of corn rotated with wheat, mixed agriculture/seasonal wetland, seasonal managed wetland, and pasture/hay habitats would be managed specifically to provide high-quality waterfowl foraging habitat. Permanent lakes would provide large bodies of open water for use by waterfowl for resting.

Mixed agriculture/seasonal wetland, seasonal managed wetland, seasonal pond, emergent wetland, permanent lake, and herbaceous upland habitats would provide suitable nesting habitat for mallards, cinnamon teal, and other dabbling ducks. Seasonal pond habitats would be managed specifically to provide high-quality duck brood water. To encourage Canada goose and wood duck nesting, approximately 800 nesting platforms and boxes will be constructed.

Levels of waterfowl hunting permitted on the Habitat Islands would be moderate relative to hunting levels on private duck clubs and state and federal waterfowl refuges. Approximately 22% of Habitat Island waterfowl habitats would be within the closed hunting zones as compared to state and federal waterfowl refuges in the Central Valley, which typically have between 15% and 50% of habitat designated as closed hunting zones. The hunting program is described in the draft HMP.

### **Other Birds**

Habitat availability and quality would be increased for most bird species groups on the Habitat Islands with implementation of Alternative 2. Table 4.7-7 lists the habitats that would be used by the major wildlife species groups on the islands. Details of general wildlife habitat management objectives, habitat descriptions, and habitat management prescriptions for Habitat Islands are included in the HMP.

The acreages of riparian woodland and scrub, emergent marsh, and seasonal managed wetland habitats would increase substantially with Project implementation. Creation of riparian and wetland habitats on the islands would benefit primarily piscivorous birds, wading birds, shorebirds, gulls and terns, and riparian and marsh birds.

Acreages of habitats used by upland and agricultural species would decrease with implementation of Alternative 2. However, implementation of management prescriptions for these habitats would increase habitat quality from existing conditions.

### **Upland Game**

Approximately 7,926 acres of corn, wheat, small grain, mixed agriculture/seasonal wetland, seasonal managed wetland, pasture/hay, riparian woodland and scrub, and herbaceous upland habitats on the Habitat Islands would provide foraging and nesting habitat and escape cover for ring-necked pheasants, mourning doves, and quail (Table 4.7-7). During fall and winter, up to 3,688 acres of corn, wheat, mixed agriculture/seasonal wetland, seasonal managed

wetland, and pasture/hay habitats would be unsuitable upland game habitat as a result of shallow flooding to attract waterfowl.

### **Summary of Project Impacts and Recommended Mitigation Measures**

Table 4.7-8 summarizes changes in habitat types and acreages from existing conditions to conditions that would occur under Alternative 2.

**Table 4.7-8.** Changes in Habitat Acreages from Existing Conditions to Conditions under Alternative 2

Existing Habitat	Habitat Type Corresponding (Created/Improved) Habitat on Habitat Islands	Existing		Alternative 2		Change from Existing to Alternative 2 Conditions (acres) <sup>b</sup>
		Reservoir Islands (acres)	Habitat Islands (acres)	Reservoir Islands (acres)	Habitat Islands (acres) <sup>a</sup>	
Corn, wheat, small grains	Corn, wheat, small grains	6,882	4,149	0	2,842	-8,189
Other crops/fallow	N/A	2,283	2,070	0	0	-4,353
Exotic marsh	Mixed agriculture/seasonal wetland, seasonal managed wetland, seasonal pond	66	1,554	0 <sup>c</sup>	3,895	+2,275
N/A	Pasture/hay	0		0	204	+204
Herbaceous upland	Herbaceous upland	1,202	856	0 <sup>c</sup>	732	-1,326
Freshwater marsh	Emergent marsh	93	156	0 <sup>c</sup>	402	+153
Riparian	Riparian	189	138	0	387	+60
Canals and ditches	Canal	70	60	0	80	-50
Ponds	Lake and borrow ponds	76	25	0 <sup>c</sup>	233	+133
<b>Total</b>					<b>8,415</b>	<b>-11,093</b>

<sup>a</sup> These acreages are based on the draft HMP and may be revised in the final HMP.

<sup>b</sup> See Summary of Project Impacts and Recommended Mitigation Measures for Alternative 2 for a description of how habitat losses would be mitigated.

<sup>c</sup> These habitats would exist on the Reservoir Islands during some operating years; however, because the areal extent of these habitat types and the frequency with which they would appear are unpredictable, no habitat acreage is credited.

**Impact W-1: Potential Injury or Mortality of, and Potential Loss of Suitable Habitat for, Valley Elderberry Longhorn Beetle**

Habitat creation and modification could result in disturbance or mortality of VELB if elderberry shrubs are removed or trimmed, or the roots of the shrubs are cut or disturbed. If the elderberry shrubs were removed, this also would result in the loss of habitat for the beetle. Because VELB is a federally listed species, this impact could be considered significant. However, as outlined in the environmental commitments to be included in the revised HMP, an avoidance and minimization measure that is part of the Construction Implementation Plan would avoid and protect VELB and its habitat by avoiding removal of elderberry shrubs and maintaining a 100-foot protective buffer around shrubs. With the implementation of the Construction Implementation Plan in the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-2: Potential Injury or Mortality of Western Pond Turtle**

Habitat creation and modification and construction activities associated with reservoir construction could result in injury or mortality of western pond turtles within suitable aquatic habitat. These activities also could cause injury or mortality of eggs or young individuals in nests in upland habitat if these areas are being used for egg deposition. Declines in populations of western pond turtles throughout the species' range have been documented (Jennings and Hayes 1994). Loss of individuals in the Project area could diminish the local population and lower reproductive potential, which could contribute to the further decline of this species. The loss of upland nesting sites or eggs also would decrease the local population. For these reasons, this impact would be considered significant. However, as outlined in the environmental commitments to be included in the final HMP, avoidance and minimization measures on the Habitat Islands, such as preconstruction surveys and construction setbacks, that are part of the Construction Implementation Plan would avoid or reduce the potential for injury or mortality of western pond turtles and direct effects on the Reservoir Islands would be compensated by improving conditions on the Habitat Islands. With the implementation of the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-3: Loss of Suitable Aquatic and Upland Habitat for Western Pond Turtle**

According to information gathered by DWR (2003), a total of 305 acres of suitable aquatic habitat would be lost from the interior and exterior of the Reservoir Islands from implementation of Alternative 2. Approximately 417 acres of suitable upland (herbaceous upland and riparian) habitat would be lost from the interior of the Reservoir Islands from implementation of Alternative 2. As outlined in the environmental commitments to be included in the final HMP, a minimum of 305 acres and 417 acres of suitable aquatic and upland habitat, respectively, would be preserved, created, or improved on the habitat islands to

compensate for the loss of habitat on the Reservoir Islands. The draft HMP includes 313 acres of aquatic habitat (lake, canals, and borrow ponds) and 1,119 acres of upland habitat (herbaceous upland and riparian) that would be suitable for western pond turtle and would compensate for the loss of habitat on the Reservoir Islands (Table 4.7-9). Because giant garter snake and western pond turtle share similar habitats, this habitat could be managed in coordination with habitat preserved for giant garter snake. Furthermore, the final HMP will require additional environmental commitments, including reconfiguring the direction and slope of upland habitat, creation of basking habitat, and a BMP to avoid mortality of turtles during maintenance activities. With the implementation of the final HMP, including the additional environmental commitments described above, this impact is less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-4: Potential Injury or Mortality of Giant Garter Snake**

Construction activities associated with reservoir construction, as well as habitat creation and modification, could result in injury or mortality of giant garter snakes if they are present within suitable aquatic and upland habitat. However, it is unlikely there is a self-sustaining giant garter snake population on the islands because they are surrounded by canals and rivers and because extensive surveys by DWR during 2002 and 2003 did not discover the snake. Although there is low potential for injury or mortality of a giant garter snake during construction activities, the loss of an individual snake would be considered significant because giant garter snake has declined substantially throughout its range because of habitat loss and fragmentation from urban development and mortality as a result of water conveyance channel maintenance, leading to its state and federal Threatened status (U.S. Fish and Wildlife Service 1999). However, as outlined in the environmental commitments, avoidance and minimization measures, such as preconstruction surveys and relocation, would avoid or reduce the potential for injury or mortality of giant garter snakes. With the implementation of the environmental commitments, this impact is less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-5: Loss of Suitable Aquatic and Upland Habitat for Giant Garter Snake**

Using the information collected by DWR in 2002 and 2003 (the best information available), it was determined that approximately 509 acres of giant garter snake aquatic habitat and 443 acres of upland habitat would be lost from construction of the reservoirs (California Department of Water Resources 2006; Patterson pers. comm.). As outlined in the environmental commitments to be included in the revised HMP, a minimum of 509 acres and 443 acres of suitable aquatic and upland habitat, respectively, would be preserved, created, or improved on the habitat islands to compensate for the loss of habitat on the Reservoir Islands. The draft HMP includes 313 acres of aquatic habitat (lake, canals, and borrow ponds) and 1,119 acres of upland habitat (herbaceous upland and riparian) that would be suitable for giant garter snake, which would partially compensate for the loss of

aquatic habitat and more than compensate for the loss of upland habitat on the Reservoir Islands (Table 4.7-10). Because the species share similar habitats, this habitat could be managed in coordination with habitat preserved for western pond turtle. With the implementation of this commitment in the revised HMP, this impact is less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-6: Loss of Upland Habitats**

