FINAL

YOLO REGIONAL CONSERVATION INVESTMENT STRATEGY/LOCAL CONSERVATION PLAN

STEERING COMMITTEE:

Yolo Habitat Conservancy
California Department of Water Resources
California Natural Resources Agency
Yolo Habitat Conservancy Advisory Committee
Yolo County
American Rivers
Environmental Defense Fund

Note: This plan is a combined regional conservation investment strategy (RCIS) and local conservation plan (LCP). The RCIS components of this plan are subject to California Department of Fish and Wildlife (CDFW) review and approval (Fish and Game Code §1852(a)). The portions of the plan that only pertain to the LCP are not subject to CDFW approval and have not been reviewed by CDFW. If there are any conflicts between RCIS and LCP sections or provisions, the RCIS provisions prevail while the RCIS is in effect.

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ICF. 2020. *Yolo Regional Conservation Investment Strategy/Local Conservation Plan*. Final. October. (ICF 00723.16.) Sacramento, CA. Draft. Prepared for Yolo Habitat Conservancy, Woodland, CA.

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Acronyms and Abbreviations

°F	Fahrenheit
AB 2087	Assembly Bill 2087
ADA	Americans with Disabilities Act
AIS	Aerial Information Systems
BANS-TAC	Bank Swallow Technical Advisory Committee
BLM	Bureau of Land Management
BWFS	Basin-Wide Feasibility Studies
Caltrans	California Department of Transportation
CCIP	Cache Creek Improvement Program
CCRMP	Cache Creek Resource Management Plan
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
CNDDB	California Natural Diversity Database
Conservancy	Yolo Habitat Conservancy
County	County of Yolo
CROS	California Roadkill Observation System
CSU Chico	California State University, Chico
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CVP	Central Valley Project
CWHR	California Wildlife Habitat Relationships Program
Delta	Sacramento–San Joaquin Delta
DPS	distinct population segment
DWR	Department of Water Resources
ESU	evolutionarily significant unit
FESA	federal Endangered Species Act
FRPA	Fish Restoration Program Agreement
GIS	geographic information system
HCP/NCCP	Yolo Habitat Conservation Plan/Natural Communities Conservation Plan
I-	Interstate

LCP	Local Conservation Plan
Legislature	California State Legislature
LMA	local maintaining agencies
MCA	mitigation credit agreement
MCV	Manual of California Vegetation
NAIP	National Agriculture Imagery Program
NCVM	Napa County Vegetation Map
NFD	not formally defined
NMFS	National Marine Fisheries Service
NPS	National Park Service
OHV	off-highway vehicle
PG&E	Pacific Gas & Electric
RCIS	regional conservation investment strategy
RCIS/LCP	Regional Conservation Investment Strategy and Local Conservation Plan
REC	Road Ecology Center
Reclamation	U.S. Bureau of Reclamation
Region	Lower Sacramento/Delta North Region
RFMP	Regional Flood Management Plan
RPA	Reasonable and Prudent Alternative
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SMUD	Sacramento Municipal Utility District
Solano HCP	Solano Multispecies Habitat Conservation Plan
SPFC	State Plan of Flood Control
SSIA	State Systemwide Investment Approach
STAC	Scientific and Technical Advisory Committee
STATSGO	State Soil Geographic
SWAP	State Wildlife Action Plan
SWP	State Water Project
TMDL	Total Maximum Daily Load
UC Davis	University of California, Davis
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRA	Water Resources Association of Yolo County
WSAFCA	West Sacramento Area Flood Control Agency

Chapter 1
Introduction

1.1 Overview

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The County of Yolo (County) comprises approximately 653,549 acres, and its 215,802 residents (as of 2016) live primarily within the four incorporated cities of Davis, West Sacramento, Winters, and Woodland (cities). Agriculture is a major component of the county's economy. Through coordinated efforts over the course of decades, the governing bodies of the County and its cities have successfully preserved the agricultural working landscape and many natural features of the area through decades of rapid change in surrounding counties. The County and cities also partnered in 2002 to form a joint powers agency (known today as the Yolo Habitat Conservancy, and referred to herein as the Conservancy) to develop a countywide Yolo Habitat Conservation Plan/Natural Communities Conservation Plan (Yolo HCP/NCCP) and, among other things, to better align local development with continued preservation of the agricultural landscape and other natural communities.

The Yolo Regional Conservation Investment Strategy and Local Conservation Plan (RCIS/LCP) is a collaborative conservation planning effort of the County, Conservancy, and California Department of Water Resources (DWR). The RCIS/LCP is intended to provide a complementary framework for future conservation efforts that includes voluntary stewardship-driven conservation, in addition to mitigation-driven conservation, to enhance the conservation benefits in Yolo County. The RCIS/LCP may guide voluntary stewardship-driven conservation efforts that support the protection and enhancement of focal species habitat across a variety of natural communities and compatible agricultural lands, assist in obtaining grants for these efforts, and promote the protection of wildlife corridors. The preparers of this plan (Section 1.3, *Planning Process*) intend various entities to use the RCIS/LCP to guide such stewardship-driven efforts, including landowners, land trusts, nonprofit organizations, and municipalities developing their own regional planning documents. The joint RCIS/LCP describes the existing condition for the amount, location, and type of natural communities and focal species habitat in the strategy area (Chapter 2, *Environmental Setting and Regional Planning Environment*)[1].

The RCIS/LCP also provides a framework within which mitigation-driven conservation can be considered in ways that augment the habitat values in the landscape in association with public infrastructure and other needs within the RCIS/LCP area. The RCIS/LCP may streamline and simplify negotiations on the adequacy of mitigation and the issuance of permits for state projects, including critical state infrastructure projects in Yolo County or other projects not covered by the Yolo HCP/NCCP, by establishing priorities for conservation areas that meet mitigation requirements beyond what the Yolo HCP/NCCP provides. The RCIS/LCP will not specify mitigation requirements, but it can provide a framework from which project proponents can design mitigation proposals for permit applications which are consistent with regional conservation priorities. The RCIS/LCP could further simplify the permitting process if entities implement voluntary conservantion and habitat

[1] The strategy area encompasses all areas within Yolo County, totaling an estimated 653,549 acres (Figure 1-1 and Figure 1-2)

enhancement actions consistent with a Mitigation Credit Agreement, which would result in the creation of mitigation credits. The RCIS/LCP, however, is not creating any new regulations in Yolo County, nor is it changing the process by which a project applicant would obtain permits for impacts to biological resources.

1.1.1 Regional Conservation Investment Strategy

This section is applicable to the RCIS only and is subject to CDFW review and approval.

Nothing in this RCIS is intended to, nor shall it be interpreted to, conflict with controlling federal, state, or local law, including Fish and Game Code sections 1850-1861, or any Guidelines adopted by the Department of Fish and Wildlife pursuant to Section 1858.

In 2016, the California State Legislature (Legislature) passed, and Governor Brown signed, Assembly Bill 2087 (AB 2087), a new law to guide voluntary conservation and mitigation actions for the state's most vulnerable species and resources and to help streamline the mitigation process for state and local projects, such as infrastructure and forest management. AB 2087 amends the California Fish and Game Code (CFGC), Division 2, Chapter 9, to add Sections 1850–1861. It creates a program to identify and prioritize the conservation needs of vulnerable species and resources at a regional scale, including actions to address the impacts of climate change and other stressors that influence the resiliency of those species and natural resources. AB 2087 ensures the new program complements HCPs and NCCPs.

The program allows the California Department of Fish and Wildlife (CDFW) or any local or state public agency to develop a RCIS to guide voluntary conservation actions and mitigation actions for a suite of species. The RCIS must include specific information about conservation actions and conservation priorities necessary to eliminate or reduce stressors and negative pressures on those species.

Once CDFW approves an RCIS, public agencies or conservation organizations can use it to identify conservation priorities that will help guide their conservation investments. Public infrastructure agencies or private developers can voluntarily use an approved RCIS to inform their selection of appropriate mitigation sites or actions.

CDFW published guidelines for the RCIS Program, called *Program Guidelines*, in April 2017. They later revised these *Program Guidelines* slightly in June 2017. This RCIS complies with the June 2017 *Program Guidelines*. The newest set of *Program Guidelines* released by CDFW in September 2018 do not apply to the Yolo RCIS.[2]

A person or entity, including a state or local agency, can sponsor the development of an MCA for a region within a strategy area (e.g., a watershed or conservation zone in which mitigation credits may be purchased) and request approval of the agreement from CDFW. An MCA allows project proponents to negotiate compensatory mitigation with CDFW before project impacts occur. An MCA identifies conservation actions or habitat enhancement actions and explains how, and to what extent, they will measurably advance the RCIS conservation objectives. Once CDFW approves the MCA, the MCA sponsor submits mitigation project proposals to CDFW to establish and release the

[2] Because the Conservancy submitted the agency draft RCIS/LCP to CDFW for their first review prior to release of the newest Program Guidelines (February 2018 and September 2018), CDFW exempted this RCIS from those guidelines.

credits consistent with the MCA's mitigation framework. Mitigation credits created pursuant to an MCA may be used to satisfy the mitigation requirements of any state or federal law, if the respective entity administering that law agrees. Once approved, this RCIS will enable MCAs to be developed and executed in the strategy area. More details on how the RCIS can be used, including preparation of MCAs, are discussed in Section 4.6, *Regulatory Uses of the RCIS*.

Adoption of this RCIS by CDFW is consistent with CFGC Sections 1850(e) and 1852(c)(7). By authorizing CDFW to approve an RCIS, it is not the intent of the Legislature to regulate the use of land; establish land use designations; or to affect, limit, or restrict the land use authority of any public agency. Nothing in the Yolo RCIS/LCP is intended to, nor *shall* it be interpreted to conflict with state law or local ordinances. Therefore, voluntary actions guided by this RCIS must comply with all applicable state and local requirements.

1.1.2 Local Conservation Plan

This section is applicable to LCP only and is not subject to CDFW review or approval.

The LCP is a compatible but separate plan from the Yolo HCP/NCCP that establishes conservation priorities to help focus implementation efforts to conserve biological resources not addressed in the Yolo HCP/NCCP. The Conservancy prepared the LCP component of this joint RCIS/LCP in parallel with the preparation of the present version of the Yolo HCP/NCCP. The LCP recognizes there are many more species of conservation interest in Yolo County than are included in the Yolo HCP/NCCP that would benefit from a similar conservation framework. To meet that need, the LCP provides a voluntary, nonregulatory framework for additional conservation, beyond what the Conservancy will achieve through the Yolo HCP/NCCP.

The development of the LCP began in 2013, when the Conservancy revised the Yolo HCP/NCCP to: (1) cover only 12 of the 32 species covered by the First Administrative Draft Yolo HCP/NCCP, (2) focus conservation in the eastern portion of the Yolo HCP/NCCP Plan Area where the 12 covered species occur, and (3) remove discussion of other species of local concern. Since the HCP/NCCP is a regulatory document with financial and conservation commitments the permittees must meet, the HCP/NCCP focuses on 12 species that are either listed now or are expected to become listed during the 50-year permit term. The Conservancy's Advisory Committee concurred with this approach, provided the Conservancy simultaneously prepared an LCP to address the 20 species dropped from the Yolo HCP/NCCP and other countywide conservation opportunities for additional species and natural communities, including the western portion of the county. The Conservancy prepared an administrative draft of the LCP in early 2016.

After the inception of the RCIS program in late 2016, DWR asked the Conservancy to consider expanding the LCP into an RCIS. Since many components of the LCP were consistent with the requirements of an RCIS, the Conservancy agreed to this approach. Details on the uses of the LCP appear in Section 4.6, *Regulatory Uses of the RCIS/LCP*.

1.1.3 Differentiating the RCIS from the LCP

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

Although RCIS and LCP components are both integrated into this plan, only the RCIS portions of this plan are subject to CDFW approval. Table 1-1 indicates which portions of this plan are relevant to the RCIS and subject to CDFW approval.

Table 1-1. Yolo Regional Investment Conservation Strategy/Local Conservation Plan Components Subject to California Department of Fish and Wildlife Review and Approval

Context	Section(s)	RCIS vs. LCP	Subject to CDFW Review and Approval[1]
1.1, *Overview*	1.1.1, *Regional Conservation Investment Strategy*	RCIS only	Yes
1.1, *Overview*	1.1.2, *Local Conservation Plan*	LCP only	No
1.1, *Overview*	1.1.3, *Differentiating the RCIS from the LCP*	RCIS and LCP	Yes
1.2, *Purpose*	1.2.1, *Regional Conservation Investment Strategy*	RCIS only	Yes
1.2, *Purpose*	1.1.2, *Local Conservation Plan*	LCP only	No
1.3.1, *State and Local Agency RCIS Proponent Approval*	1.3.1.1, *Regional Conservation Investment Strategy*	RCIS	Yes
1.3.1, *State Agency and Local RCIS Proponent Approval*	1.3.1.2, *Local Conservation Plan*	LCP only	No
1.3, *Planning Process*	1.3.2, *Steering Committee*; 1.3.3, *Advisory Committee*; and 1.3.4, *Public Outreach*	RCIS and LCP	Yes
Chapter 1, *Introduction*	1.4, *Approach*	RCIS and LCP	Yes
Chapter 1, *Introduction*	Table 1-2, *Required Elements of an RCIS*	RCIS only	Yes
1.5, *Scope of the Strategy*	1.5.1, *Strategy Area*	RCIS and LCP	Yes
1.5.2, *Term of the Strategy*	1.5.2.1, *Regional Conservation Investment Strategy*	RCIS only	Yes
1.5.2, *Term of the Strategy*	1.5.2.2, *Local Conservation Plan*	LCP only	No
1.5.2, *Term of the Strategy*	1.5.2.3, *Yolo HCP/NCCP*	RCIS and LCP	Yes
1.5, *Scope of the Strategy*	1.5.3, *Voluntary Strategy*	RCIS and LCP	Yes
1.5, *Scope of the Strategy*	1.5.4, *Natural Communities*	RCIS and LCP	Yes
1.5.5, *Focal Species and Conservation Species*	1.5.4.1, *Focal Species (Group 1 Species)*	RCIS and LCP (may need to differentiate focal species objectives based on outcome of measurable objective approach)	Yes

Context	Section(s)	RCIS vs. LCP	Subject to CDFW Review and Approval[1]
1.5.5, *Focal Species and Conservation Species*	1.5.4.2, *Group 2 Conservation Species*	LCP only	No
1.5.5, *Focal Species and Conservation Species*	1.5.4.3, *Group 3 Conservation Species*	LCP only	No
1.5, *Scope of the Strategy*	1.5.6, *Planning Species*	LCP only	No
1.5, *Scope of the Strategy*	1.5.7, *Other Conservation Elements* and 1.5.8, *Conservation Priorities*	RCIS and LCP	Yes
Chapter 1, *Introduction*	1.6, *Organization of this Document*	RCIS and LCP	Yes
Chapter 2, *Environmental Setting and Regional Planning Environment*	All	RCIS and LCP	Yes
Chapter 3, *Conservation Strategy*	Sections 3.1, *Overview*; 3.2, *Methods and Approach*; and 3.3, *Results of Conservation Gap Analysis*	RCIS and LCP	Yes
Chapter 3, *Conservation Strategy*	Section 3.4.1, *Conservation Goals, Objectives, Actions, and Priority Areas*	RCIS and LCP	Yes
Chapter 3, *Conservation Strategy*	Section 3.4.2, *RCIS Conservation Prioritization Guidelines*	RCIS only	Yes
Chapter 3, *Conservation Strategy*	Section 3.4.3, *Additional LCP Conservation Guidelines*	LCP only	No
Chapter 3, *Conservation Strategy*	Section 3.5, *Monitoring and Adaptive Management Framework*	RCIS and LCP	Yes
Chapter 4, *Implementation*	Sections 4.1, *Overview*, and 4.2, *Goals of Implementation*	RCIS and LCP	Yes
Chapter 4, *Implementation*	Section 4.3, *Required RCIS Implementation*	RCIS only	Yes
Chapter 4, *Implementation*	Section 4.4, *Optional RCIS and LCP Implementation Activities*	RCIS and LCP	Yes
Chapter 4, *Implementation*	Section 4.5, *Other Optional LCP Implementation Activities*	LCP only	No
Chapter 4, *Implementation*	Section 4.6, *Regulatory Uses of the RCIS*; Section 4.7, *Extending and Amending the RCIS*; and	RCIS only	Yes

Context	Section(s)	RCIS vs. LCP	Subject to CDFW Review and Approval[1]
	Section 4.8, *Conservation Partners*		
Chapter 5, *Preparers and Reviewers* and Chapter 6, *References Cites*	All	RCIS and LCP	Yes

[1] CDFW has not reviewed the sections that are not required to be reviewed and approved by CDFW.

1.2 Purpose

1.2.1 Regional Conservation Investment Strategy

This section is applicable to the RCIS only and is subject to CDFW review and approval.

The RCIS provides a framework for helping to simplify the process for permitting state projects consistent with local conservation priorities. As stated in CFGC Section 1852(b), the RCIS provides voluntary guidance for one or more of the following components in ways that will enhance the long-term viability of native species, habitat, and other natural resources:

1. Identification of wildlife and habitat conservation priorities, including actions to address the impacts of climate change and other wildlife stressors.
2. Investments in natural resource conservation.
3. Infrastructure planning, including but not limited to public infrastructure and forest management (e.g., regional flood control, including potential expansion and/or other changes to the Yolo Bypass).
4. Identification of areas that can provide compensatory mitigation for impacts to species and natural resources.

Yolo County and the Conservancy share these goals and believe investments in achievement of these goals should occur in a manner that avoids or minimizes conflicts with other local priorities. The continued preservation of farmland and a sustainable agricultural industry—in particular, high-value crops such as rice and processing tomatoes—are foremost among such priorities. Other local priorities include improving local flood protection, enhancing agricultural drainage and water supply infrastructure, supporting implementation of the Yolo HCP/NCCP, and protecting the wetland, recreational, educational, and other amenities of the Yolo Bypass Wildlife Area. The County envisions the RCIS and the LCP as a means to align habitat conservation efforts contemplated in AB 2087 with these longstanding local priorities.

The State of California, on the other hand, has tremendous and varied interests in the vitality of Central Valley communities, economies, and ecological landscapes. State-driven infrastructure investments—whether related to transportation, flood management, or other purposes—are a principal means by which to protect and enhance these interests. The State envisions the RCIS as an important step towards maximizing the value of these kinds of infrastructure investments within Yolo County. The RCIS will, for example, serve as a vehicle to support implementation of multi-benefit flood system projects that achieve environmental and economic goals. The 2012 Central

Valley Flood Protection Plan (CVFPP), prepared by DWR and adopted by the Central Valley Flood Protection Board (CVFPB), recommends a state systemwide investment approach (SSIA) for improvements to the Central Valley flood management system (DWR 2012). The 2017 CVFPP Update incorporates new information and provides greater specificity to help guide both short-term and long-term investments. This new information is documented in a series of detailed studies, including two Basin-Wide Feasibility Studies (BWFSs) for the Sacramento River Basin and the San Joaquin River Basin, respectively, six Regional Flood Management Plans (RFMPs), a CVFPP Investment Strategy, and a CVFPP Conservation Strategy (DWR 2016). The CVFPP Conservation Strategy (DWR 2016) provides a comprehensive, long-term approach to the improvement of ecosystem functions through the integration of ecological restoration with flood risk reduction and management projects. Partners in Conservation Strategy implementation include federal and state agencies, local maintaining agencies (LMAs), local communities, and nongovernmental organizations.

This RCIS/LCP formulates conservation goals and objectives for the strategy area, as well as conservation priorities for land acquisition and habitat management, enhancement, and restoration (see Chapter 3, *Conservation Strategy,* for details).

1.2.2 Local Conservation Plan

This section is applicable to LCP only and is not subject to CDFW review or approval.

The LCP component of the Yolo RCIS/LCP is a countywide plan for Yolo County, California, designed to meet the following purposes.

- Provide a voluntary, nonregulatory framework for landscape-based conservation planning in Yolo County in partnership with landowners, resource managers, local agencies, and other regional conservation plans.
- Provide a voluntary, nonregulatory framework for permanently sustaining natural ecosystem process dynamics in all natural communities in Yolo County, thereby maintaining habitat conditions and dynamics that sustain the viability of all native and desired nonnative species in Yolo County.
- Provide a voluntary, nonregulatory conservation framework for species and habitat types identified as of local concern in Yolo County and adjacent areas that allows local, state, and federal agencies and concerned citizens to evaluate conservation opportunities for these species and habitats in the county and adjacent areas.
- Allow private landowners to benefit from and better understand the conservation value of their lands in a regional context.
- Justify fundraising (e.g., grants, federal assistance) for financial assistance to landowners for voluntary conservation projects (e.g., pond maintenance, planting hedgerows).

Many of the components of the LCP overlap with those of the RCIS. The LCP has some unique elements that are not required in an RCIS, however, such as addressing additional sensitive species beyond the focal species identified in the RCIS and prioritizing conservation of the rarest natural communities.

1.3 Planning Process

1.3.1 State and Local RCIS Proponent Approval

1.3.1.1 Regional Conservation Investment Strategy

This section is applicable to the RCIS only and is subject to CDFW review and approval.

An organization developing an RCIS must have a state agency proponent at the time it submits the RCIS to CDFW for approval. For CDFW to approve a final RCIS, a state agency must request the approval of the RCIS by sending a letter to the director of CDFW stating the RCIS will aid in meeting the state's goals in (1) conservation, and (2) public infrastructure or forestry management. The state agency proponent of this RCIS is DWR. See Appendix A for the letter to CDFW submitted by the state agency proponent.

1.3.1.2 Local Conservation Plan

This section is applicable to the LCP only and is not subject to CDFW review or approval.

Additionally, the RCIS/LCP is subject to approval by the Yolo Habitat Conservancy Board of Directors and Yolo County Board of Supervisors. The Conservancy approved submittal of the draft RCIS/LCP to CDFW on January 22, 2018, and the Yolo County Board of Supervisors approved submittal of the draft on January 23, 2018. The RCIS/LCP went before these boards again in July, 2020 and received approval for submittal of the final RCIS/LCP to CDFW.

1.3.2 Steering Committee

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

A Steering Committee, comprised of key public agencies and stakeholders likely to utilize the RCIS/LCP, guided its development. The Steering Committee reviewed early drafts of RCIS/LCP chapters and made decisions regarding the course of the strategy. The Steering Committee included representatives from the following organizations and government entities.

- DWR
- Yolo County
- Yolo Habitat Conservancy (a joint powers agency made up of Yolo County and the cities of Davis, West Sacramento, Winters and Woodland)
- Environmental Defense Fund
- American Rivers
- Yolo Habitat Conservancy Advisory Committee (Section 1.3.3, *Advisory Committee*)

1.3.3 Advisory Committee

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

In 2004, the Conservancy appointed an Advisory Committee[3] to provide input and advice during the development of the Yolo HCP/NCCP. The Advisory Committee consists of individuals active in different sectors relevant to development of the HCP/NCCP and the RCIS/LCP, such as conservation, development, and agriculture. Members represent a range of stakeholders with an interest in the HCP/NCCP (the stakeholders) and the LCP. The Conservancy Board of Directors appointed Advisory Committee members according to their expertise, interest in the program, and capacity to represent the interests of their particular stakeholders. Advisory Committee members participate as individuals and do not represent their respective agencies and organizations.

The Advisory Committee held open meetings on a regular basis (generally monthly) to review relevant materials and documents; evaluate and synthesize ideas, data, and information; and discuss and resolve complex issues associated with the Yolo HCP/NCCP and LCP. The Advisory Committee sought to reach a consensus when possible and provide recommendations to the Conservancy Board of Directors on a range of matters. When the Conservancy expanded the LCP to include the RCIS in early 2017, the Conservancy expanded the role of the Advisory Committee to provide advice and contribute to the development of the joint RCIS/LCP.

Through 2016, the Advisory Committee participated in the preparation and review of the First Administrative Draft LCP. In 2017, the Advisory Committee met regularly and provided valuable input in the development of the public draft RCIS/LCP. One Advisory Committee member was appointed to participate in the Steering Committee when the Advisory Committee was disbanded in 2018 and assigned to report back to the RCIS/LCP subcommittee consisting of the former Advisory Committee members.