Loss of herbaceous upland, exotic marsh, and agricultural habitats on the Reservoir Islands would reduce the acreage of habitat for western meadowlarks, white-crowned sparrows, and other regionally abundant song birds. Existing upland and agricultural habitats that also provide low to moderate forage value for several breeding and wintering raptor species also would be reduced. As part of the Project, implementation of the final HMP would offset impacts of Reservoir Island water storage operations under Alternative 2 by creating fewer, but higher-quality, upland habitats. Therefore, this impact is considered less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-7: Increase in Suitable Wetland Habitats for Nongame Water and Wading Birds**

Approximately 235 acres of wetland habitat (freshwater marsh, exotic marsh, and permanent ponds) would be lost on the Reservoir Islands. However, approximately 3,750 acres of wetland habitat would be preserved or created on the habitat islands under Alternative 2 with implementation of the revised HMP. Seasonal wetlands, emergent marshes, ponds, and lakes that would be preserved or created on the habitat islands would provide foraging or nesting habitat, or both, for resident and migrant grebes, shorebirds, egrets, herons, gulls, terns, and other wetland-associated birds in the Delta region. During water storage periods, the Reservoir Islands also would provide foraging and resting habitat for grebes, gulls, terns, cormorants, and other water birds. Although not required to offset impacts, management of the Reservoir Islands for shallow-water wetlands would provide habitat values for shorebirds, wading birds, and water birds similar to, but of lower quality than, those described for the habitat islands. This impact is considered beneficial and less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-8: Loss of Foraging Habitats for Wintering Waterfowl**

Wintering waterfowl are dependent on agricultural crops, primarily corn and wheat, for forage in the Delta. Water storage operations on the Reservoir Islands would decrease the amount of agricultural crops on the Reservoir Islands. However, implementation of the final HMP would include intensive management of corn, wheat, mixed agriculture/seasonal wetland, seasonal managed wetland, and pasture/hay habitats on habitat islands specifically to provide high-quality

waterfowl forage values. Small grain fields, seasonal ponds, permanent lakes, emergent marshes, and herbaceous uplands also would provide foraging areas for wintering waterfowl on the habitat islands.

Results of the modified HEP analysis performed by the HMP team indicated that implementation of the HMP under Alternative 2 would offset impacts of Project operations on low- to moderate-quality wintering waterfowl foraging habitats through creation of high-quality foraging habitats on the habitat islands. Therefore, this impact is considered less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-9: Increase in Suitable Breeding Habitats for Waterfowl**

The primary factors limiting duck production are the availability of nesting habitat and availability of suitable brood water for ducklings. Implementation of the final HMP under Alternative 2 would include establishment of duck nesting habitats, creation of waterfowl brood ponds, and construction of wood duck nest boxes and goose nesting platforms on the habitat islands. Therefore, this impact is considered beneficial and less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-10: Loss of Habitats for Upland Game Species**

As a result of habitat loss associated with operation of the Reservoir Islands, there would be a substantial decline in the populations of ring-necked pheasant, the most common upland game species. Implementation of the final HMP would provide higher-quality habitats on the habitat islands than under existing conditions. Portions of these habitats would be unavailable to pheasants during fall and winter flood periods; however, habitat suitability would be improved during the breeding season, when agricultural lands typically provide unsuitable habitat. Few pheasant hunters currently hunt on the Project islands, and the hunting program under the HMP is expected to focus on waterfowl hunting and to have less emphasis on hunting for upland game species, including pheasant.

Other upland game species (mourning dove, California quail, and desert cottontail) are present in low numbers and occupy primarily island levees. Desert cottontail may become extirpated from Bacon Island (cottontails are not found on Webb Tract [Swanson pers. comm.]) because maximum storage events would completely inundate island interiors, except for riprapped portions of upper levee slopes. With implementation of the final HMP, an additional 60 acres of riparian habitat (some of which would be willow scrub) would be created on the habitat islands (Table 4.7-10), which would benefit mourning dove and California quail. Higher quality herbaceous upland habitat on the habitat islands also could benefit mourning dove and desert cottontail. Therefore, this impact is considered less than significant.

#### **Mitigation**

No mitigation is required.

**Impact W-11: Loss of Suitable Foraging Habitat for Greater Sandhill Crane**

Greater sandhill cranes forage in corn and grain fields, wetlands, pastures, and herbaceous uplands. Under Alternative 2 and using 2008 conditions, approximately 10,071 acres of suitable greater sandhill crane foraging habitat would be lost on the Reservoir Islands. Crop production varies annually, and median corn production from 1988 and 2002 to 2008 was approximately 2,000 acres less than 2008 conditions. The draft HMP requires 7,673 acres of foraging habitat (corn/wheat, small grains, mixed agriculture/seasonal wetland, seasonal managed wetland, seasonal pond, pasture/hay, and herbaceous upland) to be preserved/managed for greater sandhill crane. As outlined in the environmental commitments to be included in the final HMP, between 7,673 and 10,071 acres of suitable foraging habitat would be preserved or created on the habitat islands to compensate for the loss of habitat on the Reservoir Islands (using previous HMP estimates and 2008 data, respectively). In addition, the final HMP will require that the habitat preserved/created will be higher quality than the foraging habitat that would be lost on the Reservoir Islands. Preservation/creation of this acreage of habitat would ensure that the quality and quantity of foraging habitat on the Project islands for sandhill crane would remain high. With the implementation of this commitment in the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-12: Increase in Suitable Roosting Habitat for Greater Sandhill Crane**

Information from 2002–2003 surveys suggests that sandhill cranes roosted on Webb Tract during the winter of 2002–2003 (California Department of Water Resources 2003), and they also have roosted on Holland Tract. Suitable roosting sites are a key habitat requirement for wintering greater sandhill cranes, and such sites are limited in the Delta. Implementation of the HMP under Alternative 2 would include creation of wetlands managed specifically to provide roosting habitat for greater sandhill cranes. The value of crane foraging habitats that would be created on the habitat islands also would be enhanced with development of roosting habitat because cranes typically forage near roosts. Therefore, this impact is considered beneficial and less than significant.

**Mitigation**

No mitigation is required.

**Impact W-13: Loss of Suitable Foraging Habitat for Swainson's Hawk**

Under Alternative 2, approximately 9,978 acres of suitable Swainson's hawk foraging habitat (agricultural lands, fallow fields, herbaceous upland, and exotic marsh) would be lost on the Reservoir Islands. The draft HMP requires 7,539 acres of foraging habitat (corn/wheat, small grains, mixed agriculture/seasonal wetland, seasonal managed wetland, pasture/hay, and herbaceous upland) to be preserved/managed for Swainson's hawk. As outlined in the environmental commitments to be included in the final HMP, a minimum of 6,929 acres of suitable foraging habitat would be preserved or created on the

habitat islands to compensate for the loss of habitat on the Reservoir Islands. The acreage to be preserved/created was based on providing an equivalent acreage of foraging habitat for losses of fallow fields, herbaceous upland, exotic marsh, and agricultural lands other than corn and half the equivalent acreage for the loss of corn because it has a lower value as foraging habitat for Swainson's hawk. . In addition, the final HMP will require that the habitat preserved/created will be higher quality than the foraging habitat that would be lost on the Reservoir Islands. With implementation of these commitments in the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-14: Loss of Suitable Nesting Habitat for Swainson's Hawk, Cooper's Hawk, and White-Tailed Kite**

Mature cottonwood and willow trees provide suitable nesting habitat for Swainson's hawk, Cooper's hawk, and white-tailed kite. Under Alternative 2, approximately 113 acres of riparian woodland that may provide suitable nesting habitat for Swainson's hawk, Cooper's hawk, and white-tailed kite could be lost during construction on the Reservoir Islands. However, as part of the final HMP (and as described in the draft HMP), 387 acres of riparian habitat would be created on the habitat islands, which would compensate for the loss of suitable nesting habitat for these species. With implementation of the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-15: Loss of Suitable Breeding/Wintering Habitat for Western Burrowing Owl**

Under Alternative 2, approximately 747 acres of suitable breeding/wintering habitat (herbaceous upland) for western burrowing owl would be lost from the Reservoir Islands. The habitat islands currently contain approximately 1,014 acres of herbaceous upland. As outlined in the environmental commitments to be included in the final HMP, a minimum of 747 acres of suitable nesting/wintering habitat would be preserved or created on the habitat islands to compensate for the loss of habitat on the Reservoir Islands. The draft HMP included 732 acres of herbaceous upland that would be preserved/managed on the habitat islands. Therefore, the final HMP would require a slight increase in the acreage of herbaceous upland to be preserved as nesting/wintering habitat for burrowing owls. With the implementation of this commitment in the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-16: Loss of Suitable Foraging Habitat for Cooper's Hawk, White-Tailed Kite, Western Burrowing Owl, and Loggerhead Shrike**

Suitable foraging habitat for Cooper's hawk consists of riparian woodland and scrub. Suitable foraging habitat for white-tailed kite, western burrowing owl, and

loggerhead shrike consists of agricultural lands, fallow fields, and herbaceous upland. Under Alternative 2, approximately 113 acres of riparian woodland and 75 acres of riparian scrub would be lost during construction on the Reservoir Islands. In addition, 9,912 acres of foraging habitat for white-tailed kite, western burrowing owl, and loggerhead shrike also would be lost from implementation of Alternative 2.

As part of the final HMP (and as described in the draft HMP), 387 acres of riparian habitat would be created on the habitat islands, which would compensate for the loss of suitable foraging habitat for Cooper's hawk. In addition, 5,423 acres of agricultural lands, mixed agriculture/seasonal wetland, pasture/hay, and herbaceous upland would be created/managed as part of the final HMP (and as described in the draft HMP) and would compensate for the loss of suitable foraging habitat for white-tailed kite, western burrowing owl, and loggerhead shrike. Although there still would be a loss of habitat, the final HMP will require that the habitat preserved/created will be higher quality than the foraging habitat that would be lost on the Reservoir Islands. With implementation of the final HMP, this impact is less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-17: Loss of Foraging Habitat for Cackling (Aleutian Canada) Goose**

Cackling (Aleutian Canada) geese could occur irregularly in agricultural and herbaceous habitats on all four Project islands. Because this species no longer is listed under the ESA and is expected to occur infrequently on Reservoir Islands, the loss of suitable habitat caused by water storage on Reservoir Islands would not adversely affect the species. In addition, the final HMP that will be prepared as mitigation for other special-status species would benefit cackling goose through creation of suitable habitat on the habitat islands. Therefore, this impact is considered less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-18: Loss of Suitable Nesting and Foraging Habitat for Northern Harrier and Short-Eared Owl**

Suitable nesting and foraging habitat for northern harrier and short-eared owl is present on all Project islands. Under Alternative 2, approximately 975 acres of suitable northern harrier and short-eared owl nesting and foraging habitat (fallow, herbaceous upland, and marsh) and 10,071 acres of foraging habitat (agricultural lands, fallow, herbaceous upland, and marsh) would be lost on the Reservoir Islands. As part of the final HMP (and as described in the draft HMP), 3,250 acres of nesting habitat (seasonal managed wetland, emergent marsh, and herbaceous upland) and 7,941 acres of foraging habitat (agricultural lands, mixed agriculture/seasonal wetlands, seasonal managed wetland, emergent marsh, and herbaceous upland) would be created on the habitat islands, which would compensate for the loss of suitable nesting and foraging habitat for northern harrier and short-eared owl. Although there still would be a loss of habitat, the

final HMP will require that the habitat preserved/created will be higher quality than the foraging habitat that would be lost on the Reservoir Islands. With implementation of the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-19: Loss of Winter Foraging Habitat for Tricolored Blackbird**

Suitable foraging habitat (agricultural lands, fallow fields, herbaceous upland, and marsh) for tricolored blackbirds is present on all four islands, and tricolored blackbirds were observed on Bacon Island and Webb Tract during 2002–2003 surveys (California Department of Water Resources 2003). Under Alternative 2, approximately 10,071 acres of suitable tricolored blackbird foraging habitat would be lost on the Reservoir Islands. As part of the final HMP (and as described in the draft HMP), 7,941 acres of foraging habitat (agricultural lands, mixed agriculture/seasonal wetland, seasonal managed wetland, pasture/hay, emergent marsh, and herbaceous upland) would be created on the habitat islands, which would compensate for the loss of suitable foraging habitat for tricolored blackbirds. Although there still would be a loss of habitat, the final HMP will require that the habitat preserved/created will be higher quality than the foraging habitat that would be lost on the Reservoir Islands. With implementation of the final HMP, this impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-20: Change in Acreage of Suitable Nesting Habitat for Tricolored Blackbird**

Nesting colonies of tricolored blackbirds have not been observed, but suitable nesting habitat is present on all Project islands. Under Alternative 2, approximately 234 acres of suitable tricolored blackbird nesting habitat (marsh and permanent pond) would be lost on the Reservoir Islands. As part of the final HMP (and as described in the draft HMP), 635 acres of suitable nesting habitat (emergent marsh, lake, and borrow pond) would be maintained/created on the habitat islands, which would compensate for the loss of suitable nesting habitat for tricolored blackbirds. This impact is less than significant.

**Mitigation**

No mitigation is required.

**Impact W-21: Increase in Suitable Habitats for Special-Status Bird Species**

Project impacts are not assessed for six special-status species (golden eagle, bald eagle, ferruginous hawk, American peregrine falcon, mountain plover, and bank swallow) (Table 4.7-2) because these species would not nest on the islands and are not known to occur or only forage occasionally on the islands. With implementation of the final HMP, agricultural, herbaceous upland, wetland, and riparian habitats for wildlife would be created and managed, resulting in

increases in the quantity and quality of suitable habitat for these six special-status species. Therefore, this impact is considered beneficial and less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-22: Potential Injury or Mortality of Northern Harrier, Cooper's Hawk, Swainson's Hawk, White-Tailed Kite, California Black Rail, Greater Sandhill Crane, Western Burrowing Owl, Short-Eared Owl, Loggerhead Shrike, and Non-Special-Status Migratory Birds**

Construction activities associated with refurbishing and enlarging levees, installing Project infrastructure, and grading to establish habitat island habitats could result in temporary impacts on special-status bird species and other migratory birds. Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings of northern harriers, Cooper's hawks, Swainson's hawks, white-tailed kites, western burrowing owls, short-eared owls, and loggerhead shrikes or otherwise lead to nest abandonment. Construction activities also could disturb roosting greater sandhill cranes, or disturb California black rails nesting in Delta channels adjacent to Project islands. However, as outlined in the environmental commitments, avoidance and minimization measures on the Habitat and Reservoir Islands, such as preconstruction nest surveys and protective buffers around active nests, would avoid or reduce the potential for injury or mortality of northern harrier, Cooper's hawk, Swainson's hawk, white-tailed kite, California black rail, greater sandhill crane, western burrowing owl, short-eared owl, loggerhead shrike, and non-special-status migratory birds. With the implementation of the environmental commitments, this impact is less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-23: Disturbance to Greater Sandhill Cranes and Wintering Waterfowl from Aircraft Operations**

The Bouldin Island airstrip may be used to ferry hunters to the island or for other recreation uses. Up to 100 takeoffs and landings of fixed-wing aircraft related to such uses are permitted on hunt and nonhunt days during waterfowl hunting season. Use of the airstrip on hunt days would be allowed only between 12:00 p.m. and 2:00 p.m. This estimate of aircraft operations is based on full buildout of the recreation facilities. However, as described in Chapter 2, the Project applicant has removed construction of the recreation facilities from its CWA applications. Nevertheless, the analysis of aircraft operations assumes that the facilities would be constructed and operated.

The airstrip is located in the east Bouldin Island closed hunting zone. Closed hunting zones were established on the habitat islands to provide resting and foraging areas for greater sandhill cranes and wintering waterfowl that would be free from hunter disturbance on days when other portions of the habitat islands are hunted. Use of the airstrip on hunt days therefore could result in additional disturbance of these species on hunt days and could reduce habitat values

provided by the closed hunting zone. Therefore, this impact is considered significant. Implementing Mitigation Measure W-MM-1 would reduce Impact W-23 to a less-than-significant level.

**Mitigation Measure W-MM-1: Monitor Effects of Aircraft Flights on Greater Sandhill Cranes and Wintering Waterfowl and Implement Actions to Reduce Aircraft Disturbances of Wildlife**

The Project applicant will develop a monitoring program in consultation with DFG and the Habitat Management Advisory Committee (HMAC) and implement the program to determine whether airstrip use on hunt days has a deleterious impact on greater sandhill cranes or waterfowl. The plan will be submitted to the State Water Board's Chief of the Division of Water Rights within 1 year of issuance of Project operation permits.

The following will be the major elements of the monitoring plan:

- criteria for evaluating monitoring data that would be used to determine whether use of the airstrip on hunt days is having a significant impact on greater sandhill cranes and waterfowl (i.e., more than 1 greater sandhill crane collision per year and greater than 5 waterfowl collisions per year),
- criteria for determining appropriate mitigation requirements for offsetting significant impacts based on the level of impact airstrip use has on these species (i.e., restricting flights to day-time hours and clear conditions),
- a detailed description of monitoring protocols, and
- a monitoring schedule that estimates when data would be sufficient to determine whether airstrip use on hunt days has significant impacts on greater sandhill cranes or waterfowl.

If, based on monitoring results, airstrip use on hunt days is found to have a significant impact on greater sandhill cranes or waterfowl, DFG, in consultation with the HMAC, may recommend to the State Water Board's Chief of the Division of Water Rights that airstrip use be modified to ensure that the goals for establishment of the closed hunting zone are met. Depending on the level of impact, recommendations could include closing hunting on Bouldin Island during the landing and takeoff period, restricting the number of flights permitted per day, changing the landing and takeoff period to reduce impacts, or closing the use of the airstrip on hunt days. Conversely, if monitoring indicates that there is no significant impact on greater sandhill cranes or wintering waterfowl, DFG, in consultation with the HMAC, could recommend that the proposed initial aircraft use restrictions remain in place or be reduced.