1.3.4 Public Outreach

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

Public outreach has been an important element of the RCIS/LCP. As described above, public outreach has been achieved primarily through the open meetings of the Advisory Committee, which met regularly for at least 13 years (2004 to completion of the RCIS/LCP, beginning as a component of the Yolo HCP/NCCP).

Specific types of public outreach are required for CDFW to approve an RCIS. CFGC Section 1854(c)(1) requires an RCIS proponent to publish a notice of its intent to create an RCIS. The Conservancy published this notice of intent on August 15, 2017 (Appendix B).

CFGC Section 1854(c)(3)(A) requires the public agency preparing an RCIS to hold a public meeting to allow interested persons and entities to receive information about the RCIS early in the preparation process and provide written and oral comments. The Conservancy held a public meeting on September 14, 2017 at the Yolo County Department of Community Services in Woodland, California. The Conservancy posted the notice of intent to prepare this RCIS and notice of this public meeting with the Governor's Office of Planning and Research, with the Yolo County Clerk Recorder, and on the Conservancy's website on August 15, 2017 (at least 30 days prior to the public meeting). The Conservancy provided the notice to CDFW, each city and county within or adjacent to the regional conservation investment strategy area, and to the Conservancy's general Listserv. The Conservancy and other Steering Committee representatives invited interested persons to provide

[3] The Advisory Committee was formerly known as the Steering Advisory Committee, or SAC; the name was changed to Advisory Committee in 2012.

oral and written comments. The Conservancy received a single written comment during the public meeting from Dan Schatzel of the West Sac Trail Riders and a letter from Eric Vink of the Delta Protection Commission during the 60 days after the public meeting. Written public comments, and responses to those comments, are included in Appendix B, *Public Outreach*.

1.4 Approach

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

To approve the RCIS component of the Yolo RCIS/LCP, CDFW must determine that it meets all of the requirements in the CFGC for an RCIS. To assist CDFW with these findings, Table 1-2 lists the requirements in the order they appear in the Code and where they are found in this RCIS/LCP.

To develop the RCIS/LCP, the consultant preparing the plan completed the following tasks with direction from Steering Committee.

- Selected focal species for the RCIS described in Section 1.4.5.
- Mapped 13 natural community types as the basis for habitat distribution models for key focal species, provided in Appendix C, Species Accounts. These maps are based on information developed by the Conservancy, the Advisory Committee, and other local, state and federal entities for the Yolo HCP/NCCP. Chapter 2, *Environmental Setting*, provides maps and descriptions of the natural communities.
- Developed species accounts for focal species, provided in Appendix C, *Species Accounts.*
- Incorporated appropriate elements of the Yolo HCP/NCCP into the LCP.
- Conducted a gap analysis to evaluate how much of each natural community and modeled habitat of each key focal species is protected, and will be protected under the Yolo HCP/NCCP. This analysis provides information about remaining conservation needs in Yolo County, including natural community and focal species' habitat conservation priorities beyond the conservation the Yolo HCP/NCCP will provide.
- Evaluated existing conservation, development, and state infrastructure plans to assess ways the RCIS/LCP could provide conservation that complements and does not conflict with existing plans.
- Developed conservation goals and objectives at the landscape, natural community, and focal species scales and identified conservation actions to achieve these goals and objectives and address the conservation gaps identified in the gap analysis. The conservation goals and objectives, and associated conservation actions, are provided in Chapter 3, Section 3.4, *Conservation Strategy.* The conservation gap analysis is described in Section 3.2.1, *Conservation Gap Analysis.*
- Integrated the goals and objectives of local plans, as appropriate.
- Described the process by which the implementation proponent will implement, monitor, and adaptively manage the LCP (Chapter 3, Section 3.5, *Monitoring and Adaptive Management Framework*). This includes additional steps needed to refine the conservation framework provided by the LCP.

Table 1-2. Required Fish and Game Code Elements in an RCIS and Location in this RCIS

Fish and Game Code	Required Element	Relevant RCIS Section(s)
1852(a)	The department may approve a regional conservation investment strategy pursuant to this chapter. A regional conservation investment strategy may be proposed by the department or any other public agency, and shall be developed in consultation with local agencies that have land use authority within the geographic area of the regional conservation investment strategy. The department may only approve a regional conservation investment strategy if one or more state agencies request approval of the regional conservation investment strategy through a letter sent to the director indicating that the proposed regional conservation investment strategy would contribute to meeting both of the following state goals: 1. Conservation. 2. Public infrastructure or forest management.	Section 1.3.1
1852(c)(2)	An explanation of the conservation purpose of and need for the strategy.	Section 1.2.1
1852(c)(2)	The geographic area of the strategy and rationale for the selection of the area, together with a description of the surrounding ecoregions and any adjacent protected habitat areas or linkages that provide relevant context for the development of the strategy.	Section 1.5.1 Chapter 2
1852(c)(3)	The focal species included in, and their current known or estimated status within, the strategy.	Sections 1.5.5 and 2.8 Appendix C
1852(c)(4)	Important resource conservation elements within the strategy area, including, but not limited to: 1. Important ecological resources and processes 2. Natural communities 3. Habitat 4. Habitat connectivity 5. Existing protected areas, and 6. An explanation of the criteria, and methods used to identify those important conservation elements.	1. Chapter 2 2. Sections 2.2 through 2.9 3. Section 2.3 and 2.6 4. Section 2.9.5 5. Section 2.4 6. Integrated into above-listed sections
1852(c)(5)	A summary of historic, current, and projected future stressors and pressures in the strategy area, including climate change vulnerability, on the focal species, habitat, and other natural resources, as identified in the best available scientific information, including, but not limited to, the State Wildlife Action Plan.	Section 2.11
1852(c)(6)	Consideration of major water, transportation and transmission infrastructure facilities, urban development areas, and city, county, and city and county general plan designations that accounts for reasonably foreseeable development of major infrastructure facilities, including, but not limited to, renewable energy and housing in the strategy area.	Section 2.13

Fish and Game Code	Required Element	Relevant RCIS Section(s)
1852(c)(7)	Provisions ensuring that the strategy will be in compliance with all applicable state and local requirements and does not preempt the authority of local agencies to implement infrastructure and urban development in local general plans.	Sections 1.1.1 and 1.5.3
1852(c)(8)	Conservation goals and measurable objectives for the focal species and important conservation elements identified in the strategy that address or respond to the identified stressors and pressures on focal species.	Section 3.4.1
1852(c)(9)	Conservation actions, including a description of the general amounts and types of habitat that, if preserved or restored and permanently protected, could achieve the conservation goals and objectives, and a description of how the conservation actions and habitat enhancement actions were prioritized and selected in relation to the conservation goals and objectives.	Tables 3-2, 3-3, and 3-4 Sections 3.4.1 and 3.42
1852(c)(10)	Provisions ensuring that the strategy is consistent with and complements any administrative draft natural community conservation plan, approved natural community conservation plan, or federal habitat conservation plan that overlaps with the strategy area.	Sections 2.12.1
1852(c)(11)	An explanation of whether and to what extent the strategy is consistent with any previously approved strategy or amended strategy, state or federal recovery plan, or other state or federal approved conservation strategy that overlaps with the strategy area.	Sections 2.12.2, 2.12.3, 2.12.4, and 2.12.5
1852(c)(12)	A summary of mitigation banks and conservation banks approved by the department or the U.S. Fish and Wildlife Service that are located within the strategy area or whose service area overlaps with the strategy area.	Section 2.12.6
1852(c)(13)	A description of how the strategy's conservation goals and objectives provide for adaptation opportunities against the effects of climate change for the strategy's focal species.	Section 3.4.2
1852(c)(14)	Incorporation and reliance on, and citation of, the best available scientific information regarding the strategy area and the surrounding ecoregion, including a brief description of gaps in relevant scientific information, and use of standard or prevalent vegetation classifications and standard ecoregional classifications for terrestrial and aquatic data to enable and promote consistency among regional conservation investment strategies throughout California.	Chapter 2
1852(d)	A regional conservation investment strategy shall compile input and summary priority data in a consistent format that could be uploaded for interactive use in an Internet Web portal and that would allow stakeholders to generate queries of regional conservation values within the strategy area.	Section 3.2.4

Fish and Game Code	Required Element	Relevant RCIS Section(s)
1852(e)	In addition to considering the potential to advance the conservation of focal species, regional conservation investment strategies shall consider all of the following: 1. The conservation benefits of preserving working lands for agricultural uses. 2. Reasonably foreseeable development of infrastructure facilities. 3. Reasonably foreseeable projects in the strategy area, including, but not limited to, housing. 4. Reasonably foreseeable development for the production of renewable energy. 5. Draft natural community conservation plans within the area of the applicable regional conservation investment strategy.	1. Section 3.4 2. Section 2.13.2 3. Section 2.13.2 4. Section 2.13.2 5. Section 2.12.1
1854(a)	The department may prepare or approve a regional conservation investment strategy, or approve an amended strategy, for an initial period of up to 10 years after finding that the strategy meets the requirements of Section 1852.	Section 1.5.2
1854(c)(1)	A public agency shall publish notice of its intent to create a regional conservation investment strategy. This notice shall be filed with the Governor's Office of Planning and Research and the county clerk of each county in which the regional conservation investment strategy is found in part or in whole. If preparation of a regional conservation investment strategy was initiated before January 1, 2017, this notice shall not be required.	Section 1.3.4 Appendix B
1854(c)(3)(*A*)	A public agency proposing a strategy or amended strategy shall hold a public meeting to allow interested persons and entities to receive information about the draft regional conservation investment strategy or amended strategy early in the process of preparing it and to have an adequate opportunity to provide written and oral comments. The public meeting shall be held at a location within or near the strategy area.	Section 1.3.4 Appendix B
1854(c)(3)(*B*)	In a draft regional conservation investment strategy or amended strategy submitted to the department for approval, the public agency shall include responses to written public comments submitted during the public comment period.	Section 1.3.4 Appendix B
1854(c)(3)(*C*)	If preparation of a regional conservation investment strategy was initiated before January 1, 2017, and a public meeting regarding the strategy or amended strategy that is consistent with the requirements of this section was held before January 1, 2017, an additional public meeting shall not be required.	Section 1.3.4 Appendix B

Fish and Game Code	Required Element	Relevant RCIS Section(s)
1854(c)(4)	At least 30 days before holding a public meeting to distribute information about the development of a draft regional conservation investment strategy or amended strategy, a public agency proposing a strategy shall provide notice of a regional conservation investment strategy or amended strategy public meeting as follows: A. On the public agency's Internet website and any relevant LISTSERV. B. To each city, county, and city and county within or adjacent to the regional conservation investment strategy area. C. To the RCIS proponent for each natural community conservation plan or federal regional habitat conservation plan that overlaps with the strategy area. D. To each public agency, organization, or individual who has filed a written request for the notice, including any agency, organization, or individual who has filed a written request to the department for notices of all regional conservation investment strategy public meetings.	Section 1.3.4 Appendix B
1854(c) (5)	At least 60 days before submitting a final regional conservation investment strategy or amended strategy to the department for approval, the public agency proposing the investment strategy or amended strategy shall notify the board of supervisors and the city councils in each county within the geographical scope of the strategy and provide the board of supervisors and the city councils with an opportunity to submit written comments for a period of at least 30 days.	Section 1.3.4 Appendix B
1854 (e)	The department shall require the use of consistent metrics that incorporate both the area and quality of habitat and other natural resources in relation to a regional conservation investment strategy's conservation objectives to measure the net change resulting from the implementation of conservation actions and habitat enhancement actions.	Sections 3.2, 3.3, and 3.4

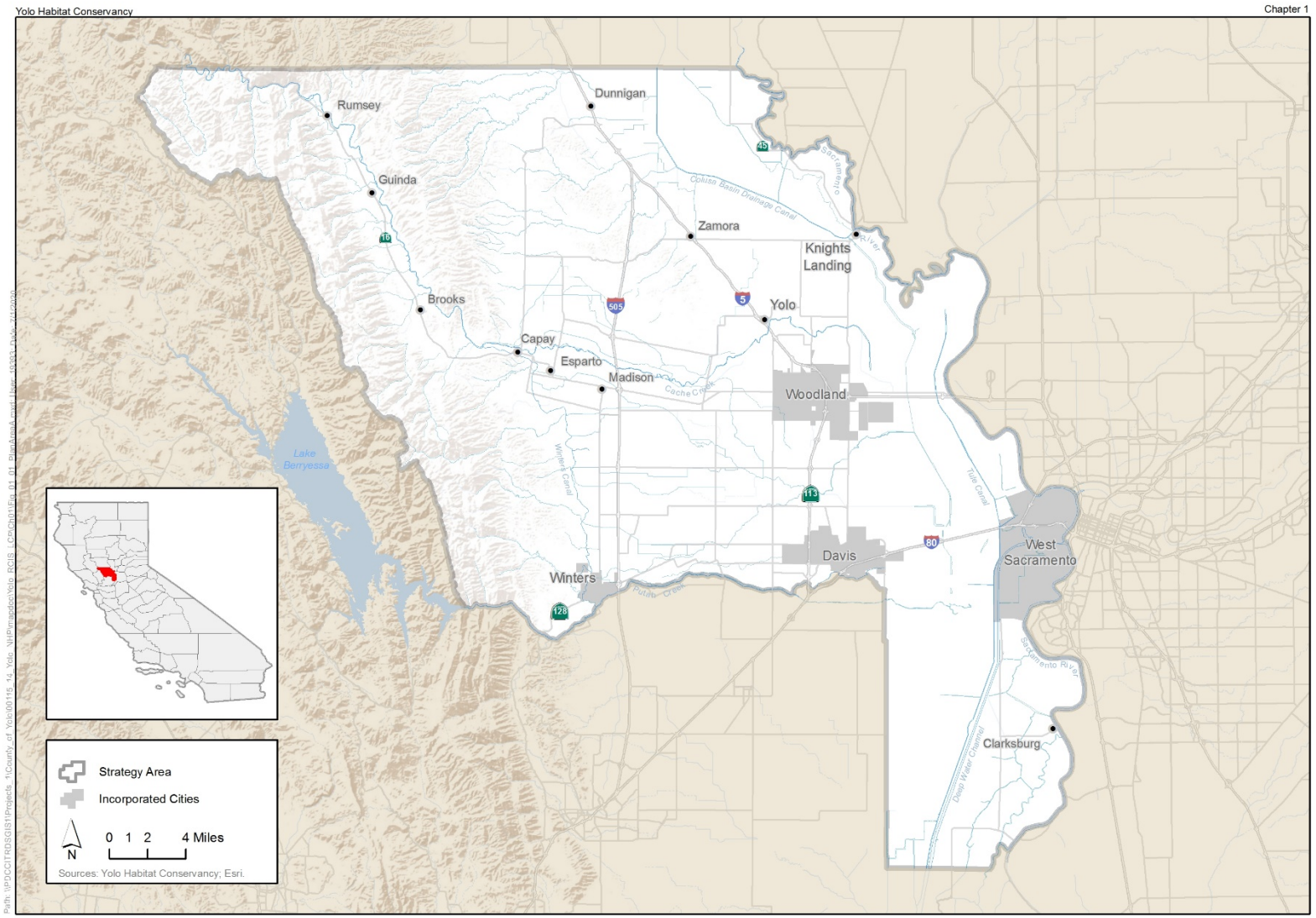
Fish and Game Code	Required Element	Relevant RCIS Section(s)
1856(b)	For a conservation action or habitat enhancement action identified in a regional conservation investment strategy to be used to create mitigation credits pursuant to this section, the regional conservation investment strategy shall include, in addition to the requirements of Section 1852, all of the following: 1. An adaptive management and monitoring strategy for conserved habitat and other conserved natural resources. 2. A process for updating the scientific information used in the strategy, and for tracking the progress of, and evaluating the effectiveness of, conservation actions and habitat enhancement actions identified in the strategy, in offsetting identified threats to focal species and in achieving the strategy's biological goals and objectives, at least once every 10 years, until all mitigation credits are used. 3. Identification of a public or private entity that will be responsible for the updates and evaluation required pursuant to paragraph (2).	1. Section 3.5 2. Section 4.3 3. Section 4.4

1.5 Scope of the Strategy

1.5.1 Strategy Area

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The strategy area encompasses all areas within Yolo County, totaling an estimated 653,549 acres (Figure 1-1 and Figure 1-2). The strategy area is within the plan area for the Yolo HCP/NCCP.



Yolo RCIS/LCP

Figure 1-1
Yolo RCIS/LCP Strategy Area

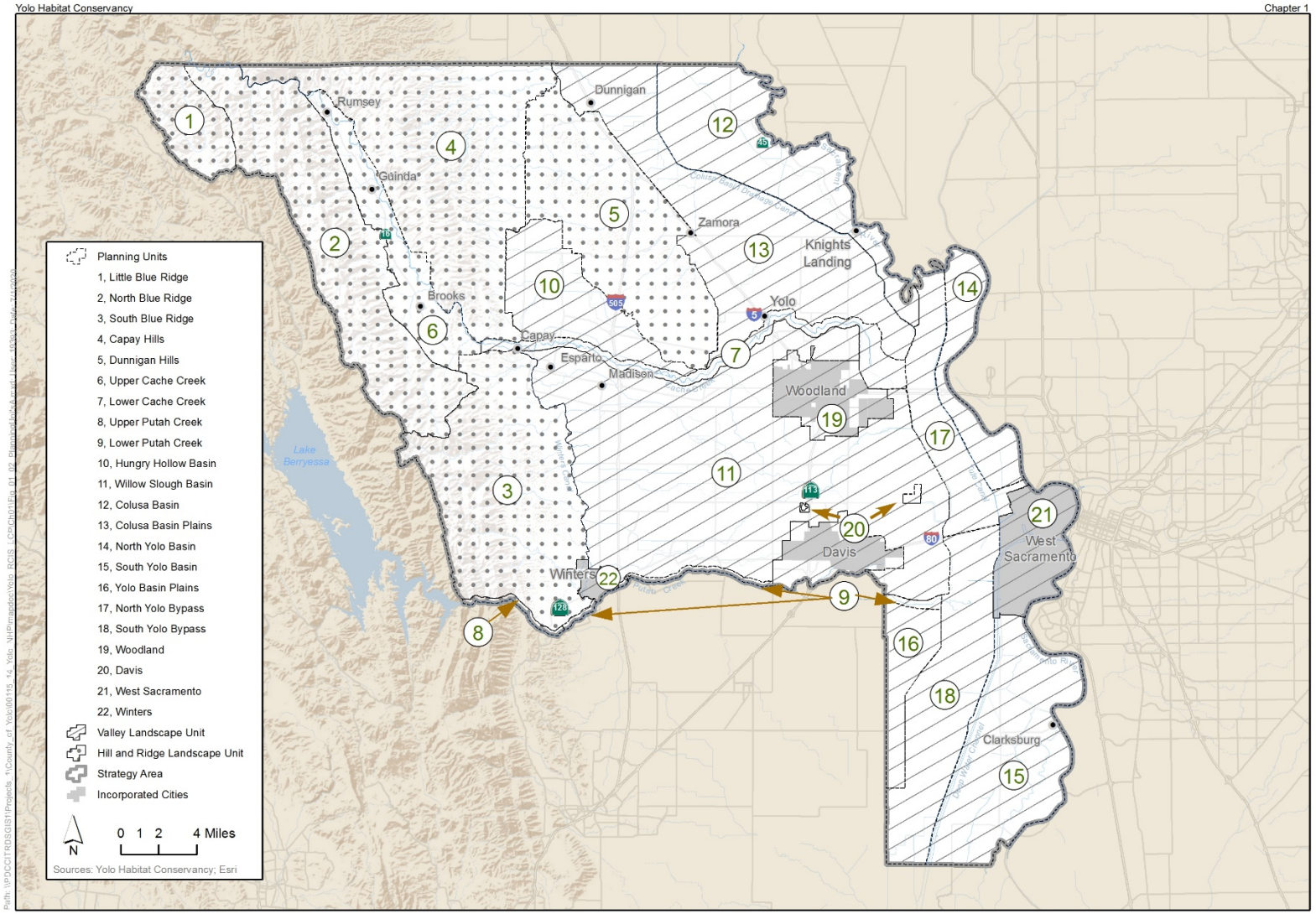


Figure 1-2
Planning Units

Yolo RCIS/LCP

1.5.2 Terms

1.5.2.1 Regional Conservation Investment Strategy

This section is applicable to the RCIS only and is subject to CDFW review and approval.

CDFW may approve an RCIS for an initial period of up to 10 years after finding the RCIS meets the requirements of CFGC Section 1852. CDFW may extend the duration of an approved or amended RCIS for additional periods of up to 10 years after the RCIS proponent or other entity updates the RCIS with new scientific information and CDFW makes a new finding the RCIS continues to meet the requirements of Section 1852. The proposed term of this RCIS is 10 years, from 2020 to 2030.

1.5.2.2 Local Conservation Plan

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The LCP component of the plan has no defined term or expiration date. The LCP component of the plan is expected to continue guiding conservation in Yolo County even after the RCIS has expired.

1.5.2.3 Yolo HCP/NCCP

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The proposed term of the Yolo HCP/NCCP is 50 years, from 2019 to 2069. Since the RCIS/LCP is intended to work in concert with the Yolo HCP/NCCP, the RCIS proponent or other entity may amend the RCIS/LCP periodically so that it remains active for the duration of the HCP/NCCP term.

1.5.3 Voluntary Strategy

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

This RCIS/LCP is a nonbinding and voluntary strategy. This RCIS/LCP does not do the following (CFGC Sections 1852(c)(7) and 1855 (b)).

- Establish a presumption under the California Environmental Quality Act that any project's impacts are, or are not, potentially significant.
- Prohibit or authorize any project or project impacts.
- Create a presumption or guarantee that any proposed project will be approved or permitted, or that any proposed impact will be authorized, by any state or local agency.
- Create a presumption that any proposed project will be disapproved or prohibited, or that any proposed impact will be prohibited, by any state or local agency.
- Alter or affect, or create additional requirements for, the general plan of the city, county, or city and county, in which it is located.
- Have a binding or mandatory regulatory effect on private landowners or project proponents.
- Preempt the authority of local agencies to implement infrastructure and urban development in local general plans.

1.5.4 Natural and Seminatural Communities

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The RCIS/LCP addresses conservation of the following natural and seminatural communities. Although cultivated lands are not a *natural* community, crop types that provide habitat for species of local concern are included within the scope of this RCIS/LCP as a *seminatural* community.

- Cultivated lands
- California prairie
- Serpentine
- Chamise chaparral
- Mixed chaparral
- Oak-foothill pine
- Blue oak woodland
- Closed-cone pine-cypress
- Montane hardwood
- Valley oak woodland
- Alkali prairie
- Vernal pool complex
- Fresh emergent wetland
- Riparian
- Lacustrine and riverine

Chapter 2, *Environmental Setting and Regional Planning Environment,* provides definitions and descriptions for each of these natural communities.

1.5.5 Focal Species and Conservation Species

This strategy categorizes 143 species into three groups based on the amount of information available for these species and whether they are included in the LCP or both the RCIS and the LCP. The criteria for including species in each group are described in more detail below. The RCIS addresses the conservation needs of the focal species, consistent with RCIS requirements. This RCIS includes 41 focal species as part of Group 1 (Table 1-3). All RCIS focal species are also a component of the LCP.

The remaining 100 species are part of Groups 2 and 3 and are referred to as the *conservation species* (Table 1-3). These conservation species are specific to the LCP and are not part of the RCIS.[4] The following subsections provide more details on each of these three groups and describe how the species were selected for each group.

[4] CDFW will be reviewing and approving this RCIS/LCP only for the focal species, not the conservation species.

1.5.5.1 Focal Species (Group 1 Species) Selection (RCIS and LCP)

This section is applicable to both the RCIS and the LCP, and is subject to CDFW review and approval.

Group 1 species include all species that are focal species for the RCIS. Only designated focal species in an RCIS can be considered for credits in an MCA. As previously stated, these species are also a component of the LCP.

There are 41 Group 1 (focal) species (Table 1-3). They include 31 species the Conservancy proposed for covering in the First Administrative Draft Yolo HCP/NCCP, 2 additional special-status bird and 8 additional special-status fish species. Species models and species accounts are available for all focal species (Appendix C). The plan includes conservation objectives for these species, either as groups of species with shared objectives, or, for some species, as individual objectives.

The focal species were evaluated based on the following criteria.

1. State and federal listing status or other special status.
2. Whether the species is listed in CDFW's State Wildlife Action Plan as a species of conservation need.
3. Climate vulnerability.
4. Occurrence in the strategy area.
5. Near term mitigation needs.
6. Width of the species range.
7. Whether the species is an indicator for ecosystem health.

Appendix D provides a table with the list of species considered, the results of the evaluation for each criterion, and the rationale for the final decision as to whether the RCIS/LCP should designate the species as a focal species.

1.5.5.2 Group 2 Conservation Species (LCP)

This section is applicable to the LCP only, and is not subject to CDFW review or approval.

Group 2 species are conservation species for the LCP only. There are 42 Group 2 species (Table 1-3). They include 38 species the Conservancy addressed as species of local concern in the First Administrative Draft Yolo HCP/NCCP, with the addition of 4 special-status bird species. These species are rare, declining, or potentially threatened by land use changes and are of concern to local organizations. While many of these species have special-status designations, they do not meet the criteria used to select as focal species in Group 1. Species accounts are provided for these species in Appendix C. Habitat models were not developed for Group 2 conservation species because of a lack of available data or resources.

The plan does not include conservation goals and objectives for Group 2 conservation species. Instead, the LCP provides conservation priorities that will support the viability of these species in the Yolo County landscape.

1.5.5.3 Group 3 Conservation Species (LCP)

This section is applicable to the LCP only, and is not subject to CDFW review or approval.

Group 3 species are conservation species for the LCP. There are 60 Group 3 species that the Advisory Committee, including local plant and wildlife experts, identified as rare or declining, and important to local conservation. Neither species accounts nor habitat models were prepared for these species because of a lack of available data. The plan does not include conservation goals and objectives for the Group 3 conservation species. Instead, the LCP prioritizes conservation that will support the viability of these species in the Yolo County landscape.

Table 1-3. Focal Species (RCIS) and Conservation Species (LCP)

	Common Name	Scientific Name	Status (Federal/State/CNPS)[a]
	FOCAL SPECIES FOR RCIS and LCP (GROUP 1 SPECIES)		
	Plants		
1	alkali milk-vetch	*Astragalus tener var. tener*	-/-/1B
2	brittlescale	*Atriplex depressa*	-/-/1B
3	San Joaquin spearscale	*Atriplex joaquiniana*	-/-/1B
4	Palmate-bracted bird's beak	*Chloropyron palmatum*	E/E/1B
5	Heckard's pepper-grass	*Lepidium latipes var. heckardii*	-/-/1B
6	Baker's navarretia	*Navarretia leucocephala ssp. bakeri*	-/-/1B
7	Colusa grass	*Neostapfia colusana*	T/E/1B
8	Solano grass	*Tuctoria mucronata*	E/E/1B
	Invertebrates		
9	Conservancy fairy shrimp	*Branchinecta conservatio*	E/-/-
10	vernal pool fairy shrimp	*Branchinecta lynchi*	T/-/-
11	midvalley fairy shrimp	*Branchinecta mesovallensis*	-/-/-
12	California linderiella	*Linderiella occidentalis*	-/-/-
13	Vernal pool tadpole shrimp	*Lepidurus packardi*	E/-/-
14	Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T/-/-
	Fish		
15	white sturgeon	*Acipenser transmontanus*	-/-/-
16	green sturgeon	*Acipenser medirostris*	T/CSC/-
17	delta smelt	*Hypomesus transpacificus*	T/E/-
18	Central Valley steelhead	*Oncorhynchus mykiss*	T/CSC/-
19	Sacramento River winter-run Chinook salmon	*Oncorhynchus tshawytscha*	E/T/-
20	Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	T/T/-
21	Central Valley fall- and late fall-run Chinook salmon	*Oncorhynchus tshawytscha*	-/CSC/-
22	Sacramento splittail	*Pogonichthys macrolepidotus*	-/CSC/-
	Amphibians		
23	California tiger salamander	*Ambystoma californiense*	T/T/-
24	western spadefoot	*Spea hammondii*	-/CSC/-

	Common Name	Scientific Name	Status (Federal/State/CNPS)[a]
	Reptiles		
25	northwestern pond turtle	*Actinemys marmorata*	-/CSC/-
26	giant garter snake	*Thamnophis gigas*	T/T/-
	Birds		
27	tricolored blackbird	*Agelaius tricolor*	-/T/-
28	grasshopper sparrow	*Ammodramus savannarum*	-/CSC/-
29	western burrowing owl	*Athene cunicularia hypugaea*	-/CSC/-
30	Swainson's hawk	*Buteo swaisonii*	-/T/-
31	greater sandhill crane	*Grus canadensis tabida*	-/T, FP/-
32	northern harrier	*Circus cyaneus*	-/CSC/-
33	black tern	*Chlidonias niger*	-/CSC/-
34	western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/E/-
35	white-tailed kite	*Elanus leucurus*	-/FP/-
36	California black rail	*Laterallus jamaicensis coturniculus*	-/T, FP/-
37	loggerhead shrike	*Lanius ludovicianus*	-/CSC/-
38	yellow-breasted chat	*Icteria virens*	-/CSC/-
39	bank swallow	*Riparia riparia*	-/T/-
40	least Bell's vireo	*Vireo bellii pusillus*	E/E/-
	Mammals		
41	Townsend's big-eared bat	*Corynorhinus townsendii*	-/CSC/-
	CONSERVATION SPECIES FOR LCP (GROUP 2 SPECIES)		
	Plants		
1	bent-flowered fiddleneck	*Amsinckia lunaris*	-/-/1B
2	Jepson's milk-vetch	*Astragalus rattanii var. jepsonianus*	-/-/1B
3	Ferris' milk-vetch	*Astragalus tener var. ferrisiae*	-/-/1B
4	heartscale	*Atriplex cordulata*	-/-/1B
5	vernal pool smallscale	*Atriplex persistens*	-/-/1B
6	round-leaved fillaree	*California macrophylla*	-/-/1B
7	Snow Mountain buckwheat	*Eriogonum nervulosum*	-/-/1B
8	adobe-lily	*Fritillaria pluriflora*	-/-/1B
9	Hall's harmonia	*Harmonia hallii*	-/-/1B
10	drymaria-like western flax	*Hesperolinon drymarioides*	-/-/1B
11	rose mallow	*Hibiscus lasiocarpus*	-/-/2.2
12	delta tule pea	*Lathyrus jepsonii var. jepsonii*	-/-/1B
13	Colusa layia	*Layia septentrionalis*	-/-/1B
14	Mason's lilaeopsis	*Lilaeopsis masonii*	-/-/R/1B
15	Bearded popcorn flower	*Plagiobothrys hystriculus*	-/-/1B
16	Morrison's jewelflower	*Streptanthus morrisonii ssp. Morrisonii*	-/-/1B

	Common Name	Scientific Name	Status (Federal/State/CNPS)[a]
17	saline clover	*Trifolium depauperatum var. hydrophilum*	-/-/1B
	Invertebrates		
18	molestan beetle	*Lytta molesta*	-/CSC/-
19	ancient ant	*Pyramica reliquia*	-/-/-
	Amphibians		
20	foothill yellow-legged frog	*Rana boylii*	-/T/-
	Birds		
21	golden eagle	*Aquila chrysaetos*	-/FP/-
22	Bell's sparrow	*Artemisiospiza belli*	-/-/-
23	short-eared owl	*Asio flammeus*	-/CSC/-
24	redhead	*Aythya americana*	-/CSC/-
25	oak titmouse	*Baeolophus inornatus*	-/-/-
26	western snowy plover	*Charadrius alexandrinus nivosus*	T/CSC/-
27	mountain plover	*Charadrius montanus*	PT/CSC/-
28	lesser nighthawk	*Chordeiles acutipennis*	-/-/-
29	Pacific-slope flycatcher	*Empidonax difficilis*	-/-/-
30	American peregrine falcon	*Falco peregrinus anatum*	D/E, FP/-
31	prairie falcon	*Falco mexicanus*	-/-/WL
32	long-billed curlew	*Numenius americanus*	-/-/WL
33	yellow-billed magpie	*Pica nuttalli*	-/-/-
34	purple martin	*Progne subis*	-/CSC/-
35	bald eagle	*Haliaeetus leucocephalus*	D/E, FP/-
36	yellow-headed blackbird	*Xanthocephalus xanthocephalus*	-/CSC/-
	Mammals		
37	pallid bat	*Antrozous pallidus*	-/CSC/-
38	ringtail	*Bassariscus astutus*	-/FP/-
39	western red bat	*Lasiurus blossevillii*	-/CSC/-
40	San Joaquin pocket mouse	*Perognathus inornatus inornatus*	-/-/-
41	American badger	*Taxidea taxus*	-/CSC/-
42	Sacramento Valley red fox	*Vulpes vulpes ssp. patwin*	-/-/-
	CONSERVATION SPECIES FOR LCP (GROUP 3 SPECIES)		
	Plants		
1	Purdy's onion	*Allium fimbriatum var. purdyi*	-/-/4.3
2	twig-like snapdragon	*Antirrhinum virga*	-/-/4.3
3	modest rockcress	*Arabis modesta*	-/-/4.3
4	serpentine milkweed	*Asclepias solanoana*	-/-/4.2
5	Brewer's milk-vetch	*Astragalus breweri*	-/-/4.2
6	Cleveland's milk-vetch	*Astragalus clevelandii*	-/-/4.3
7	lagoon sedge	*Carex lenticularis var. limnophila*	-/-/2.2

	Common Name	Scientific Name	Status (Federal/State/CNPS)[a]
8	Parry's rough tarplant	*Centromadia parryi ssp. rudis*	-/-/4.2
9	serpentine collomia	*Collomia diversifolia*	-/-/4.3
10	deep-scarred cryptantha	*Cryptantha excavata*	-/-/1B.3
11	dwarf downingia	*Downingia pusilla*	-/-/1B.2
12	Purdy's fritillary	*Fritillaria purdyi*	-/-/4.3
13	nodding harmonia	*Harmonia nutans*	-/-/4.3
14	hogwallow starfish	*Hesperevax caulescens*	-/-/4.2
15	Northern California black walnut	*Juglans hindsii*	-/-/1B.1
16	Ferris' goldfields	*Lasthenia ferrisiae*	-/-/4.2
17	Coulter's goldfields	*Lasthenia glabrata ssp. coulteri*	-/-/1B.1
18	Jepson's leptosiphon	*Leptosiphon jepsonii*	-/-/1B.2
19	woolly-headed lessingia	*Lessingia hololeuca*	-/-/3
20	Hoover's lomatium	*Lomatium hooveri*	-/-/4.3
21	Heller's bush-mallow	*Malacothamnus helleri*	-/-/4.3
22	sylvan microseris	*Microseris sylvatica*	-/-/4.2
23	little mousetail	*Myosurus minimus ssp. apus*	-/-/3.1
24	cotula navarretia	*Navarretia cotulifolia*	-/-/4.2
25	Jepson's navarretia	*Navarretia jepsonii*	-/-/4.3
26	Delta woolly-marbles	*Psilocarphus brevissimus var. multiflorus*	-/-/4.2
27	Keck's checkerbloom	*Sidalcea keckii*	E/-/1B.1
28	sticky sandspurry	*Spergularia macrotheca var. longistyla*	-/-/1B.2
29	green jewelflower	*Streptanthus hesperidis*	-/-/1B.2
30	Suisun Marsh aster	*Symphyotrichum lentum*	-/-/1B.2
	Fish		
31	Sacramento perch	*Archoplites interruptus*	-/CSC/-
32	Pacific lamprey	*Entosphenus tridentatus*	-/CSC/-
33	river lamprey	*Lampetra ayresii*	-/CSC/-
34	hardhead	*Mylopharodon conocephalus*	-/CSC/-
35	longfin smelt	*Spirinchus thaleichthys*	-/CSC/-
	Reptiles		
36	San Joaquin whipsnake	*Masticophis flagellum ruddocki*	-/-/-
	Birds		
37	lark sparrow	*Chondestes grammacus*	-/-/-
38	Snowy egret	*Egretta thula*	-/-/-
39	Cooper's hawk	*Accipiter cooperii*	-/CSC/-
40	long-eared owl	*Asio otus*	-/CSC/-
41	Least bittern	*Ixobrychus exilis*	-/CSC/-
42	Ferruginous hawk	*Buteo regalis*	-/WL/-

	Common Name	Scientific Name	Status (Federal/State/CNPS)[a]
43	merlin	*Falco columbarius*	-/WL/-
44	Lewis' woodpecker	*Melanerpes lewis*	-/-/-
45	osprey	*Pandion haliaetus*	-/WL/-
46	double-crested cormorant	*Phalacrocorax auritus*	-/-/-
47	White-faced ibis	*Plegadis chihi*	-/WL/-
48	yellow warbler	*Setophaga petechia*	-/CSC/-
49	Modesto song sparrow	*Melospiza melodia*	-/-/-
50	California thrasher	*Toxostoma redivivum*	-/-/-
	Mammals		
51	tule elk	*Cervus elaphus nannodes*	-/-/-
52	western red bat	*Lasiurus blossevillii*	-/CSC/-
53	river otter	*Lontra canadensis*	-/-/-
54	mink	*Mustela vison*	-/-/-
55	long-eared myotis	*Myotis evotis*	-/-/-
56	fringed myotis	*Myotis thysanodes*	-/-/-
57	long-legged myotis	*Myotis volans*	-/-/-
58	Yuma myotis	*Myotis yumanensis*	-/-/-
59	mountain lion	*Puma concolor*	-/-/-
60	American black bear	*Urusus americanus*	-/-/-

a. Status:
C = Candidate for listing under the FESA
E = Listed as endangered under the FESA or CESA
PT = Proposed as threatened under the FESA
T = Listed as threatened under the FESA or CESA
FP = Fully Protected under California Fish and Game Code
CSC = California Species of Special Concern
WL = CDFW Watch List
- = No designation
CESA = California Endangered Species Act
FESA = federal Endangered Species Act
1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3: Plants About Which More Information is Needed - A Review List
4: Plants of Limited Distribution - A Watch List

1.5.6 Planning Species (LCP)

This section is applicable to the LCP only and is not subject to CDFW review or approval.

The LCP (not the RCIS) also includes four *planning species,* which are species that are not necessarily rare or threatened but that may help inform the conservation actions and priorities in ways the focal species may be unable to do. The four planning species are American badger, black-tailed deer (*Odocoileus hemionus columbianus*), tule elk, and California ground squirrel (*Otospermophilus beecheyi*). These planning species may include *area-dependent species, umbrella species*, *indicator species*, or *keystone species*.

- **Area-dependent species.** Species that require large, contiguous blocks of habitat and may, therefore, inform the placement of protected areas on the landscape.

- **Umbrella species.** Species whose conservation would indirectly conserve multiple other species that are dependent on the same ecological conditions.
- **Indicator species.** Species whose abundance in a given area is believed to indicate certain environmental or ecological conditions or suitable conditions for a group of other species. Indicator species may include species that are particularly sensitive to climate change.
- **Keystone species.** Species whose impacts on the community or ecosystem are much larger than would be expected based on the species' abundance.

Following is the rationale for including each of the four planning species in the LCP.

- **American badger.** This species requires large blocks of California prairie and is, therefore, an area-dependent species. Conservation of American badger would indirectly conserve the diversity of other native California prairie species and, therefore, it can also be considered an umbrella species. The American badger is a California species of special concern; therefore, it is both a conservation species (Group 2) and a planning species under the LCP.
- **Black-tailed deer.** This species requires large blocks of land and large-scale landscape connectivity to accommodate migration; therefore, black-tailed deer is considered an area-dependent species.
- **Tule elk.** Although tule elk and black-tailed deer habitat needs overlap somewhat, their preferred feeding styles cause them to differ significantly. Elk are primarily grazers preferring prairie habitat in valleys and foothills lacking woody vegetation except along streams, while black-tailed deer are mainly browsers and prefer woody habitats like oak woodland and chaparral. When California prairies were dominated by wildflowers before their massive invasion by nonnative grasses, tule elk occupied a niche much like domestic cattle do today. The tule elk is a California species of special concern; therefore, it is both a conservation species (Group 3) and a planning species under the LCP.
- **California ground squirrel.** The California ground squirrel is a keystone species in the California prairie natural community. This species is prey for numerous raptor species and provides burrows for native wildlife, such as western burrowing owls and northern Pacific rattlesnakes. Additionally, ground squirrels till and churn the soil, enhancing the soil's ability to support a greater vegetative diversity. In turn, nitrogen-rich mixtures of grasses and forbs support grazers and browsers that use these food resources (Peterson et al. 2005).

1.5.7 Other Conservation Elements

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

Consistent with CFGC §1852(c)(4), this section explains the process of identifying important conservation elements to be addressed in the RCIS/LCP.

A conservation element is defined by CDFW as an element that is identified and analyzed in an RCIS that will benefit from conservation actions and habitat enhancement actions set forth in the RCIS (CDFW 2018). Conservation biologists on the Advisory Committee identified important conservation elements for the strategy area during LCP development, and these conservation elements were later folded into the Yolo RCIS/LCP in coordination with the Steering Committee. The conservation elements identified are important to long-term conservation and resilience of Yolo County ecosystems. Each conservation element, and rationale for inclusion in the Yolo RCIS/LCP, is described below. Section 2.9, *Other Conservation Elements,* provides a summary about existing conditions for each of the conservation elements. These conservation elements are integrated throughout Chapter 3, *Conservation Strategy.* Appendix E, Table E-18 summarizes how the conservation strategy addresses each of these conservation elements.

1.5.7.1 Natural Communities and Habitat

The Yolo RCIS/LCP includes natural and seminatural communities, such as riparian and vernal pool complex and fresh emergent wetland, as described in Section 1.4.4, *Natural and Seminatural Communities*.

Natural communities provide important habitats for focal species and native biodiversity. Important natural communities include those that provide primary habitat for focal species and include grassland, riverine and riparian, and wetland. This RCIS/LCP includes natural communities as conservation elements as a means to protect and manage natural habitats, and restore natural communities and processes that maintain them to benefit focal species and native biodiversity.

1.5.7.2 Biodiversity

Biodiversity was identified as an important conservation element for the Yolo RCIS/LCP because it is widely recognized as a critical component for resilience and conservation of California ecosystems. California supports the greatest biodiversity and is also the most populous state in the nation. As such, one of the key components to CDFW's vision identified in the 2015 State Wildlife Action Plan is to sustain the quality of California's natural resources and biodiversity in harmony with predicted economic growth and human population increases (CDFW 2015). The Governor's 2015 Environmental Goals and Policy Report (EGPR) called for the state to take steps to preserve biodiversity and ensure resilience of natural systems to recover from disruption (Governor's Office of Planning and Research [OPR] 2015).

1.5.7.3 Environmental Gradients

Environmental gradients were identified as an important conservation element for the Yolo RCIS/LCP because a variety of environmental gradients may allow shifting species distributions in response to potential future environmental changes, such as climate change, and can facilitate species' responses to transformative events such as high-severity fire or extreme environmental fluctuations such as flood or drought (Theobald et al. 2015; Nunez et al. 2013; Spencer et al. 2006). Changes in temperature range and precipitation patterns resulting from climate change may cause some areas of currently suitable habitat to become unsuitable for some species, while other areas of currently unsuitable habitat may become suitable. Climate change is expected to affect many habitats and species such that temporal dynamics and spatial distributions change in unpredictable ways. Faced with large, uncertain, and dynamic responses, it is important that a broad range of habitat characteristics is available (i.e., elevation, water depth, slope, aspect) within an

interconnected reserve system (Nunez et al. 2013; Brost and Beier 2012). This is intended to ensure that, while some current habitat may be lost or altered as a result of climate change, sufficient suitable habitat will be available in response to climate change to sustain focal and other native species; in addition, a broad range of habitat elements (facets) within landscape linkages is associated with increased functional connectivity for a variety of species (Crooks and Sanjayan 2006).

1.5.7.4 Existing Protected Areas

Existing protected areas was identified as an important conservation element for the Yolo RCIS/LCP because this is an element listed in CFGC §1852(c)(4), and a strategy-area wide reserve system will build off of existing protected areas to maximize reserve size and connectivity. Furthermore, the conservation strategy may involve management or enhancement of existing protected areas.

1.5.7.5 Habitat Connectivity

Habitat connectivity was identified as an conservation element for the Yolo RCIS/LCP because movement is essential for wildlife to find mates, seasonal habitat, shelter, and food; to disperse to new habitats; and to track shifting habitats or find new habitat in a changing climate (Section 2.9.5, *Habitat Connectivity and Linkages*).

1.5.7.6 Important Ecological Processes

The Advisory Committee and Steering Committee identified several ecological processes that are important conservation elements for the Yolo RCIS/LCP, as described below.

Hydrologic and Geomorphic Processes

Important geomorphic processes in riparian areas provide disturbances that create opportunities for early successional riparian species to establish from seed, and influence habitat conditions for fish and other aquatic and riparian species. Natural, eroding banks often have cavities, depressions, and vertical faces that support bank-dwelling species such as bank swallow, northern rough-winged swallow, belted kingfisher, mink, and river otter, and that provide cover and shelter for fish. Erosion of natural bank substrates provides instream spawning substrate for aquatic species, including salmonids. Natural fluvial processes also result in diverse substrate sizes and irregular banks that provide habitat complexity for fish and wildlife, and can support a high diversity and abundance of invertebrate and fish species.

The CVFPP Conservation Strategy also describes how a diversity of flows, suitable sources of sediment, and a sufficiently broad river corridor to allow stream meandering are necessary to sustain riverine habitats and the wildlife species that depend on them.

Fire

The ability to maintain, reestablish, or mimic natural disturbance is important to maintaining biological diversity and habitat conditions for many native species.

Stream processes and conditions

Conservation of stream processes is related to maintaining subsurface flow and groundwater that are hydrologically part of the streamflow in each watershed (Winter et al 1998). Appropriate streamflows should be encouraged to maintain aquatic life in Yolo County streams. Maintenance or reestablishment of streamflow dynamics that resemble the natural runoff patterns that sustain instream and riparian/floodplain ecosystems in Yolo County, including flow dynamics, will help support the reproduction of desired native riparian plant species. This will also encourage habitat conditions that favor native fish species.

1.5.8 Conservation Priorities

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The Yolo RCIS/LCP uses recovery plans and other conservation strategies (e.g., CVFPP Conservation Strategy [California Department of Water Resources 2016]) to identify conservation priorities. All of the following conservation factors were considered in combination when assessing the conservation value of a location.

- Locations of working lands and natural communities and land cover types using this RCIS' land cover dataset (Chapter 2, Section 2.3, *Land Cover Mapping*), to identify where in the RCIS/LCP area these conservation elements occur, and to focus conservation priorities on conservation planning units (Section 3.2.2, *Geographic Units of Conservation*) that support these conservation elements.
- Documented and recent species occurrences (Appendix C, *Species Accounts*), as this RCIS prioritizes the protection of habitat occupied by focal species.
- Designated critical habitat (for focal species and non-focal species that have designated critical habitat in the RCIS/LCP area) (Appendix C, *Species Accounts*), to inform where priority actions should be implemented.
- Recovery plans and recovery areas for federally listed species (Appendix C, *Species Accounts*), to identify priority actions and where they should be implemented.
- Locations of Essential Connectivity Areas (Chapter 2, Section 2.9.4, *Habitat Connectivity and Linkages*) to identify where priority actions should be implemented to improve landscape connectivity in the RCIS/LCP area and to habitats adjacent to the RCIS/LCP area.
- Adjacency to protected areas (Chapter 2, Section 2.4, *Protected Areas*), to expand and connect protected areas.
- Locations that would or are expected to promote climate resilience (Section 3.4.2, *RCIS Conservation Prioritization Guidelines*), to facilitate adaptations by native biodiversity to a changing climate.