**Impact W-24: Potential for Increased Incidence of Waterfowl Diseases**

Diseases kill substantial numbers of waterfowl in the Central Valley every year (Tiche 1988). Habitat management changes under Alternative 2 could increase the incidence of disease if habitat conditions are created that favor disease organisms or concentrate birds so that diseases were more easily transmitted. Two important diseases that affect waterfowl in the Delta are botulism and avian cholera. Expected habitat conditions and bird use on the Project islands with

implementation of Alternative 2 were analyzed to assess the potential for increases in waterfowl mortality resulting from disease in the Delta.

Botulism develops in waters subject to anaerobic conditions, generally when rotting vegetation depletes oxygen from water. These conditions occur most often in warm, shallow waters and especially in areas with alkaline soils. In general, waterfowl mortality resulting from botulism is minimal in the Delta (Fredrickson et al. 1988). However, the proposed deep flooding of abundant wetland vegetation on the Reservoir Islands raises concerns regarding botulism potential.

Botulism is not likely to become a problem on the Reservoir Islands for several reasons. During November–May water storage periods, temperatures are low enough for the water to remain highly oxygenated and vegetation decomposition to occur slowly. June and July are windy months in the Delta, and they are the warmest months during water storage periods. Winds would aerate the water, thereby reducing the likelihood that the anaerobic conditions necessary for botulism to develop would occur during this period (Miller pers. comm.). During periods when Reservoir Islands are managed as shallow-water wetlands, the Project applicant would circulate water through wetlands, reducing the likelihood that anaerobic conditions would develop, and would have the capability to drain wetlands rapidly if an outbreak of botulism were to occur.

Peat soils exposed during water storage drawdown periods on the Reservoir Islands would quickly dry out and absorb oxygen; this absorption would prevent creation of anaerobic conditions during periods when water is diverted onto the islands. During wetland management periods on both the reservoir and habitat islands, circulation of water through wetland cells would oxygenate the water and reduce the potential for development of botulism (Fredrickson et al. 1988). The incidence of botulism would be expected to be minimal under anticipated Project conditions.

Avian cholera is a contagious disease that kills substantial numbers of waterfowl in the Delta annually (Tiche 1988; Gifford pers. comm.). Cholera is more likely to spread when birds concentrate in high numbers and densities in shallow-water areas. Thus, actions that change waterfowl distribution and density patterns may affect the incidence of cholera.

Waterfowl on the Reservoir Islands would be distributed during shallow-water wetland periods over a large acreage of shallowly flooded area. Hunting during these periods would disturb birds periodically and prevent them from congregating in large numbers. Waterfowl would not make intensive, concentrated use of the deep-water habitats during water storage periods; moderate use by the canvasback and other diving ducks would be expected.

Cholera could become a problem in permanent lakes on Bouldin Island with implementation of the HMP. The risk would be no greater, however, than that currently existing at blowout ponds on Webb and Holland Tracts or in shallow pools in agricultural lands created by the accumulation of rainwater or seepage.

Cholera also could become a problem in corn fields and wheat fields, mixed agriculture/seasonal wetlands, and seasonal managed wetlands on the habitat islands because large numbers of birds would be attracted to the abundant and concentrated foods. Hunting would disturb waterfowl species in hunting zones during October–January and prevent them from concentrating in large numbers on days when hunting is permitted. Large numbers of waterfowl, however, would be expected to concentrate in closed hunting zones.

Waterfowl habitat conditions created on the habitat islands and, during some periods, on the Reservoir Islands under Alternative 2 would concentrate waterfowl in numbers that could be large enough to increase the incidence of avian cholera. Therefore, this impact is considered significant. Implementing Mitigation Measure W-MM-2 would reduce Impact W-24 to a less-than-significant level.

**Mitigation Measure W-MM-2: Monitor Waterfowl Populations for Incidence of Disease and Implement Actions to Reduce Waterfowl Mortality**

The Project applicant will retain a qualified biologist to monitor waterfowl use areas on the Project islands to locate incidences of waterfowl disease mortalities. The Project applicant, in cooperation with DFG and USFWS, will develop management strategies to be employed in the event of disease outbreaks. On identification of a disease outbreak, the Project applicant will notify DFG and, in cooperation with DFG biologists, implement management strategies to reduce waterfowl mortality. Management actions may include removing carcasses from the Project islands, hazing waterfowl from the islands, or draining waterfowl habitats.

Management strategies will include descriptions of:

- methods used to monitor waterfowl to detect disease outbreaks,
- protocols for determining when and what types of management actions to reduce the incidence of disease would be implemented,
- methods for collecting carcasses and removing them from affected areas,
- potential locations and methods for disposal of collected carcasses, and
- methods to haze waterfowl from Reservoir Islands.

**Impact W-25: Potential Disruption of Waterfowl Use as a Result of Increased Hunting**

Most species of waterfowl quickly learn to identify and avoid hunted areas (Bellrose 1976; Sacramento Valley Waterfowl Habitat Management Committee n.d.). Hunting disturbance can reduce waterfowl use of foraging areas to levels below the areas potential as determined by foraging habitat quality. During their searches for feeding and resting areas, waterfowl also quickly recognize and use areas that are not being hunted and will use hunting areas that are “rested” regularly from shooting activity. Existing levels of waterfowl hunting are low on the Project islands and do not substantially affect use of the islands by waterfowl.

No waterfowl hunting restrictions are proposed by the Project applicant or are required to offset Project impacts on the Reservoir Islands. The Project applicant, however, may limit hunting on the Reservoir Islands to Wednesdays, Saturdays, and Sundays during the hunting season to preserve hunting quality and reduce bird disturbance. On shooting days, birds would disperse to un hunted portions of the islands or other protected areas. Many birds likely would congregate in closed hunting zones on the habitat islands, Franks Tract, or other un hunted areas elsewhere in the Delta. If the Project applicant allows hunting only on specified days, the hunting schedule would permit waterfowl to return to feed on the Project islands on nonshooting days.

The Project applicant's proposed hunting program for the habitat islands is described in the HMP. The hunting program would reduce hunter disturbance to levels that would not substantially disturb waterfowl; elements include allowing hunting only 3 days each week (the Project applicant would also select a total of 2 additional hunting days during waterfowl season), establishing more than 2,000 acres of closed hunting zones to provide undisturbed waterfowl use areas, restricting the numbers of hunters permitted on islands, and permitting only spaced-blind hunting adjacent to closed hunting zones to reduce disturbance to birds in closed zones. Potential impacts of the hunting program under Alternative 2 were incorporated into the modified HEP analysis conducted for HMP development. The analysis indicated that implementation of the HMP and the hunting program would ensure that waterfowl would use the habitat islands at levels that would offset impacts of Alternative 2 on wintering waterfowl. Therefore, this impact is considered less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-26: Potential Disruption of Greater Sandhill Crane Use of the Habitat Islands as a Result of Increased Hunting**

Greater sandhill cranes react to hunting disturbance in much the same way as described for waterfowl under Impact W-24 (Schlorff pers. comm.). Little or no suitable foraging habitat for greater sandhill cranes would exist on the Reservoir Islands, and therefore, hunting on these islands would not affect greater sandhill crane foraging activities. Waterfowl and upland game hunting would occur on the habitat islands under Alternative 2. Implementation of the HMP, however, would restrict the number of hunting days per week and the number of hunters. One 810-acre closed hunting zone would be established on Bouldin Island that would offset the impact of hunting on crane use of foraging habitat. Two other closed hunting zones, totaling 1,198 acres, would be established to enhance waterfowl use of the habitat islands and also would provide large, undisturbed areas of crane foraging and loafing habitat. This impact therefore considered is less than significant.

#### **Mitigation**

No mitigation is required.

**Impact W-27: Increase in Waterfowl Harvest Mortality**

Existing levels of hunting on the Project islands and numbers of waterfowl harvested in the Delta are low. Because of this low harvest rate, the Delta provides an unofficial sanctuary area, which has been suggested to be important to maintaining populations of waterfowl, especially the white-fronted goose (Fleskes pers. comm.). The population of white-fronted goose declined in the 1970s but has recovered in recent years (Deuel pers. comm.). A substantial proportion of the entire population winters in the Delta region.

Existing harvest rates on the Project islands, as derived from known hunting use, are low (Table 4.7-10). Implementation of Alternative 2 would result in a substantial increase in waterfowl harvest over existing conditions on the four Project islands (Table 4.7-11). The harvest would increase because more hunters would be present and larger waterfowl populations would be attracted to the islands. Projected harvest levels on the Project islands would represent 1.2% (approximately 1,612 birds) of the average statewide goose harvest (138,500 birds) and 1.6% (approximately 24,195 birds) of the average statewide duck harvest (1,493,500 birds) during 1984–1987 (Deuel pers. comm.). This estimated harvest level also reflects addition of hunters who would be attracted to the Project islands but currently hunt other areas. Harvest increases projected under Alternative 2, however, are expected to be partially offset by increased duck production that would occur on the habitat islands with implementation of the HMP. Therefore, this impact is considered less than significant.

**Mitigation**

No mitigation is required.