The actions and priorities in this RCIS for landscapes, working lands and natural communities, and focal species were identified based on their importance for alleviating pressures and stressors and contributing to the conservation and recovery of the focal species and their habitats within the RCIS/LCP area.

1.6 Organization of this Document

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

This section provides a brief overview of the contents of the chapters and appendices of this RCIS/LCP.

The plan consists of four chapters.

- Chapter 1, *Introduction*, sets the context for the development of the RCIS/LCP, including the purpose and scope; describes the process that guided the development of the conservation strategy; and provides an overview of the RCIS/LCP document contents and organization.
- Chapter 2, *Environmental Setting and Regional Planning Environment*, describes the existing environmental conditions, built environment, and relevant plans and programs within the strategy area, providing the context for the proposed conservation actions.
- Chapter 3, *Conservation Strategy*, describes the conservation goals and objectives, priority conservation actions for each focal species and natural community, and the adaptive management and monitoring framework of the strategy.
- Chapter 4, *Implementation*, addresses RCIS/LCP implementation tasks and regulatory uses.

The document also includes the following seven appendices.

- Appendix A, *Letter to CDFW from the State Agency Proponent*
- Appendix B, *Public Outreach*
- Appendix C, *Species Accounts*
- Appendix D, *Focal Species Evaluation,* provides a table indicating the criteria by which focal species were chosen for the RCIS.
- Appendix E, *Conservation Strategy Rationale*, includes rationale for the conservation goals and objectives and a description of how the conservation strategy addresses climate change for focal species.
- Appendix F, *Consistency with Other Plans*, describes consistency with the Yolo HCP/NCCP, species recovery plans, and other conservation plans relevant to Yolo County.
- Appendix G, *Invasive Plant Management Plan*
- Appendix H, *Natural Communities with Vegetation Type Detail,* provides maps showing the detailed vegetation types included in each RCIS/LCP natural community.

Chapter 2
Environmental Setting and Regional Planning Environment

With the exception of Conservation Species listed in Section 2.8, this chapter is applicable to both the RCIS and the LCP, and is subject to CDFW review and approval.

2.1 Introduction

Sections 2.2, *Physical Characteristics*, through 2.11, *Stressors and Pressures on Conservation Elements*, of this chapter describe the physical and biological conditions in the strategy area, including conditions related to the agricultural landscape, local ecological communities and focal/conservation species. Section 2.2 describes the characteristics of the climate, hydrology, topography, geology, and soils of the strategy area. Section 2.3, *Land Cover Mapping*, describes the methods, data sources, and classification system for mapping natural communities and habitats for focal/conservation species. Section 2.4, *Protected Areas,* describes the publicly owned lands and lands protected under conservation easements in the strategy area. Section 2.5, *Ecoregions,* describes ecoregions found in the strategy area in two ways, as defined by the U.S. Department of Agriculture (USDA) and the U.S. Geological Survey (USGS). Section 2.6, *Natural and Seminatural Communities and Associated Plant and Wildlife Species*, describes the composition and extent of natural communities in the strategy area. Section 2.7, *Other Land Cover Types*, describes the composition and extent of other land covers in the strategy area that may or may not provide habitat for focal/conservation species. Section 2.8, *Focal and Conservation Species*, is supported by Appendix C, *Species Accounts*, which provides summaries of the status and attributes of the Group 1 focal species and Group 2 conservation species.

Section 2.12, *Regional Conservation Planning Environment*, summarizes other plans (existing or in preparation) related to conservation or development within the strategy area. Section 2.13, *Development and Major Infrastructure*, describes reasonably foreseeable infrastructure development in the strategy area.

2.2 Physical Characteristics

Climate, topography, hydrology, geology, and soils determine the conditions that support plant and wildlife species and the potential for protection, restoration, and enhancement of habitat for focal species. The following data sources were used to describe the physical environment of the strategy area.

- Soil Survey of Yolo County, California (Natural Resources Conservation Service 2007)
- PRISM climate data (PRISM Climate Group 2004)
- State Soil Geographic (STATSGO) database for California (U.S. Department of Agriculture Soil Conservation Service 1994)

- National Hydrographic Dataset (U.S. Geological Survey 2011)
- Other relevant technical reports and literature

2.2.1 Climate

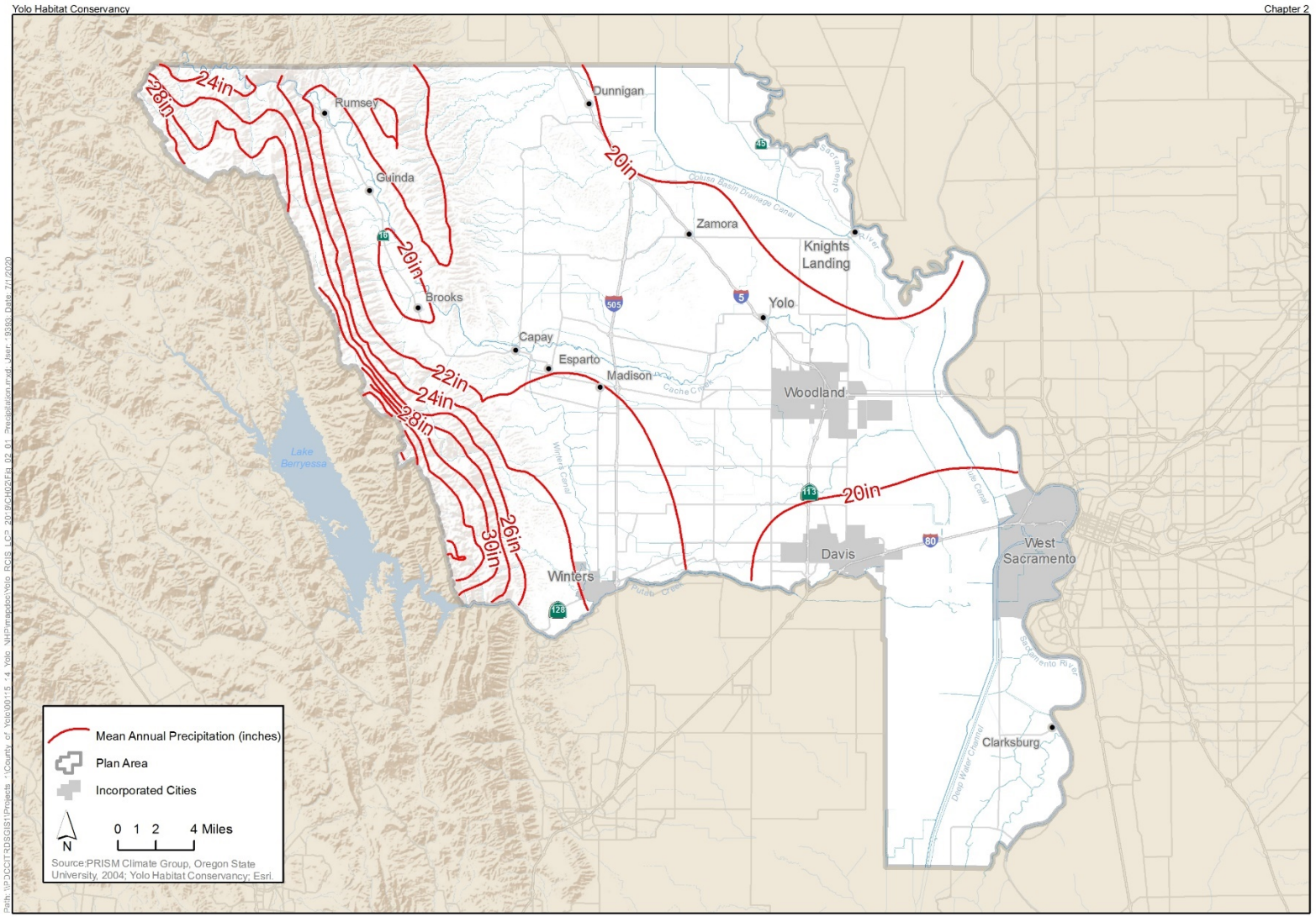
The strategy area has a Mediterranean-type climate, with cool, wet winters and warm, dry summers. Cyclical climatic events can cause large annual fluctuations in precipitation levels (Minnich 2007; Reever-Morghan et al. 2007). Precipitation primarily occurs in the form of rain from October through April, with very little precipitation during the summers. Figure 2-1 shows average annual distribution of precipitation for the strategy area.

Average annual precipitation is lowest in the areas near the Sacramento River (18 inches annually) and greatest in the Little Blue Ridge and Blue Ridge mountains (21 to 30 inches annually) (Rantz 1969). These mountains are in the inner Coast Range, which elsewhere in California is in a rain shadow and consequently has quite low rainfall. The inner Coast Range in Yolo County, however, is exposed to storms moving through a gap in the Coast Range provided by the San Francisco Bay estuary. Consequently, the inner Coast Range in Yolo County has ecological conditions resembling those found in the outer Coast Range. Average daily temperatures in the strategy area range from a high and low of 59 degrees Fahrenheit (°F) and 35°F in January to a high and low of 96°F and 59°F in July.

2.2.2 Topography

The strategy area lies within the California's Great Central Valley and Coast Ranges geomorphic provinces (Norris and Webb 1990) and its topography is characterized by valley, foothill, and mountain range components. The Little Blue Ridge and Blue Ridge occupy the west side of the strategy area, with the highest elevations in the county (approximately 3,100 feet above mean sea level) in the northwestern corner. The eastern side of the strategy area is located on the valley floor, with elevation typically less than 100 feet above mean sea level. The Capay Hills, a parallel satellite range of the Coast Range, lie east of the northern half of the Blue Ridge and are separated from it by the Capay Valley. The Capay Hills connect with the Blue Ridge at the Capay Valley's closed northern end. East of the Capay Hills a much lower and more subdued Coast Range satellite, the Dunnigan Hills/Plainfield Ridge, connects to the Capay Hills at its northern end.

The uplifting of the Coast Ranges by tectonic processes created north-northwest trending faults such as those underlying the eastern edge of Capay Valley, and folds such as the Dunnigan Hills/Plainfield Ridge anticline that runs from the Capay Hills to Putah Creek and extend superficially into Solano County. Tectonic processes also created the companion Madison syncline, forming the Hungry Hollow Basin between the Capay Hills and the Dunnigan Hills north of Cache Creek and the Cache/Putah Basin at the base of the Blue Ridge between Cache and Putah Creeks (State of California 1987; Jones & Stokes 1996; Graymer et al. 2002; Luhdorff & Scalmanini 2004; WRIME 2006). The low-lying areas of the strategy area consist of a broad, flat alluvial plain on the Central Valley floor that slopes downward from the Coast Range east to the Colusa and Yolo Basins, which parallel the Sacramento River (WRIME 2006). This alluvial plain consists of two elements: a bajada formed by sediments derived from the Cache Creek and Putah Creek basins (the area from the foothills to approximately Davis and Woodland); and the Colusa and American basins, which are associated with Sacramento River fluvial geomorphology (east of Woodland and Davis) (Kelley 1985; Mount 1995). The elevations in the southern end of the Yolo Basin are slightly below sea level.



Yolo RCIS/LCP

Figure 2-1
Mean Annual Precipitation

2.2.3 Watersheds

The strategy area is within the Sacramento River hydrologic region and includes four subbasins (HUC-8) with one or more watersheds (HUC-10). Table 2-1 includes the full acreage of each subbasin and watershed, as well as the acres of each in the strategy area. Subbasins and watersheds that overlap small portions of the strategy area (i.e., approximately 1,000 acres or less) were not counted as occurring in the strategy area.

Table 2-1. Subbasins (HUC-8) and Watersheds (HUC-10) in the Yolo County Strategy Area

Name	Entire Area (acres)	Area (acres) and Percent in Strategy Area
Sacramento-Stone Corral Subbasin (HUC 18020104)	**1,205,675**	**159,787 (24.4%)**
Colusa Basin Drainage Canal(1802010410)	155,100	125,505 (21.9%)
Colusa Trough (1802010408)	254,164	2,525 (0.4%)
Sacramento River (1802010412)	61,446	1,630 (0.3%)
Sycamore Slough (1802010409)	86,333	30,137 (5.2%)
Upper Cache Subbasin (HUC 18020116)	**745,517**	**158,750 (24.3%)**
Upper Cache Creek (1802011606)	79,148	14,150 (2.5%)
Lower Cache Creek (1802011607)	145,244	144,600 (25.2%)
Upper Putah Subbasin (HUC 18020162)	**418,663**	**29,552 (4.5%)**
Lower Putah Creek (1802016205)	55,539	29,473 (5.1%)
Lower Sacramento Subbasin (HUC 18020163)	**786,245**	**304,382 (46.6%)**
Cache Slough (1802016306)	268,589	86,253 (15%)
Knights Landing Ridge Cut-Tule Canal (1802016303)	106,927	106,927 (18.6%)
Sherman Lake-Sacramento River (1802016307)	125,619	1,468 (0.3%)
South Fork Willow Slough (1802016301)	30,091	30,086 (5.2%)
Willow Slough (1802016302)	79,651	1,467 (0.3%)
Subbasin Total	**3,156,100**	**652,471**
Watershed Total	**1,447,851**	**574,221**

2.2.4 Hydrology

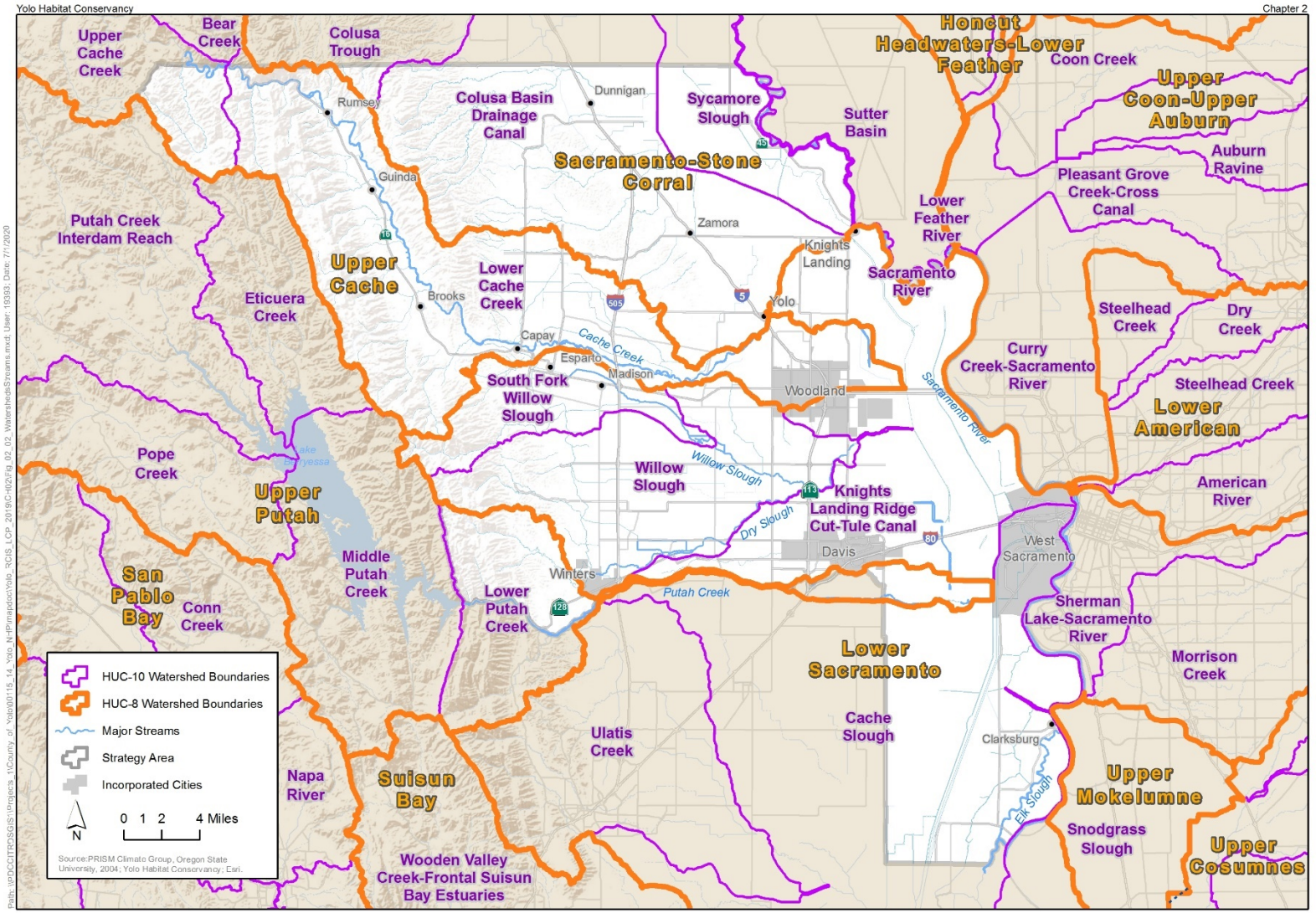
The surface hydrologic features in the strategy area are dominated by the Sacramento River and Cache and Putah Creeks (Figure 2-2), which originate upstream of Yolo County (WRIME 2006). Both Cache Creek and Putah Creek are antecedent streams that are older than the Coast Range and have maintained a relatively constant elevation as the Coast Range was tectonically uplifted during the last several million years. Consequently, both streams have eroded deep canyons through Blue Ridge. Other surface waters, originating from local precipitation, springs, and irrigation tailwater, contribute to the numerous smaller creeks that drain the Blue Ridge, Capay Hills, Dunnigan Hills/Plainfield Ridge, and the Central Valley floor. Irrigation water is distributed through a network of natural and modified sloughs and constructed drainages that ultimately drain to the Colusa and Yolo Basins, which run along the west bank of the Sacramento River. Figure 2-2 shows the watersheds in the strategy area. Cache Creek flows are regulated in Lake County by the Cache Creek

Dam at the outlet of Clear Lake and the Indian Valley Dam on the North Fork of Cache Creek, and in Yolo County by the Capay Diversion Dam. Flows in Putah Creek are regulated by the Monticello Dam, situated at the Blue Ridge, at the western edge of Yolo County, and by the Putah Diversion Dam, located west of the city of Winters (WRIME 2006). The flows in the Sacramento River and in the adjacent Colusa and Yolo Basins are controlled by the State Water Project (SWP) and Central Valley Project (CVP), and are contained by levees constructed by the Sacramento River Flood Control Project. As part of the Sacramento River Flood Control Project, high flows that pass over Fremont and Sacramento Weirs are diverted through the Yolo Bypass in the Yolo Basin. The four main drainages in the strategy area are described in the following subsections.

2.2.4.1 Sacramento River, Colusa Basin, and Yolo Basin

The Sacramento River forms the eastern edge of the strategy area. Prior to 1850, the Sacramento River periodically overflowed its natural levees, filling the adjacent lowland Colusa and Yolo Basins (Kelley 1985; Mount 1995). These two major lowlands were separated by a large deposit of alluvium known as the Knights Landing Ridge. Overflows in both basins eventually drained back into the Sacramento River at the southern end of the strategy area. Gold mining in the Sierra Nevada significantly altered the hydrologic function of the Sacramento River during the hydraulic mining period (1850–1884), producing large amounts of sediment that choked the channels of the Sacramento River. This sediment influx raised portions of the riverbed that run along the Yolo County boundary, and the sediments were flushed into the Yolo and Colusa Basins during flood events. The sediments were gradually purged from the lower sections of the Sacramento River in the early 1900s, by the time the Sacramento River Flood Control Project began (Kelley 1985). The lower Sacramento River is now largely sediment-starved as a result of sediment retention behind dams and the leveeing of the historical Sacramento River floodplain.

The Yolo Bypass was constructed in the 1930s as part of the Sacramento River Flood Control Project to shunt floodwaters out of the Sacramento River to reduce the potential for large-scale flooding in urban areas. Under normal conditions, water flows from the Colusa Basin into the Yolo Basin through a cut in the Knights Landing Ridge, known as the Knights Landing Ridge Cut Canal. During flood conditions, flows from the Sacramento River enter the 57,000-acre Yolo Bypass over the fixed Fremont Weir at its northern end. Flood flows also enter the Yolo Bypass through the gated Sacramento Weir, which is just upstream of the confluence with the American River. The Yolo Bypass can convey up to 80 percent of the system's floodwaters, which drain back into the Sacramento River a few miles upstream of Rio Vista in Solano County. During summer, the Toe Drain/Tule Canal on the east side of the Yolo Bypass carries perennial flows southward (Schemel et al. 2002). Numerous tidal sloughs dominate the southern end of the Yolo Basin. The Sacramento Deep Water Ship Channel, a navigation canal, was constructed in the early 1960s adjacent to the east side of the lower Yolo Basin to provide access for larger ships to the Port of Sacramento (now the Port of West Sacramento) in West Sacramento.



Yolo RCIS/LCP

Figure 2-2
Watersheds and Major Streams

2.2.4.2 Cache Creek

Cache Creek enters northwestern Yolo County through deep gorges in the Coast Range and then flows southeastward down the narrow Capay Valley. Near that valley's southern end it flows through the Capay Hills in another deep gorge and then eastward across the Central Valley floor to the Yolo Bypass. Flows are diverted at the Capay Diversion Dam, just west of Capay, to the Winters and West Adams irrigation canals. The reach below this dam, known as Lower Cache Creek, historically flowed between raised natural levees, and overflows would drain away from the creek into the Hungry Hollow and Cache/Putah Basin. Lower Cache Creek between the Capay Hills and Dunnigan Hills/Plainfield Ridge is characterized as a *losing reach* because it loses a substantial amount of its flow to groundwater recharge where it flows across coarse sediments deposited in the Madison syncline basin (WRIME 2006). Since this reach loses so much water, it does not support extensive stands of woody vegetation, but some areas support shrubby vegetation such as sandbar willow, typical of riparian scrub (Holstein 2013). The section of Lower Cache Creek that crosses the Dunnigan Hills/Plainfield Ridge anticline, however, is a *gaining reach*, where flows increase through groundwater contribution from springs in the creek bed. Cache Creek terminates at the Cache Creek Settling Basin, an artificial basin constructed to trap sediment that otherwise would flow into the Yolo Bypass. The Cache Creek Settling Basin is separated from the Yolo Bypass by an outlet weir that overtops at high flows, sending Cache Creek waters through the Yolo Bypass to the Sacramento–San Joaquin Delta (Delta). The gaining reach is lined with mature riparian vegetation, and the settling basin contains an extensive area of developing riparian forest.

The Central Valley Regional Water Quality Control Board (RWQCB) has determined that Cache Creek is impaired because fish tissue and water from these waterbodies contain elevated levels of mercury. The Central Valley RWQCB developed a total maximum daily load (TMDL) water quality management plan to lower mercury levels in the Cache Creek watershed and downstream in the Delta. The TMDL encompasses the 81-mile reach of Cache Creek between Clear Lake Dam and the outflow of Cache Creek Settling Basin.

2.2.4.3 Putah Creek

Putah Creek runs along the southern boundary of Yolo County (Figure 2-2). It enters Yolo County at the base of Monticello Dam and runs eastward through a canyon that widens downstream to the Putah Diversion Dam, which supplies the Putah South Canal. Below the dam, Putah Creek flows across its alluvial fan, creating a groundwater basin. Lower Putah Creek historically flowed between raised natural levees, and overflows would drain away from the creek northward into the Cache/Putah Basin and southward through minor channels into Solano County.

The lower section of Putah Creek is a losing reach until it crosses the Dunnigan Hills/Plainfield Ridge anticline, where it briefly becomes a gaining reach (Thomasson et al. 1960; California Department of Water Resources 1955). The creek continues eastward until it reaches Davis and eventually drains into the Yolo Basin. Beginning in 1870, a series of flood-control projects deepened a minor fork of Putah Creek that ran south of Davis. A levee system was constructed across the North Fork of Putah Creek that directed most flows into the South Fork and dewatered the North Fork downstream of the levees (Anonymous 1870). Putah Creek terminates at the Putah Sinks within the Yolo Bypass. Drainage modifications and agricultural conversion in the sinks beginning in the late 19th century have completely modified the Putah Sinks from historical conditions (Vaught 2006).

2.2.4.4 Willow Slough

Willow Slough drains a 164-square-mile watershed between Cache Creek and Putah Creek (Water Resources Association of Yolo County 2005). The Willow Slough watershed, which includes numerous small drainages that flow into Willow Slough, is divided into five major landform units: the eastern slope of the Inner Coast Range, the low hills at the foot of the range, the alluvial plains of the Madison syncline, a band of undulating hills known as the Plainfield Ridge, and the low-lying basin east of the ridge. Historically, after floodwaters receded each year, several large alkaline playa-type pools would remain on the edges of alluvial deposits in the plains around Willow Slough.

In the late 19th century, Willow Slough was generally perennial. Decreases in base flow may have resulted from cattle grazing in the foothills, which tends to increase direct runoff and decrease infiltration and base flow, and groundwater pumping, which tends to lower groundwater levels and shorten or eliminate reaches where groundwater seeps into slough channels. Downcutting of the nearby Cache Creek channel at Dunnigan Hills/Plainfield Ridge also likely captured groundwater formerly feeding springs that kept Willow Slough perennial.

In the 1960s, the U.S. Army Corps of Engineers (USACE) constructed the Willow Slough Bypass approximately 0.25 mile east of State Route (SR) 113 north of Davis. The bypass diverts all flood flows in downstream Willow Slough to a lower elevation of the Yolo Bypass. Creation of the bypass increased the draining velocity of flood flows through improved gravity flow (Water Resources Association of Yolo County 2005).

Willow Slough has been ditched and modified from its natural conditions into a dense rectilinear network that supplies irrigation water and drains floodwaters (Jones & Stokes 1996). In some localized areas these ditches are lined with narrow bands of riparian vegetation, while in other areas they abut cultivated agricultural fields and their banks are maintained as bare soil. Portions of Willow Slough, however, still retain their natural sinuosity and are lined with dense riparian forests (Holstein 2013). The original remnant of Willow Slough continues northeast and enters the Yolo Bypass at Conaway Ranch (Water Resources Association of Yolo County 2005).

2.2.5 Soils and Geology

The Coast Range in Yolo County is mostly underlain by the Great Valley sequence of marine sediments deposited between 190 and 70 million years ago on a shallow sea floor when the Pacific Ocean's coast was located in various places between what is now western Nevada and what are now the Sierra Nevada foothills. An exception occurs at Little Blue Ridge in the county's northwestern corner. A serpentine deposit in this location, squeezed upward by tectonic forces from deep in the earth's mantle, occurs in association with a small amount of Franciscan Formation, a mélange of sea floor sediments. These sea floor sediments were scraped off an oceanic plate being tectonically subducted into a marine trench at about the same time the Great Valley sequence was forming. Uplift occurring later along faults and resultant accrual of sediments caused Great Valley sequence deposition to end, and the ocean to withdraw from what are now the Coast Range and Central Valley. About 1 million years ago, the Coast Range achieved its present elevation in an uplift that turned beds of the Great Valley sequence sediments on their edge. Putah and Cache Creeks are older than this uplift, however, and they were able to maintain their location and elevation by eroding deep canyons in the Coast Range and Capay Hills as they uplifted.

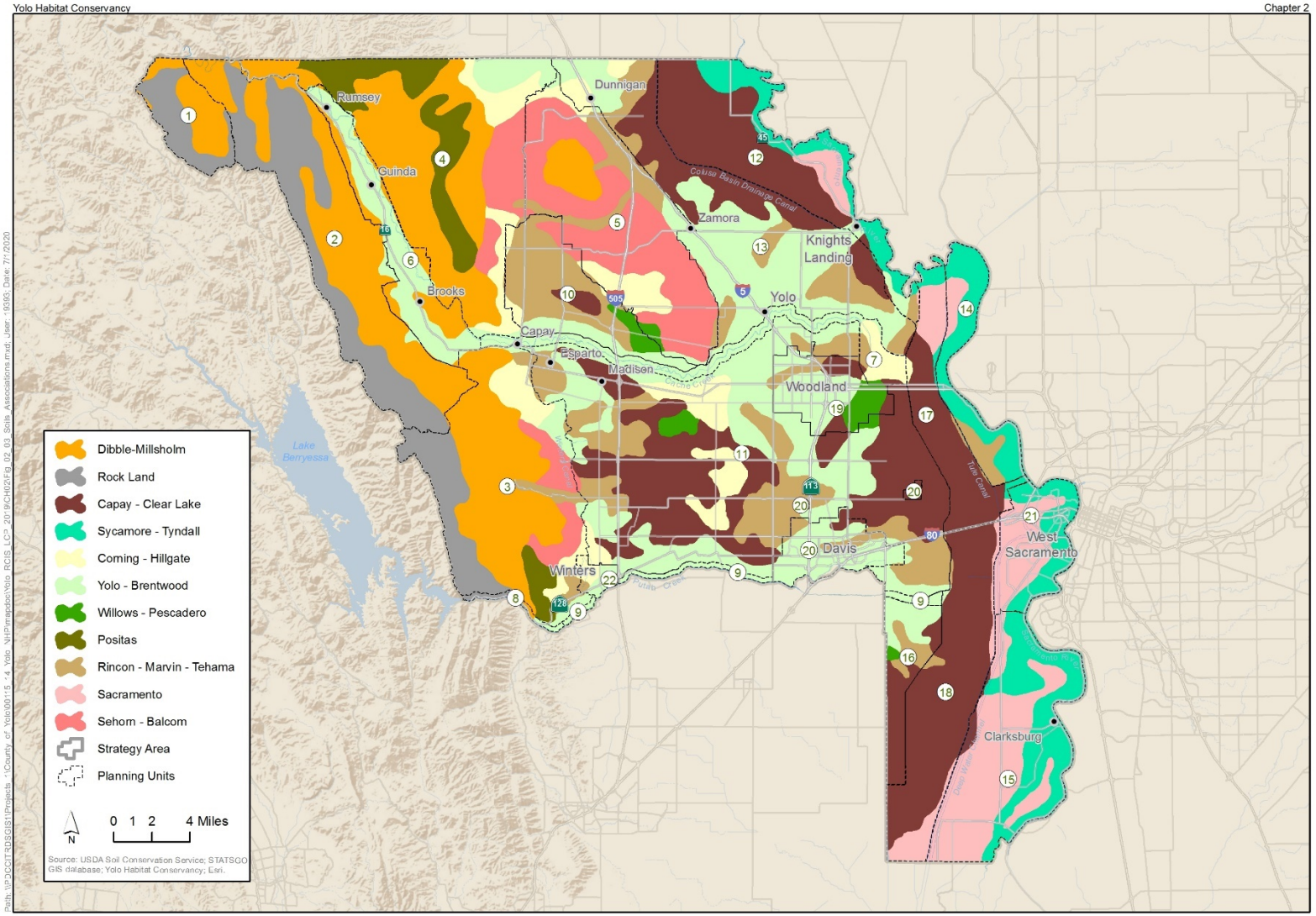
Meanwhile as the Coast Range was uplifting, what is now the Central Valley was continually subsiding into a vast basin where sediments deposited after eroding from surrounding mountains. Consequently, early marine sediments and even vast volcanic plains were buried beneath thousands of feet of nonmarine sediments that are youngest at the surface and become progressively older at depth. The volcanic plain outcrops as Lovejoy basalt along the base of the Coast Range. The Capay Hills have a Great Valley sequence core but are largely mantled by more recent uplifted nonmarine sediments, while the anticlinal Dunnigan Hills/Plainfield Ridge consists entirely of uplifted and eroded nonmarine sediments similar to those on the Central Valley floor. The majority of these nonmarine sediments were laid down as the 2- to 5-million-year-old Tehama formation.

Soils form when parent material (Figure 2-3), either bedrock or alluvium, is altered by physical and chemical processes. In Yolo County's Coast Range, soils closely mirror underlying bedrock of the Great Valley sequence and serpentine, while much more recent nonmarine sediments like the Tehama and Red Bluff formations mantle the base of Blue Ridge, most of the Capay Hills, and all of the Dunnigan Hills/Plainfield Ridge. In lowlands of the Central Valley floor, a diversity of soil types reflects ongoing exposure to the forces of stream flow, persistent drainage overflows, deposition of salts, and uneven rates of particle settling. In many cases, vegetation patterns are closely associated with particular soil types.

Soil associations of the strategy area are shown on Figure 2-4. A soil association is a landscape-level classification system based on the distinctive spatial distributions of combinations of soil series. Soils in each series have similar physical and chemical characteristics. As a result of their broad geographical extent, soil associations represent a relatively persistent historical record of landscape-level physical and chemical processes. In Yolo County, those processes have resulted in 12 soil associations, organized into an uplands group, a lowland alluvial fan group, and a lowland Colusa/Yolo Basin group, as described in the following subsections.

2.2.5.1 Uplands Soils Group

The uplands soils group consists of five soil associations: Rock Land, Dibble-Millsholm, Positas, Sehorn-Balcom, and Corning-Hillgate (Figure 2-4). The Rock Land association is located on sandstone of Franciscan complex and Great Valley sequence materials along the highest ridges of the Little Blue Ridge and Blue Ridge (Andrews 1970). Rockland can also be located on serpentine ultramafic parent material (Figure 2-4) is the source of soils that cause the unique natural communities and endemic plants in the western corner of the strategy area. Typically, 50 to 90 percent of the land surface of Rock Land is exposed sandstone, shale, or serpentinized bedrock. The remainder of the land surface is covered by a thin layer of sandy loam (Andrews 1970). The most typical vegetation on Rock Land is chaparral. Immediately below the Rock Land association on Blue Ridge and along the flanks of the Capay Hills is the Dibble-Millsholm association, which formed from Great Valley sequence materials (Andrews 1970). Exposed bedrock covers less than 10 percent of the surface of the Dibble-Millsholm association, which consequently has more soil development. The most typical vegetation of this association is woodland dominated by blue oaks, interior live oaks, and foothill pine. Although it lacks similar parent material, an outlier of this association has been mapped on the highest areas of the northern Dunnigan Hills.



Yolo RCIS/LCP

Figure 2-3
Soil Associations

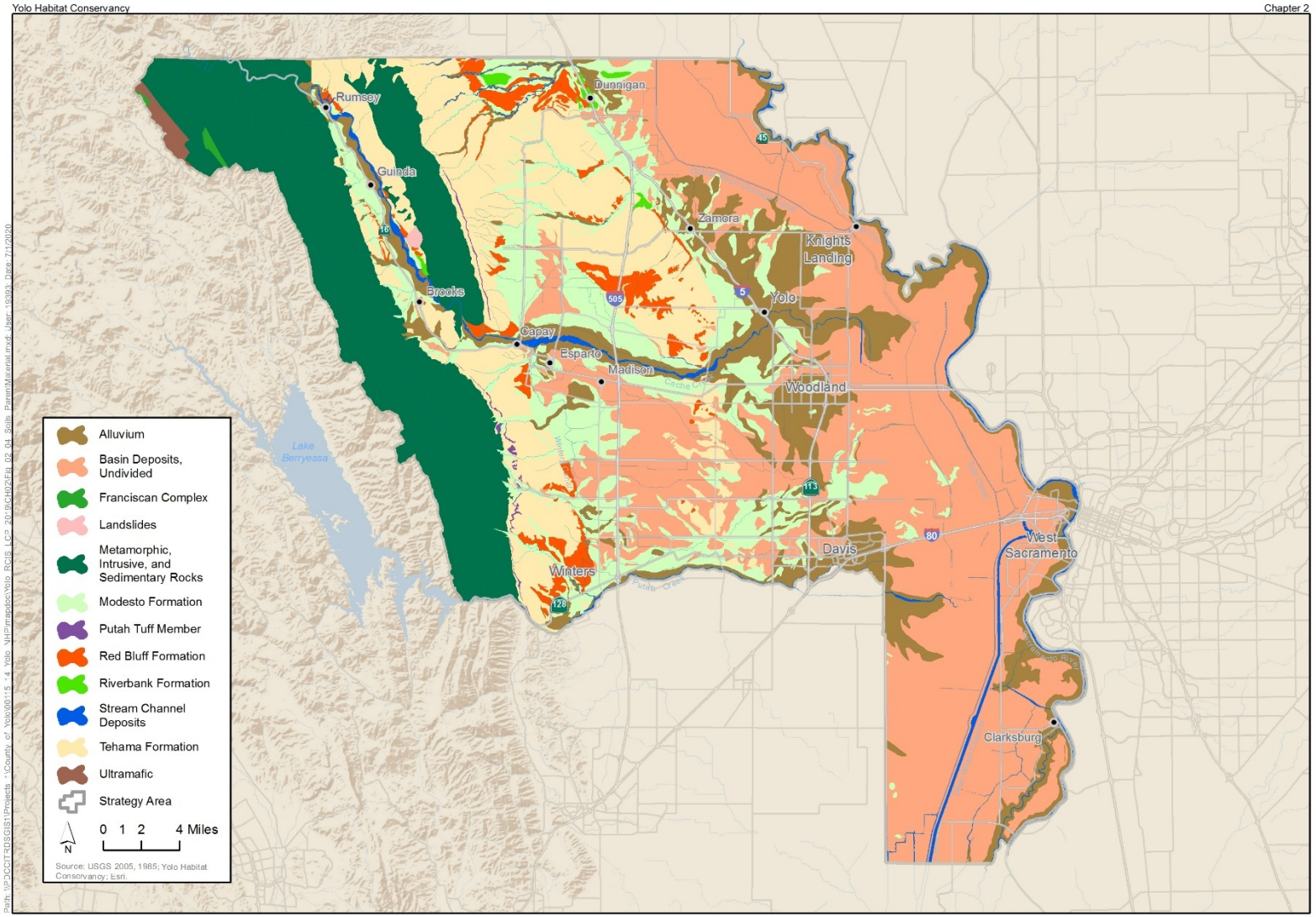
The patchy Positas association formed on terraces over the Red Bluff formations in the southern end of the Blue Ridge and along the western and northern slopes of the Capay Hills. Its soils are gravelly loams. The Sehorn-Balcom association formed over the Tehama formation, along the eastern toes of the Blue Ridge and Capay Hills, and along most of the Dunnigan Hills. The soils of this association consist of silty clays and clays. Adjacent terraces of the Red Bluff and Tehama formations support the Corning-Hillgate association, which also extends along the Plainfield Ridge. The soils of this association are gravelly loams or loams. One outlier of this association has been mapped across the entire Cache Creek Settling Basin. Vegetation in the settling basin is riparian, but vegetation of the Positas, Sehorn-Balcom, and Corning-Hillgate associations is typically California prairie with some blue oak woodland.

2.2.5.2 Lowland Alluvial Fan Group

The lowland alluvial fan group consists of four soil associations: Yolo-Brentwood, Capay-Clear Lake, Rincon-Marvin-Tehama, and Willows-Pescadero (Figure 2-4). The Yolo-Brentwood association is most closely associated with alluvial floodplains and fans of Cache and Putah Creeks. In the Cache/Putah Basin it forms the highest portions of the basin rim at the mouths of the streams from the Blue Ridge and along the natural levee of Putah Creek. Its soils are deep and well drained, and their textures range from silty loams to silty clay loams. Its historic vegetation was valley oak woodland. The soils of the Capay-Clear Lake association line the bottoms of Hungry Hollow and the Cache/Putah Basin in the Madison syncline. These soils are generally poorly drained silty clays to clays. Their historic vegetation was primarily California prairie with some localized seasonal fresh emergent wetland. The Rincon-Marvin-Tehama association is found on the rim of the Cache/Putah Basin between the Yolo-Brentwood association and the Capay-Clear Lake association. Its historic vegetation was also California prairie. On the eastern side of the Cache/Putah Basin is a patch of the Willows-Pescadero association that has formed where groundwater has been forced to the surface by the Dunnigan Hills/Plainfield Ridge anticline. The soils of this association are saline-alkaline silty clay loams to clays. These soil associations are also found east of the Dunnigan Hills/Plainfield Ridge anticline, where salts transported eastward across the Putah/Cache alluvial fans accumulate at the basin rim interface between the fans and the Yolo and Colusa Basins. The historic vegetation on Willows-Pescadero soils was alkali prairie.

2.2.5.3 Lowland Colusa/Yolo Basin and Sacramento River Natural Levee Group

The lowland Colusa/Yolo Basin and Sacramento River natural levee group consists of three soil associations: Sycamore-Tyndall, Sacramento, and Capay-Sacramento (Figure 2-4). The Sycamore-Tyndall association is on the natural levees of the Sacramento River. Its soils are somewhat poorly drained, very fine sandy loams to clay loams. Their historic vegetation was Valley oak woodland with some riparian vegetation along the Sacramento River. Below the Sycamore-Tyndall association in the rice lands of the Colusa Basin is the Sacramento association. Its soils are poorly drained silty clay loams and clays. Finally, because of their artificial drainage systems, the Yolo Bypass and parts of the Colusa Basin contain the Capay-Sacramento association with its moderately well-drained to poorly drained silty clay loams to clays. The historic vegetation of the Sacramento and Capay-Sacramento associations was perennial fresh emergent wetland dominated by tules.



Yolo RCIS/LCP

Figure 2-4
Soil Parent Material

2.3 Land Cover Mapping

A land cover dataset for the strategy area was created for use in developing the conservation strategy. Land cover consists of naturally occurring and anthropogenic vegetation, human-made structures, and other unvegetated land cover types (e.g., barren lands, other lands incidental to agriculture). This section describes the land cover classification system and the methods used to map these land cover types in the strategy area. The land cover dataset was generated at a scale and level of resolution appropriate for regional resources planning; it was not developed for use in project-level planning. Land cover will be verified at the project level during implementation for tracking and compliance purposes. While updates to this dataset have been made at a much finer scale to reflect the smaller areas of essential land covers, much of the dataset was digitized at a more coarse scale reflecting an alliance level of vegetation types. A total of 79 land cover types were identified and mapped. As described in the following subsections, the land cover type map represents point-in-time data and was developed at a resolution sufficient for RCIS/LCP planning. The land cover type mapping may be periodically updated during implementation (Section 3.5, *Monitoring and Adaptive Management Framework*) and may continue to be used as a planning tool during implementation.

Land cover mapping was developed using the following data sources.

- Mapping of the Blue Ridge and Little Blue Ridge regions of the strategy area on 1993 USGS digital orthophotographs prepared by University of California at Davis, CDFW, and Aerial Information Systems (AIS)
- Riparian land cover mapping prepared by Jones & Stokes (1989, 1990)
- Riparian land cover mapping of the Sacramento River (1996), Cache Creek (1996), and Putah Creek (1998) prepared by California State University, Chico (CSU Chico) as adjusted in 2004.
- CDFW Bay-Delta vegetation mapping dataset (2005 data)
- DWR 2008 land cover data set
- National Agriculture Imagery Program (NAIP) 2012 aerial imagery
- U.S. Fish and Wildlife Service (USFWS) wetland easements data
- 2013 Google Earth imagery
- I-Cubed Aerial Imagery Service
- 2011 and 2013 Yolo County Agricultural Commissioner's Field Level Pesticide data

2.3.1 Natural Community, Vegetation, and Other Land Cover Classification

The Conservancy developed a comprehensive, multilevel land cover classification and mapping system for the HCP/NCCP planning process. The RCIS/LCP uses this system, although slightly modified. The land cover classification system achieves the following goals.

- Integrates existing, commonly used and emerging vegetation classification systems.

- Represents the natural and anthropogenic communities, vegetation types, and other land cover types in the strategy area under existing conditions.
- Provides the basis for characterizing current and future wildlife habitat uses through wildlife habitat relationships models (Section 2.8).
- Provides a foundation for future mapping efforts, where more detailed site-specific mapping could be integrated.

The classification system uses a two-level hierarchy that establishes 16 natural communities and 79 floristic-based vegetation types and other unvegetated land cover types (Table 2-2). The vegetation types were primarily derived from the hierarchical structure of *A Manual of California Vegetation* (MCV) (Sawyer and Keeler-Wolf 1995), as adopted and modified by the California Vegetation Classification and Mapping Program and the Napa County Vegetation Map (NCVM) (Thorne et al. 2004). Modifications to the MCV vegetation types were applied from the NCVM to describe the relatively unique vegetation in the western part of the strategy area. Sawyer, Keeler-Wolf, and Evans (2009) is the current standard for California vegetation classification but was not available when much data in the tables below were collected.

Table 2-2. Natural Communities and Other Land Cover Types

Natural Community	Vegetation/Land Cover Detail	Crop Type	Total Extent in Strategy Area (acres)[a]
Natural or Seminatural Communities			
Cultivated Lands Seminatural Community	Alfalfa	Alfalfa	48,879
	Rice	Rice	35,724
	Field Crops	Corn	8,017
		Dry Beans	229
		Grain Sorghum	163
		Safflower	15,508
		Sudan	1,536
		Sugar Beets	10
		Sunflowers	11,114
		Undifferentiated Field Crops	5,488
	Truck/Berry Crops	Asparagus	128
		Melons/Squash/ Cucumbers	3,049
		Onions/Garlic	815
		Peppers	956
		Strawberries	18
		Tomatoes	36,656
		Undifferentiated Truck and Berry Crops	1,832
	Grain/Hay Crops	Grain and Hay Crops	65,258

Natural Community	Vegetation/Land Cover Detail	Crop Type		Total Extent in Strategy Area (acres)[a]
Cultivated Lands Seminatural Community, continued	Pasture	Miscellaneous Grasses (grown for seed)		3,855
		Mixed Pasture		11,195
		Native Pasture		138
			Total	**250,568**
California Prairie	California Annual Grasslands Alliance			70,934
	Lotus scoparius Alliance (post-burn)			172
	Sparse Bush Lupine/ Annual Grasses/Rock Outcrop NFD Alliance			39
	Upland Annual Grasslands & Forbs Formation			8,169
	Urban Ruderal			1,582
			Total	**80,896**
Serpentine	Serpentine Barren			10
	Serpentine Grasslands NFD Super Alliance			237
	California Bay - Leather Oak - Rhamnus Mesic Serpentine NFD Super Alliance			173
	Leather Oak - Chaparral Alliance			1,729
	White Leaf Manzanita - Leather Oak - (Chamise - Ceanothus spp.) Xeric Serpentine NFD Super Alliance			167
	McNab Cypress Alliance			11
			Total	**2,327**
Chamise Chaparral	Chamise - Wedgeleaf Ceanothus Alliance			9,255
	Chamise Alliance			20,881
			Total	**30,137**
Mixed Chaparral	Evergreen Shrubland			403
	Mixed Manzanita - (Interior Live Oak - California Bay - Chamise) NFD Alliance			4

Natural Community	Vegetation/Land Cover Detail	Crop Type	Total Extent in Strategy Area (acres)[a]
	Scrub Oak Chaparral Alliance		11,396
Mixed Chaparral, continued	Toyon - (Foothill Pine/ Chamise)/Annual Grasses Savanna NFD Alliance		530
	Whiteleaf Manzanita Alliance		92
		Total	**12,425**
Oak-Foothill Pine	Foothill Pine Alliance		3,760
	Interior Live Oak-Blue Oak-(Foothill Pine) NFD Association		26,797
	Interior Live Oak Alliance		13,182
		Total	**43,739**
Blue Oak Woodland	Blue Oak Alliance	**Total**	**35,944**
Closed-Cone Pine-Cypress	Knobcone Pine Alliance		201
	McNab Cypress Alliance		11
		Total	**212**
Montane Hardwood	Black Oak Alliance		98
	Canyon Live Oak Alliance		485
	Mixed Oak Alliance		2,442
	Sparse California Juniper-Canyon Live Oak-California Bay-California Buckeye/Steep Rock Outcrop NFD Alliance		62
		Total	**3,087**
Valley Oak Woodland	Valley Oak Alliance	**Total**	**181**
Alkali Prairie	Alkali Prairie		309
Vernal Pool Complex	Vernal Pool Complex		299
Fresh Emergent Wetland	Alkali Bulrush - Bulrush Brackish Marsh NFD Super Alliance		9
	Bulrush - Cattail Wetland Alliance		712
	Bulrush - Cattail Fresh Water Marsh NFD Super Alliance		3,707

Natural Community	Vegetation/Land Cover Detail	Crop Type	Total Extent in Strategy Area (acres)[a]
	Carex spp. - Juncus spp. - Wet Meadow Grasses NFD Super Alliance		718
	Crypsis spp. - Wetland Grasses - Wetland Forbs NFD Super Alliance		16,579
	Perennial pepperweed (*Lepidium latifolium*) Alliance		216
	Saltgrass Alliance		3,987
	Undetermined alliance – Managed		371
		Total	**26,299**
Riparian	Blackberry NFD Super Alliance		226
	Coyote Brush		208
	Fremont Cottonwood - Valley Oak - Willow (Ash - Sycamore) Riparian Forest NFD Association		3,062
	Giant Reed Series		101
	Great Valley Oak Riparian Association		75
	Mixed Fremont Cottonwood - Willow spp. NFD Alliance		1,721
	Mixed Willow Super Alliance		2,979
	Tamarisk Alliance		507
	Undifferentiated Riparian Bramble and Other		17
	Undifferentiated Riparian Scrub		131
	Undifferentiated Riparian Woodland/Forest		222
	Valley Oak Alliance – Riparian		3,136
	White Alder (Mixed Willow) Riparian Forest NFD Association		57
		Total	**12,442**
Lacustrine and Riverine	Open Water		13,203

Natural Community	Vegetation/Land Cover Detail	Crop Type		Total Extent in Strategy Area (acres)[a]
Total Natural and Seminatural Communities				**512,002**
Other Land Cover Types				
Other Agriculture	Citrus/Subtropical	Dates		6
		Lemon		0
		Miscellaneous Subtropical Fruits		16
		Olives		948
		Oranges		189
	Deciduous Fruits/Nuts	Almonds		22,618
		Apples		409
		Apricots		210
		Figs		41
		Peaches/Nectarines		150
		Pears		215
		Pistachios		731
		Prunes		2,071
		Undifferentiated Deciduous Fruits and Nuts		1,335
		Walnuts		15,810
			Deciduous fruits/nuts subtotal	**28,279**
	Vineyards	Vineyards		17,151
	Pasture	Turf Farm		**141**
		Flowers/Nursery/ Tree Farms		122
			Other Agriculture Subtotal	**62,164**
Semiagricultural/ Incidental to Agriculture		Semiagricultural/ Incidental to Agriculture	**Subtotal**	**30,510**
Eucalyptus		Eucalyptus Alliance	**Subtotal**	**369**
Barren		Barren-Anthropogenic (levees)		414
		Barren-Gravel and Sand Bars		1,373
		Rock Outcrop		335

Natural Community	Vegetation/Land Cover Detail	Crop Type		Total Extent in Strategy Area (acres)[a]
			Barren Subtotal	**2,122**
Developed		Urban or Built Up		40,683
		Urban Ruderal		7
		Vegetated Corridor		5,010
			Developed Subtotal	**45,700**
			Total Barren and Developed	**47,822**
Total Other Land Cover Types				**140,865**
Total Land Cover Types				**653,494**

[a] Numbers may not precisely sum due to rounding.