**Table 4.7-9.** Estimated Annual Waterfowl Harvest under Existing Use and Alternative 2

Island	Existing Use			Alternative 2		
	Number of Hunter Use-Days	Number of Birds Harvested <sup>a</sup>		Maximum Number of Hunter Use-Days <sup>b</sup>	Number of Birds Harvested <sup>c</sup>	
		Geese	Ducks		Geese	Ducks
Bacon	0	0	0	2,592	259	3,888
Webb	320	50	350	2,664	266	3,996
Bouldin	150	15	175	7,424	742	11,136
Holland	60	5	25	3,449	345	5,174
Total	530	70	550	16,129	1,612	24,194

<sup>a</sup> See Table H2-12 in Appendix H2, “Wildlife Inventory Methods and Results,” of the 2001 FEIS for sources of harvest rates.

<sup>b</sup> See Chapter 3J, “Recreation and Visual Resources,” of the 2001 FEIS for methods used in calculating estimated numbers of annual hunter use-days.

<sup>c</sup> Average harvest rates are assumed to be 1.5 ducks/hunter/day and 0.1 goose/hunter/day, respectively, under the Project.

**Impact W-28: Potential Changes in Local and Regional Waterfowl Use Patterns**

Under Alternative 2, the quality of foraging habitat for swans and white-fronted geese on the habitat islands would be similar to or greater than habitat quality provided on all four Project islands under existing conditions. Duck use of all the Project islands, however, is expected to be substantially greater under Alternative 2. This level of increase is not likely to cause a noticeable change in waterfowl populations and harvest in other parts of the Delta, in the Central Valley, or at Suisun Marsh because the Project islands would be hunted and agricultural and seasonal wetland habitats would be flooded on staggered schedules through winter, thereby reducing habitat availability in some periods. Therefore, this impact is considered less than significant.

**Mitigation**

No mitigation is required.

**Impact W-29: Potential Impacts on Wildlife and Wildlife Habitats Resulting from Delta Outflow Changes**

Compliance with existing water quality objectives and other requirements would ensure that changes in Delta outflow do not cause salinity changes that would be detrimental to the management of wetlands for wildlife (Wernette pers. comm.). No substantial impacts on wildlife habitats or populations are expected to occur. Therefore, this impact is considered less than significant.

**Mitigation**

No mitigation is required.

**Impact W-30: Loss of Roost Sites and Foraging Habitat for and Potential Injury or Mortality of Bats**

Implementation of Alternative 2 would result in the loss of suitable roost sites and foraging habitat for special-status (i.e., western red bat and pallid bat) and non-special-status bats. In addition, both of these islands contain suitable foraging habitat for bats. On Bacon Island and Webb Tract, suitable roost sites consist of various structures and trees. Although none of the structures were occupied during 2002 surveys (California Department of Water Resources 2003), they could become occupied prior to Project construction. Conversion of Bacon Island and Webb Tract to reservoirs would result in the removal of structures and flooding of vegetation (hollow trees, snags, and other mature trees) that provide suitable roosting sites for bats. Inundation of the islands also would remove foraging habitat for bats (riparian and other vegetation associated with ponds, lakes, and canals). As part of the final HMP (and as described in the draft HMP), 387 acres of riparian habitat and 224 acres of permanent ponds would be created or preserved on the habitat islands, which would compensate for the loss of suitable roosting and foraging habitat for bats. With implementation of the final HMP, this impact is less than significant.

Implementation of Alternative 2 could result in the injury or mortality of special-status and non-special-status bats. Removal of structures or trees that contain roosting bats could cause injury or mortality if bats are present. Injury or mortality of pallid or western red bat, two special-status bats that have potential

to roost on the islands, during building or tree removal would be considered an adverse impact. Based on available information on distribution, status, ecology, and known threats, pallid bat and western red bat have been rated in the category of highest priority by the Western Bat Working Group and are considered imperiled or are at high risk of imperilment in California (Western Bat Working Group 2007). However, as outlined in the environmental commitments to be included in the final HMP, avoidance and minimization measures on the Habitat and Reservoir Islands would avoid or reduce the potential for injury or mortality of special-status and non-special-status bats. With the implementation of the environmental commitments, this impact is less than significant.

#### **Mitigation**

No mitigation is required.

## **Alternative 1**

Because only the diversion and discharge rates of Alternatives 1 and 2 are different, the impacts and mitigation measures of Alternative 1 are the same as those of Alternative 2.

## **Alternative 3**

Alternative 3 involves storage of water on Bacon Island, Webb Tract, Bouldin Island south of SR 12, and Holland Tract, with secondary uses for wildlife habitat and recreation. Reservoir islands could be managed in fall, winter, and spring as shallow-water wetlands during some nonstorage periods. The portion of Bouldin Island north of SR 12 would be managed as the North Bouldin Habitat Area (NBHA). However, in contrast to their use under Alternatives 1 and 2, Bouldin Island and Holland Tract would not be devoted entirely to providing wildlife habitat under Alternative 3.

## **Changes in Wildlife Habitat Conditions and Use**

### **Bacon Island, Webb Tract, Holland Tract, and Bouldin Island South of SR 12**

All wildlife habitat conditions on the Reservoir Islands under Alternative 3 would be similar to conditions described above under Impacts and Mitigation Measures of Alternative 2, except that the frequency of these conditions would differ (see Appendix G4 of the 1995 EIR/EIS, "Prediction of Vegetation on the Delta Wetlands Reservoir Islands").

Impacts on wildlife under Alternative 3 on Bacon Island and Webb Tract (the Reservoir Islands) would be the same as those described above for Reservoir Islands under Impacts and Mitigation Measures of Alternative 2. The magnitude of adverse impacts, however, would be greater because Bouldin Island south of SR12 and all of Holland Tract would be used for water storage. Consequently,

losses of wildlife habitat would be greater than under Alternatives 1 and 2. Table 4.7-10 compares changes in habitat types and acreage under existing conditions and conditions that would occur under Alternative 3.

### **North Bouldin Habitat Area**

The portion of Bouldin Island north of SR 12 would be managed as the NBHA. Approximately 50 acres of perennial ponds, 330 acres of seasonal managed wetlands, 170 acres of corn and wheat, 200 acres of riparian woodland, and 125 acres of herbaceous upland would be established and managed for wildlife in the NBHA (Table 4.7-10).

Wildlife habitat conditions associated with each of the NBHA habitats are the same as those described above for habitat island habitats under Impacts and Mitigation Measures of Alternative 2. Detailed descriptions of how these habitats would be managed and the wildlife values they provide are presented in Appendix G3 of the 1995 DEIR/EIS, "Habitat Management Plan for the Delta Wetlands Habitat Islands."

Impacts on wildlife resulting from development of the NBHA would be similar to those described above for the habitat islands under Impacts and Mitigation Measures of Alternative 2 for each of the habitat types that would be established.

**Table 4.7-10.** Changes in Habitat Acreages from Existing Conditions to Conditions under Alternative 3

Existing Habitat	Corresponding Habitat at Habitat Area	Existing Conditions		Alternative 3		Change from Existing to Alternative 3 Conditions (acres) <sup>a</sup>
		All Islands (acres)	Reservoir Islands (acres)	North Bouldin Habitat Area (acres)		
Corn, wheat, small grains	Corn and wheat	11,031	0	170		-10,861
Other crops/fallow	N/A	4,353	0	0		-4,353
Exotic marsh	Seasonal managed wetland	1,620	0 <sup>b</sup>	330		-1,290
Herbaceous upland	Herbaceous upland	2,058	0 <sup>b</sup>	125		-1,933
Freshwater marsh	N/A	249	0 <sup>b</sup>	0		-249
Riparian	Riparian	326	0	200		-126
Canals and ditches	N/A	130	0	0		-130
Ponds	Perennial ponds	101	0 <sup>b</sup>	50		-51
Total		19,868		875		-18,993

<sup>a</sup> See “Summary of Project Impacts and Recommended Mitigation Measures” for Alternative 3 for a description of how habitat losses would be mitigated.

<sup>b</sup> These habitats would exist on the Reservoir Islands during some operating years; however, because the areal extent of these habitat types and the frequency with which they would appear are unpredictable, no habitat acreage is credited.

## Summary of Project Impacts and Recommended Mitigation Measures

### Impact W-1: Potential Injury or Mortality of, and Loss of Suitable Habitat for, Valley Elderberry Longhorn Beetle

Conversion of Holland Tract to a Reservoir Island could result in the loss of elderberry shrubs that provide suitable habitat for VELB. The removal or flooding of elderberry shrubs could result in the injury or mortality of VELB. Because VELB is a federally listed species, this impact would be considered significant. Implementing Mitigation Measure W-MM-3 would reduce Impact W-1 to a less-than-significant level.

### Mitigation Measure W-MM-3: Avoid or Compensate for the Loss of Habitat for the Valley Elderberry Longhorn Beetle

The Project applicant will avoid removal of and maintain a 100-foot buffer around the cluster of elderberry shrubs on Holland Tract, or if this is not possible,

The Project applicant will compensate for the loss of elderberry shrubs in accordance with USFWS guidelines through the Section 7 or 10 processes.