For the Yolo HCP/NCCP, the Conservancy classified natural communities in a manner adapted from the California Wildlife Habitat Relationship Program (CWHR) classification system (Mayer and Laudenslayer 1988), including land cover categories for characterizing cultivated lands, non-natural areas (including vacant or urban parcels), and open water. Sections 2.6 and 2.7 provide descriptions of the land cover types. Ecologists on the Advisory Committee recommended modifications to the natural community designations used in the Yolo HCP/NCCP, and the Conservancy incorporated these modifications into the RCIS/LCP. Table 2-3 presents the natural communities and corresponding land cover designations from other classification systems, including the Yolo HCP/NCCP. Consistent with RCIS Guidelines, Table 2-3 crosswalks the Yolo RCIS/LCP natural communities with the Second Edition of *A Manual of California Vegetation* (Sawyer et al. 2009), the California standard for vegetation mapping.

The Conservancy used the vegetation and other land cover types to predict the known and potential distribution of Group 1 focal species under existing conditions and under future conditions with HCP/NCCP implementation, as described in Section 2.8.

2.3.2 Mapping Methods

This section describes the methods used to develop the land cover dataset from existing datasets, which were developed for portions of the strategy area at different times using differing land classification systems and mapping methods. These varying datasets were combined to develop a seamless land cover geographic information system (GIS) data layer.

To prepare the land cover database, multiple land cover and vegetation sources were obtained and assessed. Certain important characteristics such as mapping scale, mapping methods, and land cover/vegetation classification varied among these data sources. To minimize mapping inconsistencies that can result from using multiple data sources and classification systems, a crosswalk was developed for the various classification systems used in the mapping efforts, and a single, standardized classification system was developed for the Yolo HCP/NCCP, as described in Section 2.3.1, *Natural Community, Vegetation, and Other Land Cover Classification*, and Table 2-3.

Supplemental mapping was conducted to minimize inconsistencies as they were identified during the mapping process. This process involved spatial changes and attribute editing where necessary. The mapping units from the various sources were thus combined into a seamless GIS layer covering the extent of the strategy area. Although some inconsistencies remain in the dataset, this process reduced remaining anomalies to a level that provides a reliable basis for developing the conservation strategy.

Land cover in the Blue Ridge and Little Blue Ridge Planning Units was identified using mapping data developed jointly by UC Davis, CDFW, and AIS. The data was developed for Napa County but extended into this portion of the strategy area. The Napa County map was created using the now obsolete 1995 MCV classification system, aerial photo interpretation, and limited field verification. Land cover that could be formally assigned to a defined type in the 1995 MCV classification system was classified at the alliance level (floristic-based), although a few associations comprising several vegetation types were also included. All grass types, many shrub types, and low-density stands of foothill pine were not identifiable in the aerial photos; these vegetation types were therefore aggregated into a super alliance. Vegetation types that could not be formally assigned because the type had not been formally defined, or because the type could not be distinguished in the aerial photographs, were assigned a provisional classification consistent with 1995 MCV and were identified as not formally defined (NFD). The minimum mapping unit of most land cover types was 2.5 acres, although units as small as 0.63 acre were delineated around important features such as agricultural ponds.

Riparian features were originally mapped in 1990, augmented in 1996 (Sacramento mainstem) and 1998 (Cache Creek and Putah Creek), and reviewed and adjusted in 2004, with some areas updated as recently as 2014. The Yolo County Community Development Agency's Riparian Zone Mapping dataset includes mapping of the valley bottoms and lower slopes of Yolo County that occurred during winter 1989 and spring 1990 (Jones & Stokes 1990). Portions of the Sacramento River and major tributaries were mapped by CSU Chico to inventory and map riparian lands along these hydrologic features (the Sacramento River and Major Tributaries Riparian Zone Mapping dataset). CSU Chico mapped the Sacramento River mainstem in 1996, Cache Creek in 1998, and Putah Creek in 1998. The strategy area was confined to streams in the Sacramento Valley, and mapping ended in the foothill canyons on both sides of the valley. All areas were mapped at a 1:12,000 mapping scale. These data were incorporated into the initial land cover dataset to provide greater resolution of riparian land cover types. The 1989 and 1990 Yolo County Community Development Agency's Riparian Zone Mapping dataset, consisting of printed maps and no digital data layers, was reviewed and compared with the 2004 digital orthophotographs. New polygons were digitized on the 2004 aerial photos to correspond to the printed mapped polygons, and the vegetation classification assigned on the printed maps was correlated with these newly digitized polygons. In the Davis, West Sacramento, Woodland and Winters Planning Units, riparian vegetation was remapped in June 2011. Riparian features existing in the DWR 2008 land cover dataset that fell beyond the riparian features mapped in 1990, 1996, 1998, 2004, and 2011 were also included in the riparian mapping.

The alkali prairie and fresh emergent wetland features in the western portion of the strategy area were mapped in February 2013 using 2012 NAIP and i-Cubed imagery, in conjunction with CDFW biologists' interpretations. Land cover was initially mapped by aerial photo interpretation using 1993 USGS digital orthophotography.

The 2005 Bay-Delta vegetation mapping dataset was created by AIS for CDFW using CDFW's vegetation classification and mapping program to assess existing vegetation and land use conditions

in the Delta region. The CDFW Bay-Delta vegetation cover dataset was used to augment vegetation mapping of areas of overlap between the strategy area and the region surveyed by CDFW. The map classification is based on field data collected during the summer and fall of 2005. Vegetation was mapped from the suballiance to super alliance level using the National Vegetation Classification Standard. Maps were at 1:12,000 scale, vegetation was mapped at a 2-acre minimum mapping unit, and critical vegetation types such as wetlands were mapped at a 1-acre minimum mapping unit. Features that were distinct or deemed important were mapped below the minimum mapping unit size.

In spring 2008, 2004 orthophotography was used to update the land cover data layer for ponds and new development. The orthophotography was reviewed in detail to identify any ponds, which are a component of some focal species habitat models (Appendix C) that were not captured by the previous mapping efforts. At the same time, areas that were seen as developed on the orthophotography were updated. Orthophotography was used to further update the developed lands layer in 2014.

Cultivated lands and natural land cover types not addressed in other data sources at greater resolution were identified using the DWR Land Use Map 2008 dataset. Where necessary, the classifications of DWR polygons were adjusted to conform to the HCP/NCCP land cover dataset classification hierarchy. NAIP 2012 aerial imagery was reviewed to assign the appropriate land cover classification where the DWR classification of nonagricultural land cover types could not be directly aligned to the HCP/NCCP or RCIS/LCP classification. In the case of agriculture polygons that lacked detail, the Yolo County Agricultural Commissioner's Field Data were used to assign the appropriate polygon classification. Additionally, the Yolo Agricultural Commissioner's Field Data were used in spring 2014 to identify and update the conversion of field crops to orchards and vineyards. DWR crops are classified as nine types of structurally similar crop types or groups and three land use designations. This agricultural land cover component of the data set represents a point-in-time characterization of the agricultural landscape of the strategy area. The distribution, acreage, and types of crops grown in the strategy area, however, change annually and at larger timescales. The implementation process provides for decision-making (e.g., acquisition of lands supporting focal species habitats) based on the actual land cover types present at the time such decisions are made.

2.3.3 Evaluation of Other Mapping Methods

Fish and Game Code requires an RCIS to use ". . . standard or prevalent vegetation classifications and standard ecoregional classifications for terrestrial and aquatic data to enable and promote consistency among regional conservation assessments throughout California" (FGC 1853(c)(4)). The Yolo RCIS/LCP Steering Committee evaluated the CDFW Natural Communities List and Great Valley Ecoregion data[5] against mapping completed for the Public Review Draft Yolo RCIS/LCP. Table 2-3 crosswalks the RCIS/LCP natural communities with the RCIS/LCP vegetation types associated with each natural community, the CDFW Natural Communities List, and the California Wildlife Habitat Relationship Classification (CWHR) system.

[5] The Great Valley Ecoregion dataset produced by the CDFW Geographical Information Center (Vegetation – Great Valley Ecoregion [ds2632] is available in CDFW's Biogeographic Information and Observation System (BIOS). https://www.wildlife.ca.gov/Data/BIOS

After evaluating the various datasets, the Yolo RCIS/LCP Steering Committee and CDFW decided to adopt the dataset used for the Public Review Draft Yolo RCIS/LCP for the following reasons:

- The Yolo RCIS/LCP mapping is consistent with the Yolo HCP/NCCP.
- The Yolo RCIS/LCP mapping is based largely on the CWHR system (Table 2-3), and was used to develop all the species habitat models. CWHR was developed specifically to assess habitat for wildlife, and is therefore appropriate for development of wildlife habitat models.
- The Yolo RCIS/LCP mapping identifies multiple different crop types while the CDFW Natural Communities List and Great Valley mapping do not differentiate crop types. Many of the Yolo RCIS/LCP focal and conservation species depend on agricultural lands and the habitat quality is often defined by crop type, therefore the Yolo RCIS/LCP mapping is better suited than the CDFW Natural Communities List for mapping habitats in Yolo County.

Where the Yolo RCIS/LCP Steering Committee noticed discrepancies between the Yolo RCIS/LCP mapping and the Great Valley mapping, one dataset was not consistently more accurate than the other, therefore mapping accuracy was not a factor in choosing which dataset to use. The Yolo RCIS/LCP mapping will be refined as needed during plan implementation.

Although the Yolo RCIS/LCP natural communities are mapped at a relatively broad scale compared with the CDFW Natural Communities List and Great Valley mapping, each natural community is composed of a group of RCIS/LCP vegetation types that are mapped at a finer scale (Tables 2-2 and 2-3). Appendix H provides maps at the finer, vegetation type scale.

Table 2-3. Comparison of RCIS/LCP Land Cover Types to Other Local and Statewide Classifications Systems

RCIS/ LCP Land Cover Types	Yolo HCP/NCCP Natural Communities	RCIS/LCP Vegetation Types	California Department of Fish and Wildlife Natural Communities List	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation Types
California Prairie	Grassland	California Annual Grasslands Alliance	Wild Oats Grassland Semi-Natural Alliance	Annual Grassland	California Annual Grasslands Alliance
		Lotus Scoparius Alliance (Post-Burn)	Deer Weed Scrub Alliance		Lotus Scoparius Alliance (Post-Burn)
		Sparse Bush Lupine / Annual Grasses / Rock Outcrop NFD Alliance	Silver Bush Lupine Scrub Alliance		Sparse Bush Lupine / Annual Grasses / Rock Outcrop NFD Alliance
		Upland Annual Grasslands & Forbs Formation	Wild Oats Grassland Semi-Natural Alliance		Upland Annual Grasslands & Forbs Formation
		Urban Ruderal	No term available		Urban Ruderal

RCIS/ LCP Land Cover Types	Yolo HCP/NCCP Natural Communities	RCIS/LCP Vegetation Types	California Department of Fish and Wildlife Natural Communities List	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation Types
Serpentine	Serpentine	Serpentine Barren		Serpentine	Serpentine Barren
		Serpentine Grasslands NFD Super Alliance	Needlegrass-Melic Grass Grassland Alliance, California Oat Grass Prairie Alliance, California Goldfields-Dwarf Plantain-Six Weeks Fescue Flower Fields Alliance		Serpentine Grasslands NFD Super Alliance
Serpentine, continued	Mixed Chaparral	Leather Oak Chaparral Alliance	Leather Oak Chaparral Alliance	Mixed Chaparral	Leather Oak Chaparral Alliance
		Whiteleaf Manzanita - Leather Oak (*Chamise* - *Ceanothus* spp.) - Xeric Serpentine NFD Super Alliance	White Leaf Manzanita Chaparral Alliance		Whiteleaf Manzanita - Leather Oak (*Chamise* - *Ceanothus* spp.) - Xeric Serpentine NFD Super Alliance
	Closed-Cone Pine-Cypress	California Bay - Leather Oak (*Umbellularia*) - Mesic Serpentine NFD Super Alliance	Leather Oak Chaparral Alliance		California Bay - Leather Oak (*Umbellularia*) - Mesic Serpentine NFD Super Alliance
		McNab Cypress Alliance	McNab Cypress Woodland Alliance	Closed-Cone Pine-Cypress	McNab Cypress Alliance
Chamise Chaparral	Chamise Alliance	Chamise - Wedgeleaf Ceanothus Alliance	Chamise Chaparral Alliance	Chamise Alliance	Chamise - Wedgeleaf Ceanothus Alliance
		Chamise Alliance	Chamise Chaparral Alliance		Chamise Alliance
Mixed Chaparral	Mixed Chaparral	Evergreen Shrubland	No term available	Mixed Chaparral	Evergreen Shrubland

RCIS/ LCP Land Cover Types	Yolo HCP/NCCP Natural Communities	RCIS/LCP Vegetation Types	California Department of Fish and Wildlife Natural Communities List	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation Types
		Mixed Manzanita (Interior Live Oak - California Bay - Chamise) NFD Alliance	Interior Live Oak Woodland Alliance		Mixed Manzanita (Interior Live Oak -California Bay - Chamise) NFD Alliance
		Scrub Oak Chaparral Alliance	Scrub Oak Chaparral Alliance		Scrub Oak Chaparral Alliance
		Toyon - (Foothill Pine / Chamise)/ Annual Grasses Savanna NFD Alliance	No term available		Toyon - (Foothill Pine / Chamise)/ Annual Grasses Savanna NFD Alliance
		Whiteleaf Manzanita Alliance	Whiteleaf Manzanita Chaparral Alliance		Whiteleaf Manzanita Alliance
Oak-Foothill Pine	Oak-Foothill Pine	Foothill Pine Alliance	Foothill Pine Woodland Alliance	Blue Oak-Foothill Pine	Foothill Pine Alliance
		Interior Live Oak - Blue Oak - (Foothill Pine) NFD Association	Interior Live Oak Woodland Alliance, Blue Oak Woodland Alliance		Interior Live Oak - Blue Oak - (Foothill Pine) NFD Association
		Interior Live Oak Alliance			Interior Live Oak Alliance
Blue Oak Woodland	Blue Oak Woodland	Blue Oak Alliance	Blue Oak Woodland Alliance	Blue Oak-Foothill Pine	Blue Oak Alliance
Montane Hardwood	Montane Hardwood	Black Oak Alliance	California Black Oak Forest Alliance	Montane Hardwood	Black Oak Alliance
		Canyon Live Oak Alliance	Canyon Live Oak Forest Alliance		Canyon Live Oak Alliance
		Mixed Oak Alliance	Blue Oak Woodland, Valley Oak Woodland Alliance		Mixed Oak Alliance
		Sparse California Juniper-Canyon Live Oak-California Bay-California Buckeye / Steep Rock Outcrop NFD Alliance	California Juniper Woodland Alliance		Sparse California Juniper-Canyon Live Oak-California Bay-California Buckeye / Steep Rock Outcrop NFD Alliance

RCIS/ LCP Land Cover Types	Yolo HCP/NCCP Natural Communities	RCIS/LCP Vegetation Types	California Department of Fish and Wildlife Natural Communities List	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation Types
Valley Oak Woodland	Valley Oak Woodland	Valley Oak Alliance (Riparian)	Valley Oak Woodland Alliance	Valley Oak Woodland	Valley Oak Alliance (Riparian)
		Great Valley Oak Riparian Association	Valley Oak Woodland Alliance		Great Valley Oak Riparian Association
Closed-Cone Pine-Cypress	Closed-Cone Pine-Cypress	Knobcone Pine Alliance	Knobcone Pine Forest Alliance	Knobcone Pine Alliance	Knobcone Pine Alliance
Eucalyptus	Eucalyptus	Eucalyptus Alliance	Eucalyptus-Tree-of Heaven-Black Locust Groves Semi-Natural Alliance	Eucalyptus Alliance	Eucalyptus Alliance
Alkali Prairie	Alkali prairie	Alkali prairie		N/A	Alkali prairie
Fresh Emergent Wetland	Fresh Emergent Wetland	(Alkali Bulrush - Bulrush) Brackish Marsh NFD Super Alliance	Salt Marsh Bulrush Marshes Alliance	Fresh Emergent Wetland	(Alkali Bulrush - Bulrush) Brackish Marsh NFD Super Alliance
		Bulrush - Cattail Wetland Alliance	Hardstem and California Bulrush Marsh Alliance, American Bulrush Marsh Alliance		Bulrush - Cattail Wetland Alliance
		(Bulrush - Cattail) Fresh Water Marsh NFD Super Alliance	Hardstem and California Bulrush Marsh Alliance, American Bulrush Marsh Alliance		(Bulrush - Cattail) Fresh Water Marsh NFD Super Alliance
		(*Carex* spp. - *Juncus* spp. - Wet Meadow Grasses) NFD Super Alliance	Iris-leaf Rush Seeps Alliance		(*Carex* spp. - *Juncus* spp. - Wet Meadow Grasses) NFD Super Alliance
		Crypsis spp. - Wetland Grasses - Wetland Forbs NFD Super Alliance	No term available		*Crypsis* spp. - Wetland Grasses - Wetland Forbs NFD Super Alliance
		Perennial pepperweed (*Lepidium latifolium*) Alliance	Perennial Pepper weed Patches Alliance		Perennial pepperweed (*Lepidium latifolium*) Alliance
		Saltgrass Alliance	Salt Grass Flats Alliance		Saltgrass Alliance

RCIS/ LCP Land Cover Types	Yolo HCP/NCCP Natural Communities	RCIS/LCP Vegetation Types	California Department of Fish and Wildlife Natural Communities List	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation Types
		Undetermined alliance - Managed	Cattail Marshes Alliance, Salt Grass Flats Alliance, Perennial Pepper weed Patches Alliance, Hardstem and California Bulrush Marsh Alliance, American Bulrush Marsh Alliance		Undetermined alliance - Managed
		Giant Reed Series	Common and Giant Reed Marshes Semi-Natural Alliance		Giant Reed Series
Valley Foothill Riparian	Valley Foothill Riparian	Blackberry NFD Super Alliance	Coastal Brambles Alliance, Himalayan Blackberry-Rattlebox-Edible Fig Riparian Scrub Semi-Natural Alliance	Valley Foothill Riparian	Blackberry NFD Super Alliance
		Coyote Brush	Coyote Brush Scrub Alliance		Coyote Brush
		Mixed Fremont Cottonwood - Willow spp. NFD Alliance	Fremont Cottonwood Forest Alliance		Mixed Fremont Cottonwood - Willow spp. NFD Alliance
		Mixed Willow Super Alliance	Black Willow Thickets Alliance, Red Willow Thickets Alliance, Shining Willow Groves Alliance		Mixed Willow Super Alliance
		Tamarisk Alliance	Tamarisk Thickets Semi-Natural Alliance		Tamarisk Alliance
		Undifferentiated Riparian Bramble and Other	Coastal Brambles, Himalayan Blackberry-Rattlebox-Edible Fig Riparian Scrub		Undifferentiated Riparian Bramble and Other

RCIS/ LCP Land Cover Types	Yolo HCP/NCCP Natural Communities	RCIS/LCP Vegetation Types	California Department of Fish and Wildlife Natural Communities List	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation Types
		Undifferentiated Riparian Scrub	Black Willow Thickets Alliance, Red Willow Thickets Alliance, Shining Willow Thickets Alliance, Fremont Cottonwood Forest Alliance, Valley Oak Woodland Alliance		Undifferentiated Riparian Scrub
Valley Foothill Riparian, continued	Valley Foothill Riparian, continued	Undifferentiated Riparian Woodland/Forest	Black Willow Thickets Alliance, Red Willow Thickets Alliance, Shining Willow Thickets Alliance, Fremont Cottonwood Forest Alliance, Valley Oak Woodland Alliance	Valley Foothill Riparian, continued	Undifferentiated Riparian Woodland /Forest
		White Alder (Mixed Willow) Riparian Forest NFD Association	White Alder Groves		White Alder (Mixed Willow) Riparian Forest NFD Association
Vernal Pool Complex	Vernal Pool Complex	Vernal Pool Complex	Fremont's Goldfields-Saltgrass Alkaline Vernal Pools Alliance, Fremont's Goldfields-Downingia Vernal Pools Alliance, Smooth Goldfields Vernal Pool Bottoms Alliance, Fremont's tidy tips-Blow Wives Vernal Pools Alliance	Vernal Pool Complex	Vernal Pool Complex
Lacustrine/ Riverine	Lacustrine/ Riverine	Open Water	No term available	Riverine	Open Water
Cultivated Land	Agricultural (Seminatural Community)	Field Crops	No term available	Irrigated Row and Field Crops	Field Crops
		Grain and Hay	No term available	Dryland Grain Crops	Grain and Hay
		Pasture	No term available	Pasture	Pasture

RCIS/ LCP Land Cover Types	Yolo HCP/NCCP Natural Communities	RCIS/LCP Vegetation Types	California Department of Fish and Wildlife Natural Communities List	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation Types
		Rice	No term available	Rice	Rice
		Truck, Nursery, and Berry Crops	No term available	Irrigated Row and Field Crops	Truck, Nursery, and Berry Crops
Other Agricultural Land	Agriculture (not habitat for focal species)	Citrus/Subtropical	No term available	Evergreen orchard	Citrus/Subtropical
		Deciduous Fruits and Nuts	No term available	Deciduous Orchard	Deciduous Fruits and Nuts
		Vineyard		Vineyard	Vineyard
Unvegetated, Vacant, and Developed	Unvegetated, Vacant, and Developed	Semiagricultural/ Incidental to Agriculture	No term available	Urban	Semiagricultural / Incidental to Agriculture
		Barren – Anthropogenic	No term available	Barren	Barren – Anthropogenic
		Barren – Gravel and Sand Bars	No term available	Barren	Barren – Gravel and Sand Bars
		Rocky Outcrop	No term available	Barren	Rocky Outcrop
		Urban or Built-up	No term available	Urban	Urban or Built-up
		Vegetated Corridor	Wild Oat Grasslands	Urban, Annual Grassland	Vegetated Corridor

[a] Sawyer et al. 2009

[b] Land cover in the Blue Ridge and Little Blue Ridge region of the strategy area was identified using UC Davis, CDFW, and AIS jointly mapped habitats in Napa County, which extended into this portion of the strategy area.