**Impact W-2: Potential Injury or Mortality of Western Pond Turtle.**

The potential for injury or mortality of western pond turtles under Alternative 3 would be similar to Alternative 2. The magnitude of the impact could be greater because more of the islands would be affected. Implementing Mitigation Measure W-MM-4 would reduce Impact W-2 to a less-than-significant level.

**Mitigation Measure W-MM-4: Avoid and Minimize Injury and Mortality of Western Pond Turtle**

To avoid and minimize injury and mortality of western pond turtles during construction activities associated with reservoir construction, and habitat creation and modification, the following measures will be implemented:

The construction area will be clearly defined using orange barrier fencing to minimize disturbance to riparian vegetation and western pond turtle habitat.

A preconstruction survey for western pond turtles will be conducted by a qualified biologist within 24 hours of the start of construction activities in suitable aquatic habitat. If a turtle is located within the construction area, the turtle will be relocated out of this area, and exclusion fence will be installed to prevent the movement of turtles back into the construction area. If construction will occur in suitable upland habitat between April 1 and September 1, a survey for nests sites will be conducted within 24 hours prior to ground-disturbing activities in suitable upland habitat.

Grading and construction activities along ponds, borrow pits, ditches, and canals and within 1,000 feet of these areas will be minimized between October 15 and April 15 to reduce potential mortality to hibernating turtles.

If a turtle becomes trapped during construction activities within aquatic habitat, the turtle will be removed from the work area by a qualified biologist with a valid scientific collecting permit and an MOU from DFG and placed downstream from the construction area or in adjacent suitable aquatic habitat outside of the construction area.

**Impact W-3: Loss of Suitable Aquatic and Upland Habitat for Western Pond Turtle**

According to information gathered by DWR (2003), a total of 549 acres of suitable aquatic habitat will be lost from the interior and exterior of the four islands from implementation of Alternative 3. Approximately 737 acres of suitable upland (herbaceous upland and riparian) habitat will be lost from the interior of the four islands from implementation of Alternative 3. Actual acreage lost would be less because a part of Bouldin Island would not be inundated. The loss of these large quantities of aquatic and upland habitats would be a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-3 to a less-than-significant level.

### **Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

The Project applicant, in consultation with the Corps, DFG, and USFWS, will implement an off-site mitigation plan for mitigating impacts on habitats for special-status and other wildlife (western pond turtle, giant garter snake, greater sandhill crane, Swainson's hawk, northern harrier, Cooper's hawk, white-tailed kite, western burrowing owl, short-eared owl, loggerhead shrike, tricolored blackbird, bats, waterfowl, and upland game species). The mitigation area(s) will be located in San Joaquin or Contra Costa County, preferably in the Delta, unless otherwise approved by DFG and USFWS. Selection of the mitigation site and details of the mitigation plan will be determined through consultation with the Corps, DFG, and USFWS. The plan will include long-term monitoring of the habitat mitigation areas to determine species' use of the of the mitigation area and to ensure that habitats are being managed appropriately for species included in the plan. Monitoring reports will be prepared and submitted to DFG and USFWS on a schedule to be determined in consultation with the agencies. No water diversion/storage will be permitted until ESA and CESA consultations have been completed, no-jeopardy opinions have been issued by USFWS and DFG, and a mitigation plan and mitigation implementation schedule have been developed. The plan will include the following specifications and measures; however, mitigation ratios may be modified during consultation with DFG and USFWS:

- A minimum of 549 acres of suitable aquatic habitat and 737 acres of suitable upland habitat (1:1 ratios) will be preserved and managed for western pond turtle. Aquatic habitat will be surrounded by or immediately adjacent to suitable upland (grassland and/or riparian habitat). Management of aquatic habitat may include placement of basking substrate (logs or boards) and maintaining emergent vegetation for cover.
- A minimum of 966 acres of suitable aquatic habitat and 769 acres of suitable upland habitat (1:1 ratios) will be preserved and managed for giant garter snake. Aquatic habitat will be surrounded by or immediately adjacent to suitable upland (grassland and/or riparian habitat). Habitat management specifications may include conducting maintenance in upland habitat during the active period for the snake (May 1 through October 1), avoiding or minimizing activities within 200 feet of the banks of suitable aquatic habitat, confining vehicle movement to existing roadways, and confining wetland vegetation clearing to the minimal area necessary.
- The mitigation area(s) will contain high-quality herbaceous and agricultural habitats for wintering raptors and resident and migrant songbirds to compensate for the loss of 18,437 acres of herbaceous upland, exotic marsh, and agricultural habitats.
- The mitigation area(s) will contain high-quality agricultural, herbaceous upland, freshwater marsh, and perennial pond habitats for wintering waterfowl to compensate for the loss of 18,737 acres of agricultural, herbaceous upland, exotic marsh, freshwater marsh, and permanent ponds. Management of habitat may include periodic mowing of densely vegetated wetlands before flooding to provide open areas, harvesting only a portion of

corn and wheat crops to increase food abundance, and flooding harvested fields and wetlands sequentially to increase the length of time during which foraging habitat is available.

- The mitigation area(s) will contain high-quality agricultural, herbaceous upland, and riparian woodland and scrub habitats for upland game species to compensate for the loss of 18,563 acres of agricultural, herbaceous upland, exotic marsh, and riparian woodland and scrub.
- A minimum of 18,437 acres of suitable foraging habitat would be preserved and managed for greater sandhill crane (1:1 ratio). Suitable habitat will consist of high-quality agricultural lands, seasonal managed wetland, pasture or herbaceous upland. Management of habitat may include leaving unharvested strips of corn in corn fields and periodically mowing densely vegetated habitats to improve access for foraging cranes.
- A minimum of 14,017 acres of suitable foraging habitat would be preserved and managed for Swainson's hawk to compensate for the loss of 18,437 acres of foraging habitat. This acreage was determined by using a 0.5: 1 ratio for the loss of corn and a 1:1 ratio for the loss of other habitat types. A smaller ratio was used for compensating for the loss of corn, because it has lower value as foraging habitat for Swainson's hawk. Management of habitat may include mowing densely vegetated habitat to increase access to prey and maintaining upland borders around seasonal and perennial wetlands and ponds to provide refugia for prey species (e.g., mice and voles).
- The mitigation area(s) will contain a minimum of 126 acres of high-quality riparian woodland that would provide suitable nesting habitat for Swainson's hawk, Cooper's hawk, and white-tailed kite to compensate for the loss of 126 acres of riparian woodland (1:1 ratio).
- A minimum of 1,933 acres of suitable nesting/wintering habitat would be preserved and managed for western burrowing owl to compensate for the loss of approximately 1,933 acres of suitable nesting/wintering habitat (herbaceous upland) (1:1 ratio). Management of habitat may include mowing densely vegetated habitat to increase the suitability of burrow nest sites and prey accessibility, prohibiting the use of rodenticides, and allowing colonization by ground squirrels to maintain and expand burrow sites.
- The mitigation area(s) will contain a minimum of 126 acres of high-quality riparian woodland that would provide suitable foraging habitat for Cooper's hawk and will contain high-quality foraging habitats (agricultural and herbaceous upland) for white-tailed kite, western burrowing owl, and loggerhead shrike to compensate for the loss of 17,147 acres of agricultural lands and herbaceous upland.
- The mitigation area(s) will contain high-quality agricultural, herbaceous upland, and freshwater marsh habitats for northern harrier and short-eared owl to compensate for the loss of 3,472 acres of suitable nesting and foraging habitat and 15,214 acres of foraging habitat only (i.e., agricultural lands).
- The mitigation area(s) will contain high-quality agricultural and herbaceous upland foraging habitats for tricolored blackbird to compensate for the loss of

approximately 17,147 acres of suitable foraging habitat (agricultural lands and herbaceous upland).

- The mitigation area(s) will contain high-quality freshwater marsh and perennial pond nesting habitats for tricolored blackbird to compensate for the loss of 1,590 acres of suitable nesting habitat (exotic and freshwater marsh and permanent pond). If perennial ponds are constructed, the shoreline contours will be designed to allow riparian, emergent wetland, and herbaceous vegetation to become established.
- The mitigation area(s) will contain high-quality foraging habitat (riparian and perennial ponds) for bats to compensate for the loss of suitable foraging habitat (riparian and other vegetation associated with ponds, lakes, and canals) from inundation of the four islands.

#### **Impact W-4: Potential Injury or Mortality of Giant Garter Snake**

The potential for injury or mortality of giant garter snakes from Alternative 3 would be similar to Alternative 2. The magnitude of the impact could be significant because more of the islands would be affected. Implementing Mitigation Measure W-MM-6 would reduce Impact W-4 to a less-than-significant level.