[c] Although this alliance under the Napa County Vegetation Mapping system corresponds with the valley/foothill riparian vegetation type, coast live oak is not present in Yolo County. The dominant live oak in Yolo County is interior live oak.

[d] Although this alliance under the Napa County Vegetation Mapping system corresponds with the valley/foothill riparian vegetation type, coast live oak is not present in Yolo County. The dominant live oak in Yolo County is interior live oak.

2.4 Protected Areas

2.4.1 Data Sources

As required in the RCIS Program Guidelines (June 2017 version), this RCIS/LCP uses the California Protected Areas Database and the California Conservation Easement Database to identify protected areas within the strategy area. Data used for the protected areas database include the following.

- California Protected Areas Database (California Natural Resources Agency and Department of Water Resources 2016).

- California Conservation Easement Database (California Conservation Easement Database 2016).
- Protected Areas Database of the United States (U.S. Geological Survey 2017).
- CDFW-owned/managed lands (http://www.calfish.org/ProgramsData/ReferenceLayersLandOwnership/CDFWOwnedandOperatedLands.aspx)
- National Conservation Easement Database (https://www.conservationeasement.us/)

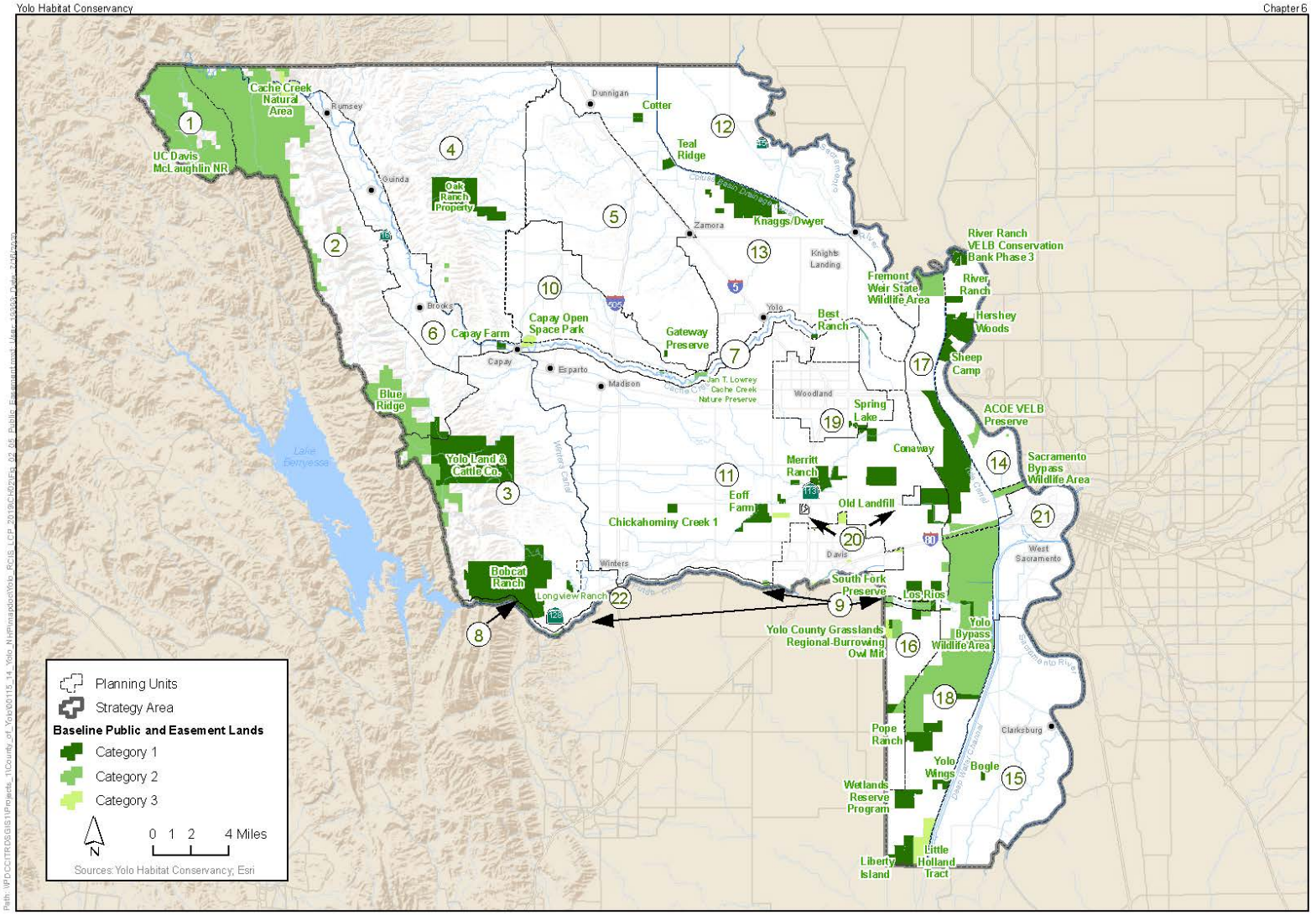
Figure 2-5 shows the locations of these protected areas in the strategy area as of 2018.

2.4.2 Protected Areas Adjacent to the Strategy Area

There are many protected areas that are connected to, but are just outside of the strategy area. The largest of these areas is northwest of the strategy area and provides landscape connectivity between the strategy area and Cache Creek Wilderness Area extending north to, and including, Berryessa Snow Mountain National Monument. The Knox Wildlife Area, which also runs adjacent to the northwest strategy area border, provides connectivity from the strategy area to protected lands further north and west owned by the Bureau of Land Management (BLM). Along the southwest border, protected lands adjacent to the strategy area include Lake Berryessa Wildlife Area, Stebbins Reserve, Putah Creek Wildlife Area, and Stebbins Cold Canyon Reserve, which all provide linkage to Bobcat Ranch within the strategy area. Adjacent to the southern tip of the strategy area is Liberty Island, which extends south along the Sacramento River. Adjacent protected areas along the eastern border are limited to a few properties that include lands owned by the Natomas Basin Conservancy, California State Lands Commission, and DWR.

2.5 Ecoregions

Ecoregions are areas of general similarity in ecosystems based on major terrain features such as a desert, plateau, valley, mountain range, or a combination thereof as defined by the USDA, in coordination with the U.S. Environmental Protection Agency. They provide a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregions are hierarchical, and are identified based on patterns of biotic and abiotic phenomena, including geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. Ecoregions can be effective units for setting regional conservation goals, as well as developing biological criteria and water quality standards.



Yolo RCIS/LCP

Figure 2-5
Baseline Public and Easement Lands (2018)

Ecoregions in the strategy area are described in two ways: (1) according to the USDA ecoregion classification, and (2) according to the USGS ecoregion classification. Each classification system describes the ecoregions in the strategy area in a different way, but both are important for informing ecoregional planning and each provides unique information. In both cases, North America is divided into different levels of ecoregions, from coarsest to finest. In the USDA classification, the strategy area overlaps with two provinces (i.e., ecoregions) (Figure 2-6a) (Cleland et al. 2007). Within each of these ecoregions, the strategy area overlaps one subsection (region). The USGS and USDA ecoregion classifications are described in the following subsections. In the USGS classification, the strategy area overlaps with two Level III ecoregions (Griffith et al. 2016). Within each of these ecoregions there are several Level IV ecoregions (Figure 2-6b).

2.5.1 U.S. Department of Agriculture Ecoregions

The USDA defines two ecoregions in the strategy area (Figure 2-6b). The Sierran Steppe-Mixed Forest-Coniferous Forest-Alpine Meadow Province is defined by mountainous terrain with steep slopes. Precipitation is strongly influenced by altitude and direction of mountain ranges—winters are cold and snowy, and summers are hot and dry. Vegetation ranges from broadleaf-needle leaf woodland and shrublands to needle leaf evergreen forests. There is only one ecological section within this ecoregion and within the strategy area: the Northern California Interior Coast Ranges Section. This ecological section has low- to moderate-elevation parallel ranges with crests of unequal height underlain by sedimentary rock. Vegetation is western hardwoods, chaparral-mountain shrubs, and annual grasses.

The second USDA ecoregion is the California Dry Steppe Province, which is defined by alluvial plains with low hills. The climate consists of hot, dry summers and mild winters with precipitation in the winter. Vegetation was originally herbaceous but now is largely irrigated agricultural crops. There is only one ecological section within this ecoregion and within the strategy area: the Great Valley Section. This ecological section has a low-elevation fluvial plain formed by nonmarine sedimentary rocks. Vegetation cover is agricultural; small areas of natural land cover remain, including annual grassland, western hardwoods, and wet grasslands.

2.5.2 U.S. Geological Survey Ecoregions

2.5.2.1 Central California Foothills and Coastal Mountains

The western portion of the strategy area (about one third) overlaps with the Central California Foothills and Coastal Mountains ecoregion (Level III) (Figure 2-6b). The primary distinguishing characteristic of this ecoregion is its Mediterranean climate of hot, dry summers and cool, moist winters, and associated vegetative cover comprised primarily of chaparral and oak woodlands. Grasslands also occur in some low elevations. Large areas are ranchland and are grazed by domestic livestock. Relatively little land has been cultivated. Natural vegetation includes coast live oak, blue oak, black oak, and gray pine woodlands (Griffith et al. 2016). Several Level IV ecoregions fall within the strategy area. These ecoregions are described in the following list, with descriptions from Griffith et al. (2016).

- **Foothill Ridges and Valleys.** The Foothill Ridges and Valleys ecoregion includes ridges, steep hills, and narrow valleys in the interior northern California Coast Ranges. This ecoregion is higher in elevation and more hilly than ecoregions to the east, but lower in elevation and drier

than ecoregions to the west. Vegetation includes prairies with numerous Eurasian grasses and some native grass species including purple needlegrass, chamise and mixed-chaparral shrublands, and various combinations of blue oak and mixed-oak woodlands and foothill pine.

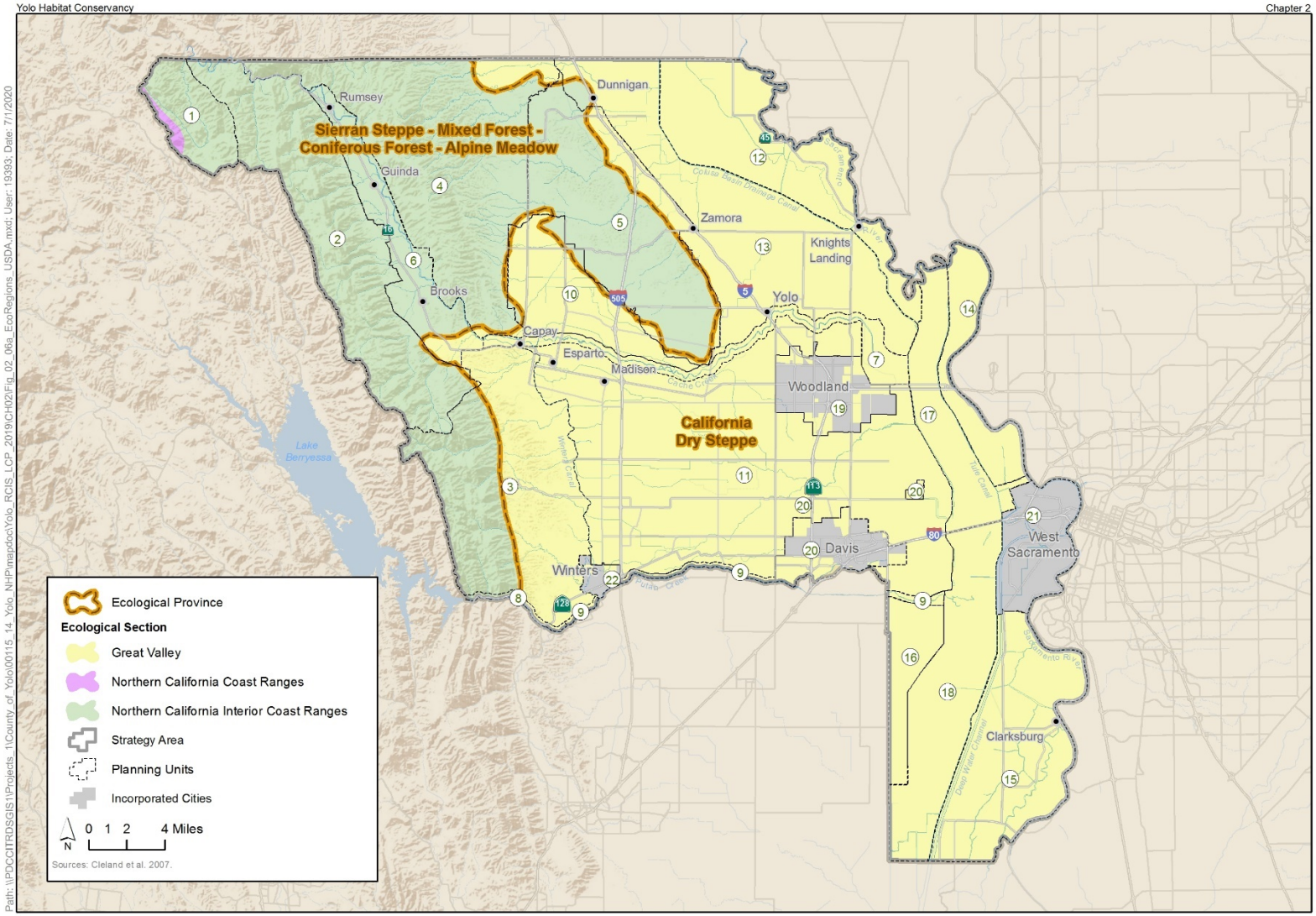


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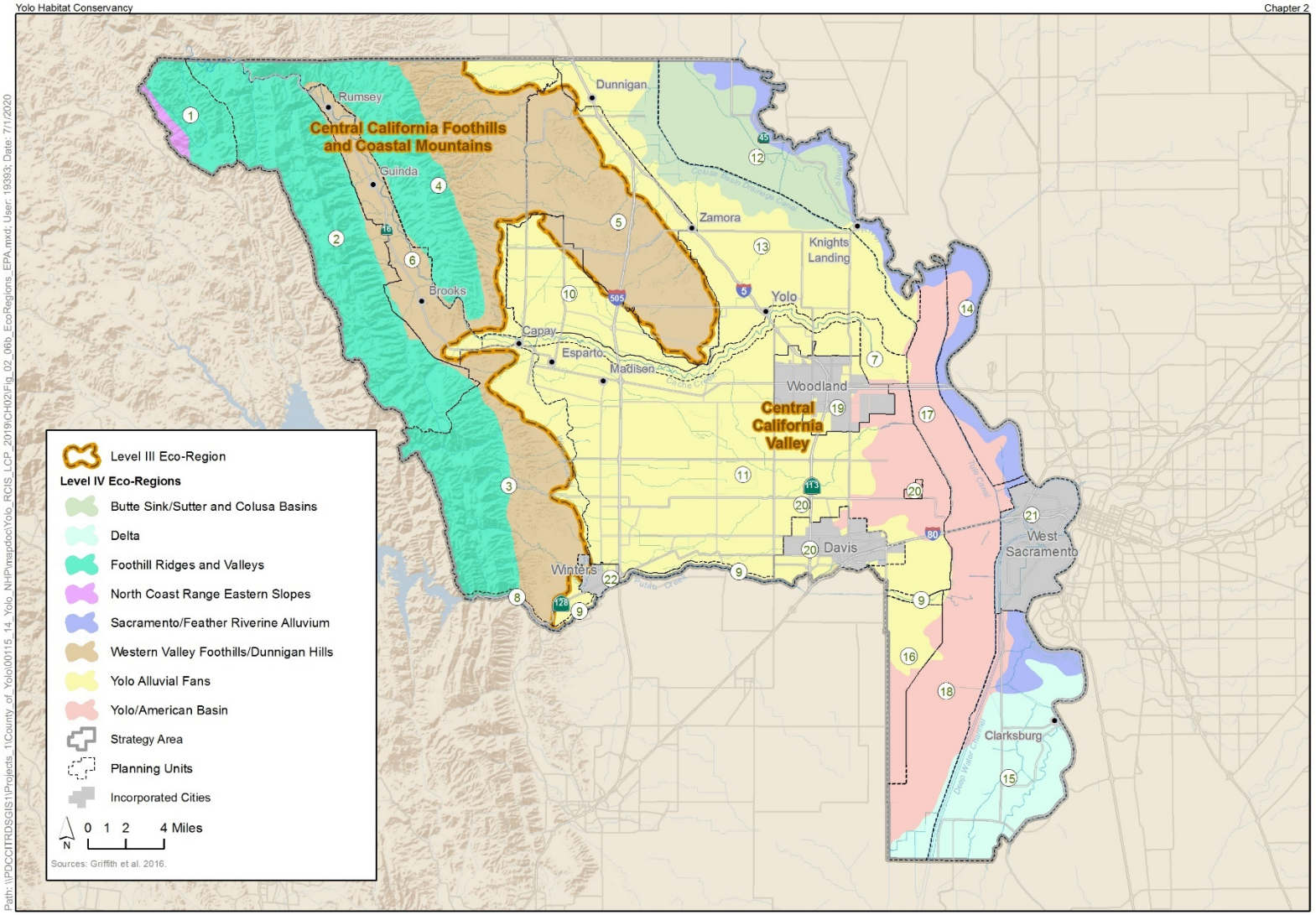
Figure 2-6a
USDA Ecoregions



Yolo RCIS/LCP

Figure 2-6b
USGS Ecoregions

- **North Coast Range Eastern Slopes.** The North Coast Range Eastern Slopes ecoregion is located along the steep, north-trending eastern edge of the Northern Coast Range mountains, mostly west of Yolo County, with sedimentary and ultramafic rocks. It has more relief and elevations than ecoregions to the east; however, it is vegetated with chaparral. It has few conifers and oaks compared to other high-elevation ecoregions to the west. Vegetation includes leather oak on serpentine soil, chamise on shallow soils, and mixed conifer on deeper, mesic soils. Soils in the foothills may contain McNab or Sargent cypress or some foothill and knobcone pine.
- **Western Valley Foothills/Dunnigan Hills.** The Western Valley Foothills/Dunnigan Hills ecoregion consist of the Dunnigan Hills, English Hills, and Capay Valley, and low hills and broad Tehama formation terraces adjacent to the western margin of the Central California Valley ecoregion. Common vegetation includes mixed prairies, and blue oak and blue oak-foothill pine woodlands. Streamcourses typically exhibit well-developed riparian corridors.

2.5.2.2 Central California Valley

The eastern two-thirds of the strategy area overlaps with the Central California Valley ecoregion (Level III) (Figure 2-6b). This ecoregion is flat with intensively farmed plains. Its long, hot, dry summers and mild winters distinguish the Central California Valley ecoregion from its neighboring ecoregions that are either hilly or mountainous, covered with forest or shrub, and generally nonagricultural. The Central California Valley ecoregion includes the flat valley basins of deep sediments adjacent to the Sacramento and San Joaquin Rivers, as well as the fans and terraces around the edge of the valley. The two major rivers flow from opposite ends of the Central California Valley, entering into the Delta and San Pablo Bay. The region once contained extensive prairies, oak savannas, desert grasslands, riparian woodlands, freshwater marshes, and vernal pools. More than half of the region is now cropland, about three-fourths of which is irrigated. Environmental concerns in the region include salinity due to evaporation of irrigation water, groundwater contamination from heavy use of agricultural chemicals, loss of wildlife and plant habitats, and urban sprawl. One Level IV ecoregion in the Coast Ranges overlaps with the strategy area.

- **Butte Sink/Sutter and Colusa Basins.** The Butte Sink/Sutter and Colusa Basins ecoregion occurs on nearly level to very gently sloping alluvial fans, floodplains, and basin floors that are split by the alluvium of the Sacramento River. Elevations range from 20 to 150 feet. Historical flood regimes created seasonal wetland and perennial marshes. There is extensive agriculture of rice, and some orchards and pasture in this ecoregion; however, the region also offers wildlife habitat for waterfowl and pheasant and drainage canals support a warm-water fishery.
- **Sacramento/Feather Riverine Alluvium.** The Sacramento/Feather Riverine Alluvium ecoregion consists of nearly level floodplains and levees associated with the Sacramento, Feather and lower Yuba and Bear Rivers. Much of the unweathered gravel, sand, and silt deposits are in contact with the river system and have constantly changing morphology. This ecoregion supports pasture, wheat, fruit and nut orchards, and woody wetlands.
- **Yolo Alluvial Fans.** The Yolo Alluvial Fans ecoregion contains recent alluvial fan material from the Coast Ranges and from hills on the western side of the Sacramento Valley. Most of the region is cropland, with some areas of pastureland. Alfalfa, winter wheat, sunflower, corn, tomatoes, strawberries, and stone fruit, walnut, and almond orchards are typical crops.
- **Yolo/American Basin.** The Yolo/American Basin ecoregion includes nearly level to very gently sloping stream channels, levees, overflow basins, and alluvial fans of the main alluvial plan

adjacent to the lower Sacramento River. The American Basin, just east of the river, is the northern unit, and the Yolo Basin, just west of the river, is the southern unit. Elevations range from 10 to 40 feet. Some flooding and high water tables occur during wet winters. The region includes substantial areas of rice agriculture that also function as seasonal and permanent wetlands, which provide resting and feeding habitat for migratory birds and other wildlife, as well as the most significant floodplain rearing habitat for salmonids in the Sacramento River basin.

- **Delta.** The Delta ecoregion is a low-elevation area, near sea level, at the confluence of major rivers. It is characterized by numerous sloughs where major rivers enter the ecoregion. Water entering the Delta is influenced by tidal action, streamflow, and water diversion as it flows toward the San Francisco Bay. Agricultural land use is dominant, with corn, alfalfa, hay, and wheat the most extensive crops in the area. Many of the diked wetlands are managed for waterfowl hunting.