#### **Mitigation Measure W-MM-6: Avoid and Minimize Injury and Mortality of Giant Garter Snake**

To avoid and minimize injury and mortality of giant garter snakes during construction activities associated with reservoir construction and habitat creation and modification, the following measures will be implemented:

- Minimize or avoid the take of giant garter snake by limiting construction activities in and adjacent to suitable habitat during the active period for the species (May 1–October 1) in accordance with USFWS (1997b) guidelines.
- Within 24 hours of construction, a qualified biologist approved by USFWS will conduct a survey for giant garter snakes in suitable habitat in the Project area. Results of this survey will be submitted to USFWS within 24-hours of commencement of construction activities.
- To identify and protect any giant garter snake encountered, the qualified biologist will be present during any construction in or near suitable aquatic habitat. Any snake found during construction will be avoided and allowed to move away from construction activities on its own. Capture and relocation may be attempted only by individuals with a valid 10(a)(1)(A) recovery permit from USFWS.
- Avoid or minimize construction activities within 200 feet of the banks of suitable aquatic habitat (e.g., canals, ditches, borrow pits, ponds) and confine the movement of heavy equipment to existing roadways.
- Clearing of wetland vegetation will be confined to the minimal area necessary.

**Impact W-5: Loss of Suitable Aquatic and Upland Habitat for Giant Garter Snake**

According to information gathered by DWR in 2002 and 2003 (California Department of Water Resources 2003, 2006, and unpublished information), a total of 966 acres of suitable aquatic habitat could be lost from the four islands from implementation of Alternative 3. Approximately 769 acres of suitable upland habitat could be lost from the four islands from implementation of Alternative 3. Actual acreage lost would be less because a part of Bouldin Island would not be inundated and would become the Bouldin Island Habitat Area. The loss of these large quantities of aquatic and upland habitats would be a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-5 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above under Alternative 2.

**Impact W-6: Loss of Upland Habitats**

Water storage operations on the Reservoir Islands under Alternative 3 would result in the loss of approximately 18,437 acres of herbaceous upland, exotic marsh, and agricultural habitats (Tables 4.7-10 and 4.7-11). These habitats provide foraging areas for wintering raptors and resident and migrant songbirds associated with herbaceous and agricultural habitats. Therefore, this impact is considered significant. Implementing Mitigation Measure W-MM-5 would reduce Impact W-6 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-8: Loss of Foraging Habitats for Wintering Waterfowl**

Implementation of Alternative 3 would result in the loss of approximately 18,737 acres of low- to moderate-quality foraging habitats for wintering waterfowl (Table 4.7-12). The loss of this large quantity of habitat is considered significant. Implementing Mitigation Measure W-MM-5 would reduce Impact W-8 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Table 4.7-11.** Comparison of Impacts of Alternatives 1, 2, and 3 on Acreages of Suitable Foraging Habitat for Swainson's Hawk, Wintering Raptors, Greater Sandhill Crane, and Wintering Waterfowl

Habitat Type	Increase (+) or Decrease (-) in Foraging Habitat Acres from Existing Conditions					
	Swainson's Hawk and Wintering Raptors		Greater Sandhill Crane		Wintering Waterfowl	
	Alternatives 1 and 2	Alternative 3	Alternatives 1 and 2	Alternative 3	Alternatives 1 and 2	Alternative 3
Agriculture	-12,542	-15,214	-12,542	-15,214	-12,542	-15,214
Exotic marsh	+2,275	-1,290	+2,275	-1,290	+2,275	-1,290
Herbaceous upland	-1,326	-1,933	-1,326	-1,933	-1,326	-1,933
Freshwater marsh	N/A	N/A	N/A	N/A	+153	-249
Ponds	N/A	N/A	N/A	N/A	+133	-51
Total	-11,593	-18,437	-11,593	-18,437	-11,307	-18,737

Note: N/A = not applicable.

**Impact W-9: Increase in Suitable Breeding Habitats for Waterfowl**

Development of the NBHA under Alternative 3 would include establishment of duck nesting habitats, creation of waterfowl brood ponds, and construction of wood duck nest boxes and goose nesting platforms. Because there is limited breeding habitat for waterfowl on the four islands, these actions would increase the suitability of the Project islands as waterfowl breeding habitat. Therefore, this impact is considered beneficial and less than significant.

**Mitigation**

No mitigation is required.

**Impact W-10: Loss of Habitats for Upland Game Species**

The impacts of water storage operations on upland game species and their habitats are described above under Impacts and Mitigation Measures of Alternative 2. Implementation of Alternative 3 would result in the loss of approximately 18,563 acres of suitable upland game habitat (i.e., agricultural areas, riparian woodland and scrub, exotic marsh, and herbaceous upland). The loss of this large quantity of habitat is impact is considered significant. Implementing Mitigation Measure W-MM-5 would reduce Impact W-10 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-11: Loss of Foraging Habitat for Greater Sandhill Crane**

Implementation of Alternative 3 would result in the loss of approximately 18,437 acres of foraging habitat (agricultural lands, herbaceous upland, and exotic marsh) for greater sandhill crane (Table 4.7-11). The loss of this large quantity of habitat is considered significant. Implementing Mitigation Measure W-MM-5 would reduce Impact W-11 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-13: Loss of Suitable Foraging Habitat for Swainson's Hawk**

Implementation of Alternative 3 would result in the loss of approximately 18,437 acres of foraging habitat for Swainson's hawk (Table 4.7-11). The loss of this large quantity of habitat is impact is considered significant. Implementing Mitigation Measure W-MM-5 would reduce Impact W-13 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-14: Loss of Suitable Nesting Habitat for Swainson's Hawk, Cooper's Hawk, and White-Tailed Kite**

Implementation of Alternative 3 would result in the loss of approximately 126 acres of riparian woodland that may provide suitable nesting habitat for Swainson's hawk, Cooper's hawk, and white-tailed kite. The loss of this habitat would be considered a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-14 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-15. Loss of Suitable Nesting/Wintering Habitat for Western Burrowing Owl**

Implementation of Alternative 3 would result in the loss of approximately 1,933 acres of suitable nesting/wintering habitat (herbaceous upland) for western burrowing owl. The loss of this habitat would be considered a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-15 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-16: Loss of Suitable Foraging Habitat for Cooper's Hawk, White-Tailed Kite, Western Burrowing Owl, and Loggerhead Shrike**  
Suitable foraging habitat for Cooper's hawk consists of riparian woodland and scrub. Suitable foraging habitat for white-tailed kite, western burrowing owl, and loggerhead shrike consists of agricultural lands, fallow fields, and herbaceous upland. Implementation of Alternative 3 would result in the loss of approximately 126 acres of riparian woodland and scrub from the four islands. In addition, 17,147 acres of foraging habitat for white-tailed kite, western burrowing owl, and loggerhead shrike also would be lost from implementation of Alternative 3. The loss of these habitats would be considered a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-16 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-17: Loss of Foraging Habitat for Cackling (Aleutian Canada) Goose**

Cackling (Aleutian Canada) geese could occur irregularly in agricultural and herbaceous habitats on all four Project islands. Because this species no longer is listed under the ESA and is expected to occur infrequently on Reservoir Islands, the loss of suitable habitat caused by Alternative 3 would not adversely affect the species. Therefore, this impact is considered less than significant.

**Mitigation**

No mitigation is required.

**Impact W-18: Loss of Suitable Nesting and Foraging Habitat for Northern Harrier and Short-Eared Owl**

Under Alternative 3, approximately 3,472 acres of suitable northern harrier and short-eared owl nesting and foraging habitat and 15,214 acres of foraging habitat only (i.e., agricultural lands) would be lost. The loss of these habitats would be considered a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-18 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-19: Loss of Winter Foraging Habitat for Tricolored Blackbird**

Under Alternative 3, approximately 17,147 acres of suitable tricolored blackbird foraging habitat (agricultural lands and herbaceous upland) would be lost. The loss of this large quantity of foraging habitat would be considered a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-19 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-20: Change in Acreage of Suitable Nesting Habitat for Tricolored Blackbird**

Under Alternative 3, approximately 1,590 acres of suitable tricolored blackbird nesting habitat (exotic and freshwater marsh and permanent pond) would be lost. The loss of this large amount of suitable nesting habitat would be considered a significant impact. Implementing Mitigation Measure W-MM-5 would reduce Impact W-31 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Impact W-22: Potential Injury or Mortality of Northern Harrier, Cooper's Hawk, Swainson's Hawk, White-Tailed Kite, California Black Rail, Greater Sandhill Crane, Western Burrowing Owl, Short-Eared Owl, Loggerhead Shrike, and Non-Special-Status Migratory Birds**

Potential impacts on northern harrier, Cooper's hawk, Swainson's hawk, white-tailed kite, western burrowing owl, short-eared owl, loggerhead shrike, greater sandhill crane, and California black rail under Alternative 3 would be similar to Alternative 2. This impact is considered significant. Implementing Mitigation Measure W-MM-7 would reduce Impact W-22 to a less-than-significant level.

**Mitigation Measure W-MM-7: Prepare a Construction Implementation Plan to Avoid Impacts on Roosting and Nesting Birds**

The Project applicant will develop a Construction Implementation Plan for the Reservoir Islands following development of detailed Project construction schedules, specifications, and plan drawings for construction of Project infrastructure, pumps and siphons, enlarged levees, and recreation and other facilities. The plan will be submitted to the State Water Board and DFG for approval. Disagreements between the Project applicant and DFG during the plan approval process may be submitted to the State Water Board Chief of the Division of Water Rights for resolution.

The Construction Implementation Plan will identify methods to avoid impacts on roosting greater sandhill cranes and on nesting northern harriers, Cooper's hawks, Swainson's hawks, white-tailed kites, western burrowing owls, short-eared owls, loggerhead shrikes, and California black rails. These methods will include conducting preconstruction surveys to locate nesting and roosting sites of these species and may include measures such as avoiding construction during sensitive use periods.

Elements of the plan will identify:

- preconstruction survey protocols to locate Swainson's hawk nest sites and greater sandhill crane roosts on Reservoir Islands and nesting California black rails on the water side of perimeter levees;
- preconstruction survey protocols to locate nests of northern harriers, Cooper's hawks, white-tailed kites, western burrowing owl, short-eared owls, loggerhead shrikes, and other migratory birds;
- measures that would be instituted to avoid affecting state-listed wildlife species, including restriction of construction activities to areas at least 600 feet from nesting California black rails;
- construction monitoring methods and schedule to be implemented to ensure compliance with the construction mitigation plan; and
- potential remedial measures to compensate for impacts incurred during construction.

Following construction, the Project applicant will submit a report describing success of construction impact avoidance measures to the State Water Board Chief of the Division of Water Rights and DFG.

#### **Impact W-24: Potential for Increased Incidence of Waterfowl Diseases**

The potential for increased incidence of waterfowl diseases from implementation of Alternative 3 would be similar to that described above under Impact W-24 for Alternative 2. This impact is considered significant. Implementing Mitigation Measure W-MM-2 would reduce Impact W-24 to a less-than-significant level.

#### **Mitigation Measure W-MM-2: Monitor Waterfowl Populations for Incidence of Disease and Implement Actions to Reduce Waterfowl Mortality**

This mitigation measure is described above under Alternative 2.

#### **Impact W-25: Potential Disruption of Waterfowl Use as a Result of Increased Hunting**

The potential for disruption of waterfowl use from implementation of Alternative 3 would be similar to that described above under Impact W-25 for Alternative 2. This impact is considered less than significant.

#### **Mitigation**

No mitigation is required.

#### **Impact W-27: Increase in Waterfowl Harvest Mortality**

The potential for increased waterfowl harvest mortality under Alternative 3 would be similar to that described above under Impact W-27 for Alternative 2. Waterfowl harvest would be approximately 65% of the harvest predicted under Alternative 2. This impact is considered less than significant.

#### **Mitigation**

No mitigation is required.

**Impact W-28: Potential Changes in Local and Regional Waterfowl Use Patterns**

The potential for changes in local and regional waterfowl use patterns under Alternative 3 would be similar to that described above under Impact W-28 for Alternative 2. This impact is considered less than significant.

**Mitigation**

No mitigation is required.

**Impact W-29: Potential Impacts on Wildlife and Wildlife Habitats Resulting from Delta Outflow Changes**

The potential for impacts on wildlife and wildlife habitats from Delta outflow changes under Alternative 3 would be similar to that described above under Impact W-29 for Alternative 2. This impact is considered less than significant.

**Mitigation**

No mitigation is required.

**Impact W-30: Loss of Roost Sites and Foraging Habitat for and Potential Injury or Mortality of Bats**

The loss of roost sites and foraging habitat and the potential for injury or mortality of bats under Alternative 3 would be similar to Alternative 2, except that a larger area of foraging habitat would be lost. This impact is considered significant. Implementing Mitigation Measures W-5 and W-8 would reduce Impact W-30 to a less-than-significant level.

**Mitigation Measure W-MM-5: Compensate for Loss of Habitats for Special-Status and Other Species through an Off-Site Wildlife Habitat Mitigation Plan**

This measure is described above.

**Mitigation Measure W-MM-8: Conduct Preconstruction Surveys for Roosting Bats and Compensate for Loss of Roosting Habitat If Bats Are Found**

A qualified biologist will conduct surveys to examine structures and trees that provide suitable roosting habitat for bats prior to their demolition or removal. If no bats are detected during the preconstruction survey, structure and tree removal will be conducted during the month of September to ensure that breeding and hibernating bats are avoided. If bats are observed, demolition and tree removal will be delayed until the bats leave the roosting sites or until DFG authorizes building demolition/tree removal. In addition, bat boxes or other suitable roosting habitat will be constructed, per DFG recommendations, to mitigate the loss of roosting habitat on the Reservoir Islands.

## No-Project Alternative

### Changes in Wildlife Habitat Conditions and Use

Under Section 404(f)(1) of the CWA, normal farming activities such as plowing, seeding, cultivating, and maintaining drainage ditches are exempt from Section 404 permit requirements as long as surface materials are not redistributed by blading or grading to fill a Section 404 jurisdictional wetland area. The No-Project Alternative thus is limited to those farming activities to increase cropping intensity that could be implemented without a Section 404 permit (i.e., no jurisdictional wetlands would be converted to crops). Therefore, because wetlands would not be converted to crops, wetlands that provide habitat for wildlife would not be removed.

Implementation of the No-Project Alternative would result in changes of existing annual grain crops to perennial crops such as vineyards and asparagus. In general, the impacts would result primarily from conversion of pasture, herbaceous upland, and corn and wheat to perennial crops (Table 4.7-12). Conversion of annual grain crops to perennial crops would greatly reduce the amount of foraging habitat for waterfowl and other birds.

**Table 4.7-12.** Predicted Changes in Acreages of Habitat Types under the No-Project Alternative

Habitat Type Conditions	Acreage										Change in Acres from 2008 to No Project
	Bacon Island		Webb Tract		Bouldin Island		Holland Tract		Total		
	2008	No Project	2008	No Project	2008	No Project	2008	No Project	2008	No Project	
Riparian woodland and scrub	6	3	183	56	11	7	127	46	327	112	-215
Freshwater marsh	41	0	51	16	74	0	82	2	248	18	-230
Exotic marsh	11	0	55	40	47	0	1,507	0	1,620	40	-1,580
Herbaceous upland	406	261	796	220	691	349	165	113	2,058	943	-1,115
Subtotal	464	264	1,085	332	823	356	1,881	161	4,253	1,113	-3,140
Annual grain crops	4,918	3,126	4,178	4,961	5,058	3,329	0	1,912	14,154	13,328	-826
Perennial crops orchards/vineyards	0	1,969	0	0	0	2,097	0	610	0	4,676	+4,676
Pasture	0	0	0	0	0	0	0	256	0	256	+256
Fallow	0	0	69	0	0	0	1,161	0	1,230	0	-1,230
Subtotal	4,918	5,095	4,247	4,961	5,058	5,426	1,161	2,778	15,384	18,260	+2,876
Sloughs and ditches	42	92	27	50	39	118	21	45	129	305	+176
Ponds	0	3	76	106	10	9	15	23	101	141	+40
Developed	155	86	38	20	80	75	0	71	273	252	-21
Subtotal	197	181	141	176	129	202	36	139	503	698	+195
<b>Total</b>	<b>5,579</b>	<b>5,540</b>	<b>5,473</b>	<b>5,469</b>	<b>6,010</b>	<b>5,984</b>	<b>3,078</b>	<b>3,078</b>	<b>20,140</b>	<b>20,171</b>	

Note: Minor inconsistencies in totals result from rounding.

### **Use by Waterfowl and Other Bird Species**

Conversion of pasture, herbaceous upland, and annual grain crops to perennial crops (e.g., asparagus, vineyards) on the four Project islands under the No-Project Alternative would reduce the abundance of many bird species that rely on these habitats. Overall habitat values for wintering waterfowl under the No-Project Alternative would be similar or lower than those found under existing conditions. Habitat values may decrease because of the decrease in acreage of corn, but flooding of crops for weed control may balance this loss. The increase in acreage of perennial crops would increase wintering habitat for those birds that prefer areas that are bare or that support low vegetation. Abundance of prey species and foraging habitats for raptors would decrease, causing a reduction in use of the islands by wintering raptors. The increase in the acreage flooded for weed control would provide additional habitat for wading birds, shorebirds, and other waterbirds.

### **Use by Upland Game**

Habitat values for ring-necked pheasant and desert cottontail would decrease with conversion of fallow fields to crops. Assuming that riparian habitats would not be removed, use by mourning dove and quail would remain the same under the No-Project Alternative.

### **Use by Special-Status Species**

Many special-status species could be affected by the removal of pasture, herbaceous upland, and annual grain crops through implementation of the No-Project Alternative. Upland habitat for western pond turtle and giant garter snake on Holland and Webb Tracts would be lost. Individual turtles or snakes also could be injured or killed during the conversion process.

Nesting and foraging habitat for northern harrier, Swainson's hawk, Cooper's hawk, white-tailed kite, burrowing owl, short-eared owl, loggerhead shrike, and tricolored blackbird would be lost from the conversion of more natural lands to crops of potatoes, onions, asparagus, and vineyards. The conversion of corn, which provides foraging habitat for greater sandhill cranes, to other crops would reduce the amount of foraging habitat for this species. Ground-nesting species such as northern harrier, burrowing owl, and short-eared owl also could be injured or killed during conversion activities.

### **Increase in Waterfowl Harvest Mortality**

Under the No-Project Alternative, an intensive for-fee hunting program would be operated on the Project islands. This program would result in additional hunting over existing conditions, resulting in additional waterfowl harvest mortality. This program would need to be consistent with state hunting regulations to ensure a sustainable harvest is achieved.