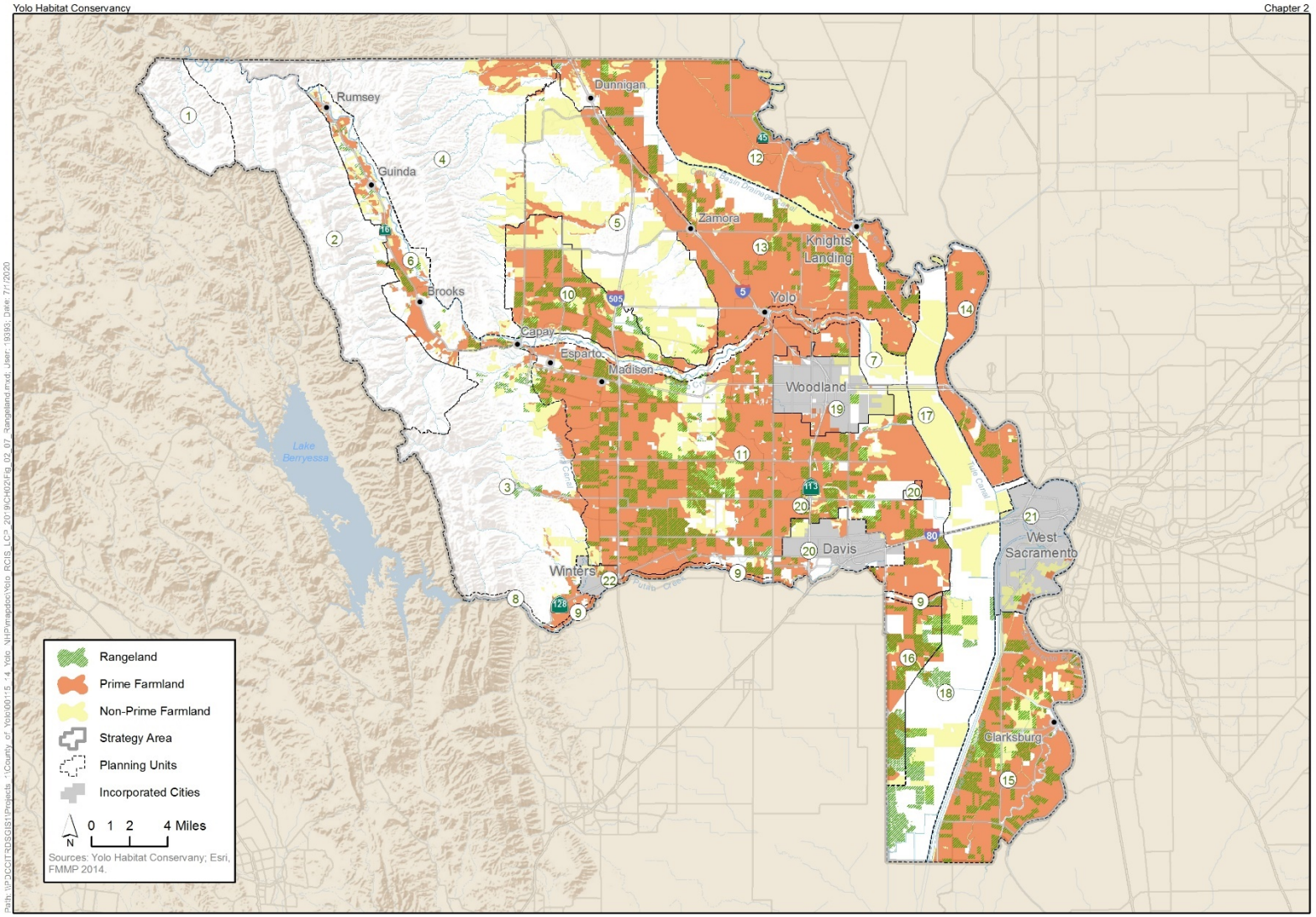
2.6 Natural and Seminatural Communities and Associated Plant and Wildlife Species

This section describes the 16 classified natural communities and associated plant and wildlife species that occur in the strategy area. The natural and seminatural communities are grouped into six categories: agriculture (categorized as a seminatural community), California prairie, serpentine, chaparral, woodlands and forest, and riparian and wetlands. The natural community categories provide a primary system for describing biological communities in this RCIS/LCP and assigning conservation measures that apply to multiple species. The natural community descriptions provide information regarding use by focal/conservation species. The descriptions focus mainly on primary uses of the habitats by species (i.e., regular use for certain key activities or periods by wildlife, or areas of typical occurrence and highest density of plants). Acreage of each natural community for the strategy area is presented in Table 2-2.

2.6.1 Cultivated Land

As of 2018 inYolo County approximately 297,000 acres, or 45 percent of total land cover, was harvested cropland. Most of the farmland is in the central and eastern portions of the strategy area (Figure 2-7). Cultivated lands in Yolo County are working lands that provide conservation benefits. CFGC Section 1852(e)(1) requires that an RCIS consider "the conservation benefits of working lands for agricultural uses." This section of the Yolo RCIS/LCP describes the conservation benefits of cultivated lands.

The Yolo RCIS/LCP categorizes cultivated land that supports focal and conservation species as a *seminatural* community to distinguish it from natural communities that do not support anthropogenic crops.



Yolo RCIS/LCP

Figure 2-7
Distribution of Farmland and Rangeland Communities

2.6.1.1 Alfalfa

Alfalfa is a relatively low-growing perennial herbaceous legume species that is periodically irrigated and cut for hay. Since alfalfa fixes nitrogen, alfalfa is often used as a "green manure" fertilizer and is incorporated into the soil as part of many crop rotations. As of 2018, alfalfa accounted for 48,879 acres, or approximately 7.5 percent of the strategy area (Table 2-2; Figure 2-8). Alfalfa crops are also most productive on the Yolo-Brentwood soils where Valley oak woodland once occurred.

The high protein content of its leaves makes alfalfa highly palatable for rodents such as ground squirrels, gophers, and voles, which are often present in high numbers in the fields. As a result of the large rodent populations, alfalfa fields support particularly high-value foraging habitat for raptors and other predators. Due to its low stature and high productivity and protein content, alfalfa may actually provide better foraging habitat for Swainson's hawk than the beardless wild rye fields of Valley oak woodland they historically used for foraging. The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the alfalfa seminatural community.

- Swainson's hawk
- White-tailed kite
- Tricolored blackbird
- Loggerhead Shrike

2.6.1.2 Rice

Rice is unique among Yolo County's major crops because it is grown in flooded fields that resemble and provide some of the same ecological services as the fresh emergent wetland natural community. Rice fields consequently provide extremely important habitat for focal species such as giant garter snake, which was formerly entirely confined to fresh emergent wetlands. Because of this species' association with permanent water in canals, however, only rice grown where this community formerly occurred in the Colusa and Yolo Basins provide habitat. Rice in basins west of Plainfield Ridge formerly vegetated by seasonal marsh/prairie now and always lacked permanent water and thus do not provide habitat for this focal species. As of 2018, rice covered an estimated 35,724 acres, or 5.4 percent, of the RCIS strategy area (Table 2-2; Figure 2-8). Rice mostly grows on Capay-Clear Lake soils because they retard downward drainage.

The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the rice seminatural community.

- Giant garter snake
- Northwestern pond turtle
- Bank swallow
- Tricolored blackbird
- White-tailed kite
- Black tern

- Bald eagle
- Northern harrier
- Purple martin
- Yellow-headed blackbird

2.6.1.3 Field Crops

Diverse irrigated herbaceous crops like safflower, corn, and sunflower are extremely important elements of Yolo County's agricultural economy and some also provide important habitat for focal species as well as other local concern species. These crops are also most productive on the Yolo-Brentwood soils where Valley oak woodland once occurred. As of 2018, field crops covered an estimated 36,577 acres, or 5.8 percent, of the strategy area (Table 2-2; Figure 2-8).

2.6.1.4 Truck and Berry Crops

Truck and berry crops involve intensive agricultural operations to produce food and landscaping plants that are typically transported for sale elsewhere. Truck farming is the cultivation of fruit or vegetable crops on a relatively large scale for transport to distant markets and includes the production of tomatoes (the dominant crop), asparagus, melons, squash, cucumbers, onions, strawberries, and peppers. Nurseries produce flowering plants, shrubs, and trees for local and distant retail sales. Farming practices associated with these crops generally suppress the growth of other vegetation. These crop types support the yellow-billed magpie, a local concern species, and provide foraging habitat for wildlife species such as red-winged blackbirds and small mammals. As of 2018, truck and berry crops accounted for 43,576 acres, or 6.6 percent of the strategy area (Table 2-2; Figure 2-8).

The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the truck and berry crops seminatural community.

- White-tailed kite
- Swainson's hawk
- Yellow-billed magpie

2.6.1.5 Grain and Hay Crops

These crops differ from the field crops because many, but not all, are not irrigated and their acreage can expand into and somewhat resemble California prairie at times. The most important grain species in Yolo County is wheat, which is mostly grown on Sehorn-Balcom and Rincon-Marvin-Tehama soils poorly suited for more productive irrigated farming. Triticale grain is important for nesting by the focal species tricolored blackbird elsewhere in California but this phenomenon is not reported in Yolo County. As of 2018, grain and hay crops covered an estimated 65,258 acres or 10 percent of the strategy area (Table 2-2; Figure 2-8).

The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the grain and hay crops seminatural community.

- Tricolored blackbird
- Swainson's hawk

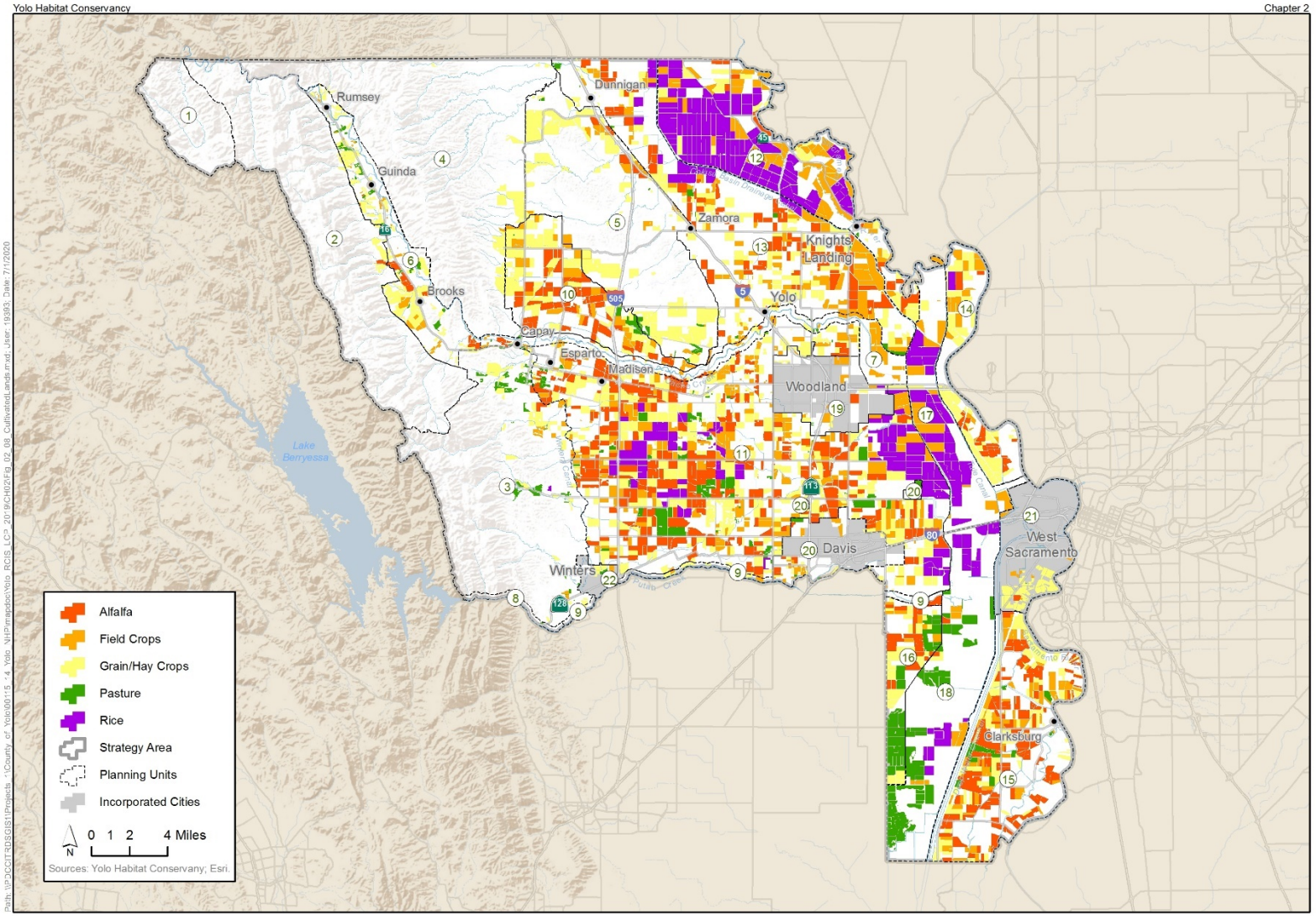
- White-tailed kite

2.6.1.6 Pasture

Pasture is typically irrigated but is most often used to feed cattle rather than to produce a plant crop. It is typically vegetated with a variety of nonnative perennial grasses and forbs and shares ecological features with both prairie and fresh emergent wetland natural communities but is distinctly different from either. Its productivity attracts much native wildlife but most are common species. According to Table 2-2 it covered 15,188 acres, or less than 0.1 percent, of the total land cover types in the strategy area as of 2018. It is most extensive in the southeastern part of the county on Capay-Clear Lake soils (Figures 2-4 and 2-8) because they resist water loss through downward drainage.

The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the pastures seminatural community.

- California tiger salamander
- Western Spadefoot
- Swainson's hawk
- Western burrowing owl
- Tricolored blackbird
- Townsend's big-eared bat
- Short-eared owl
- Yellow-billed magpie
- Loggerhead shrike



Yolo RCIS/LCP

Figure 2-8
Distribution of Cultivated Land Seminatural Communities

2.6.2 California Prairie

California has vast natural open areas with entirely herbaceous vegetation that lack trees or shrubs. These areas were called California prairie until 1959, when an academic mistake caused them to be increasingly called by the misnomer "grasslands." Recent research by Dr. Richard Minnich of University of California, Riverside has now confirmed that these open areas were historically more often dominated by non-grass forbs than by grasses, something many ecologists had suspected. Even though these native prairies are now heavily invaded by nonnative weedy grasses and forbs, their greatest biodiversity remains in native forbs, which are still present. These forbs include numerous spring annuals and bulbs like smooth tidy-tips, butter-and-eggs, and Ithuriel's spear followed by some summer perennials including narrow-leaved mule's ears and harvest brodiaea and then culminating in early fall with hayfield tarplant and virgate tarplant. The most important native grass on slopes was purple needlegrass and the most important native grass on the valley floor was beardless wild rye. California prairie in the strategy area and elsewhere is now invaded by a suite of nonnative annual grasses that began with wild oat, ripgut grass, and soft chess, later included rye grass, and now includes aggressive newcomers like medusahead and barbed goat grass. Nonnative forbs, especially yellow starthistle, can also be significant California prairie invaders.

Most of the extant California prairie in Yolo County is now in the Coast Range foothills and the Dunnigan Hills, because their sloping topography has impeded development of irrigated agriculture. Several relict areas of California prairie are on the Central Valley floor, such as Glide Ranch west of UC Davis, which clearly indicates California prairie was once its most widespread natural community. California prairie covers an estimated 80,896 acres, or 12.4 percent, of the RCIS/LCP Area (Table 2-2; Figure 2-9).

Extant California prairie in the Hill and Ridge Landscape Unit is mostly on the Tehama formation and the less widespread Red Bluff formation, but small areas also occur on the Great Valley sequence. California prairie in the Valley Landscape Unit was once widespread on the Modesto formation and in small basins west of fresh emergent wetlands in the Colusa and Yolo Basins (Figure 2-3). Soils most currently and historically associated with California prairie in Yolo County include Corning-Hillgate, Sehorn-Balcom, and Rincon-Marvin-Tehama, but some prairie was also present on Dibble-Millsholm and Capay-Clear Lake (Figure 2-3). Capay-Clear Lake soils occurred in basins in the central part of the county where historically seasonal floods occurred but were of significantly shorter duration periods than the nearly perennial flooding in the main eastern basins supporting fresh emergent wetlands. The central basins are now entirely converted to cropland, but their historic vegetation was likely a prairie seasonal marsh phase in which species like Baltic rush, tall flatsedge, and common spikerush were important.

California prairie soils are typically high in clay, which holds wet season moisture near the soil surface where it is available to the relatively shallow roots of herbs rather than the often deeper roots of woody plants. It also creates a barrier to downward movement of air and water that these deeper roots need. On more porous soils with less clay, the California prairie natural community tends to shift to blue oak woodland on Dibble-Millsholm soils and to Valley oak woodland on Yolo-Brentwood soils.

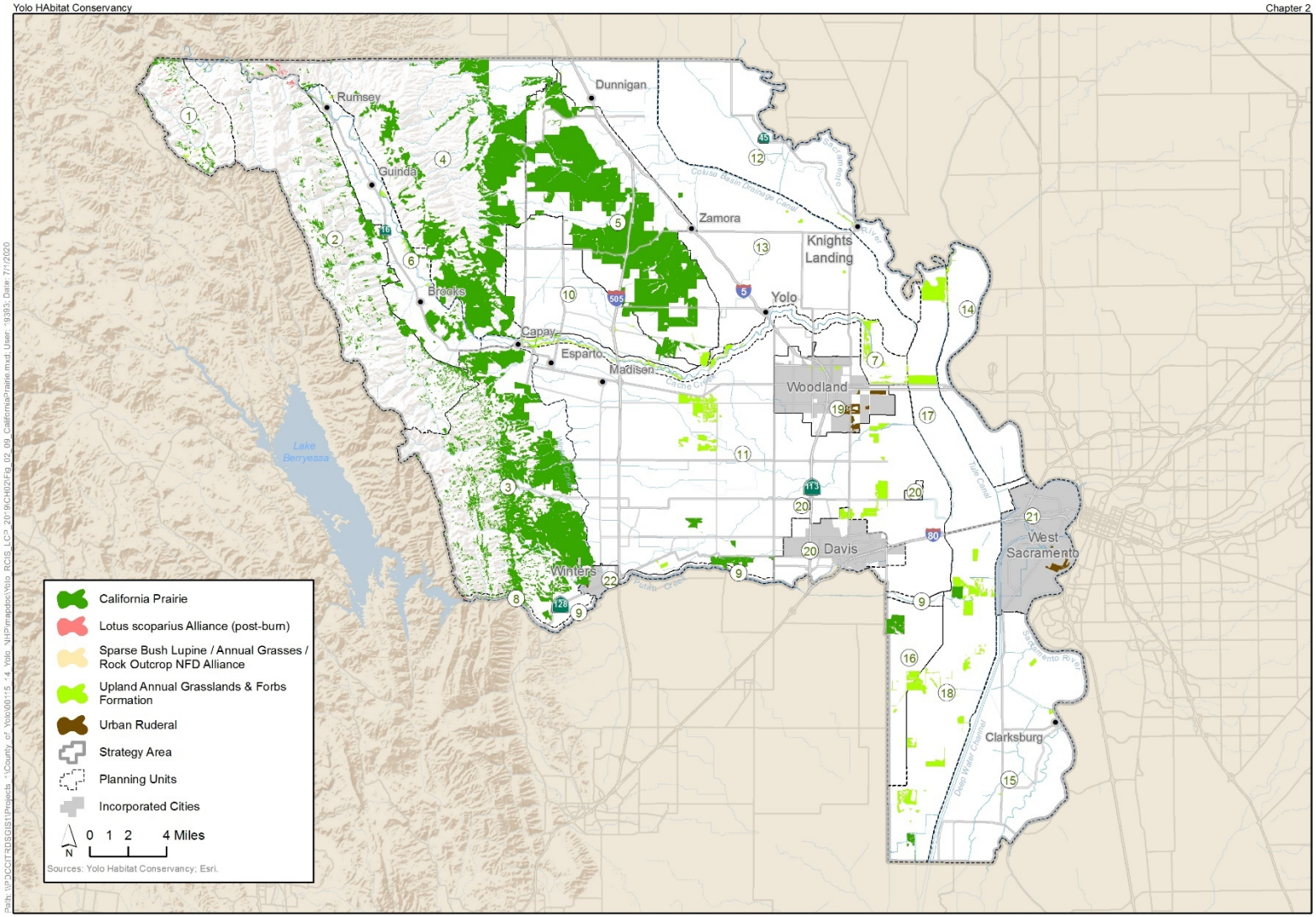
The California prairie natural community is a component of Yolo County's working landscape, in that much of it is used for rangeland. In Yolo County approximately 15,000 acres of, or 0.02 percent, of total land cover is rangeland. Rangeland is located primarily in the central and eastern portions of the RCIS/LCP Area (Figure 2-7). California prairie in Yolo County includes working lands that provide conservation benefits. CFGC Section 1852(e)(1) requires that an RCIS consider "the conservation benefits of working lands for agricultural uses." This section describes the conservation benefits of California prairie, consistent with CFGC Section 1852(e)(1).

The dominant current land use of California prairie is commercial grazing by cattle, which provide ecological effects similar to those once provided by now vanished vast herds of tule elk and pronghorn. Grazing can be a critical control on nonnative invasive plants so that, contrary to conventional wisdom, native prairie plants are typically most abundant where grazing is heaviest. Elk herds once produced localized barren zones with greatly reduced prairie vegetation that several species symbiotically used as primary habitat. This barren phase of prairie is particularly important to the focal species western burrowing owl and mountain plover.

The following RCIS/LCP focal and conservation species occur in, but many are not necessarily restricted to, California prairie.

- San Joaquin pocket mouse
- American badger
- Tule elk
- Tricolored blackbird—for foraging
- Loggerhead shrike—for foraging
- Northern harrier
- Prairie falcon—for foraging
- Western burrowing owl
- Grasshopper sparrow
- Lark sparrow
- Long-billed curlew
- Mountain plover
- Ferruginous hawk
- California tiger salamander—for aestivation
- Western spadefoot
- Northwestern pond turtle—for nesting
- San Joaquin whipsnake
- Molestan beetle
- Bent-flowered fiddleneck
- Round-leaved filaree
- Adobe-lily

- Hogwallow starfish
- Wooly-headed lessingia
- Cotula navarretia
- Keck's checkerbloom



Yolo RCIS/LCP

Figure 2-9
Distribution of California Prairie Natural Community

2.6.3 Serpentine

The serpentine natural community occurs where chemically unusual rocks called serpentine were pushed upward from deep in the earth's mantle to be exposed at its surface. This process is limited to places where violent collisions between land masses occurred in western North America, when land masses called exotic terranes, carried eastward by sea floor spreading, collided with and become welded to the western edge of North America. The collision caused the continent to expand westward from a former shoreline in what is now western Nevada to the present California coast. This process took hundreds of millions of years and involved several distinct exotic terrane collisions and serpentine uplifts. In Yolo County, serpentine soil and its vegetation occurs in a small area in its northwestern corner identified as ultramafic (Figures 2-3, 2-10).

Serpentine is referred to as ultramafic because it is high in magnesium and several heavy metals, and low in calcium, relative to otherwise ubiquitous crustal rocks. This unique chemistry causes vegetation on serpentine to include many localized species and, unlike surrounding non-serpentine vegetation, to have a dull green color, slow growth, and distinctive structure. In Yolo County, most serpentine vegetation has a chaparral understory of leather oak, a near serpentine endemic, and often a woodland overstory of gray pine, which is also common in other areas of the county. In the Yolo HCP/NCCP strategy area, the serpentine natural community only includes serpentine barren and serpentine grasslands land cover types. In Table 2-1 what is defined as serpentine natural community also includes California Bay-Leather Oak Mixed Chaparral Alliance, Leather Oak-Chaparral Alliance, White Leaf Manzanita-Leather Oak Mixed Chaparral Alliance, and McNab Cypress Alliance where serpentine soil is present. This natural community is present in an estimated 2,327 acres, or 0.4 percent of the strategy area (Table 2-2).

The following RCIS/LCP focal and conservation species occur in, but are not necessarily restricted to, the serpentine natural community.

- Townsend's big eared bat
- Purdyi's onion
- Twig-like snapdragon
- Serpentine milkweed
- Brewer's milk-vetch
- Cleveland's milk-vetch
- Jepson's milk-vetch
- Serpentine collomia
- Snow Mountain buckwheat
- Purdy's fritillary
- Hall's harmonia
- Drymaria-like western flax
- Colusa layia
- Hoover's lomatium

- Jepson's navarretia
- Cleveland's ragwort
- Green jewelflower
- Morrison's jewelflower

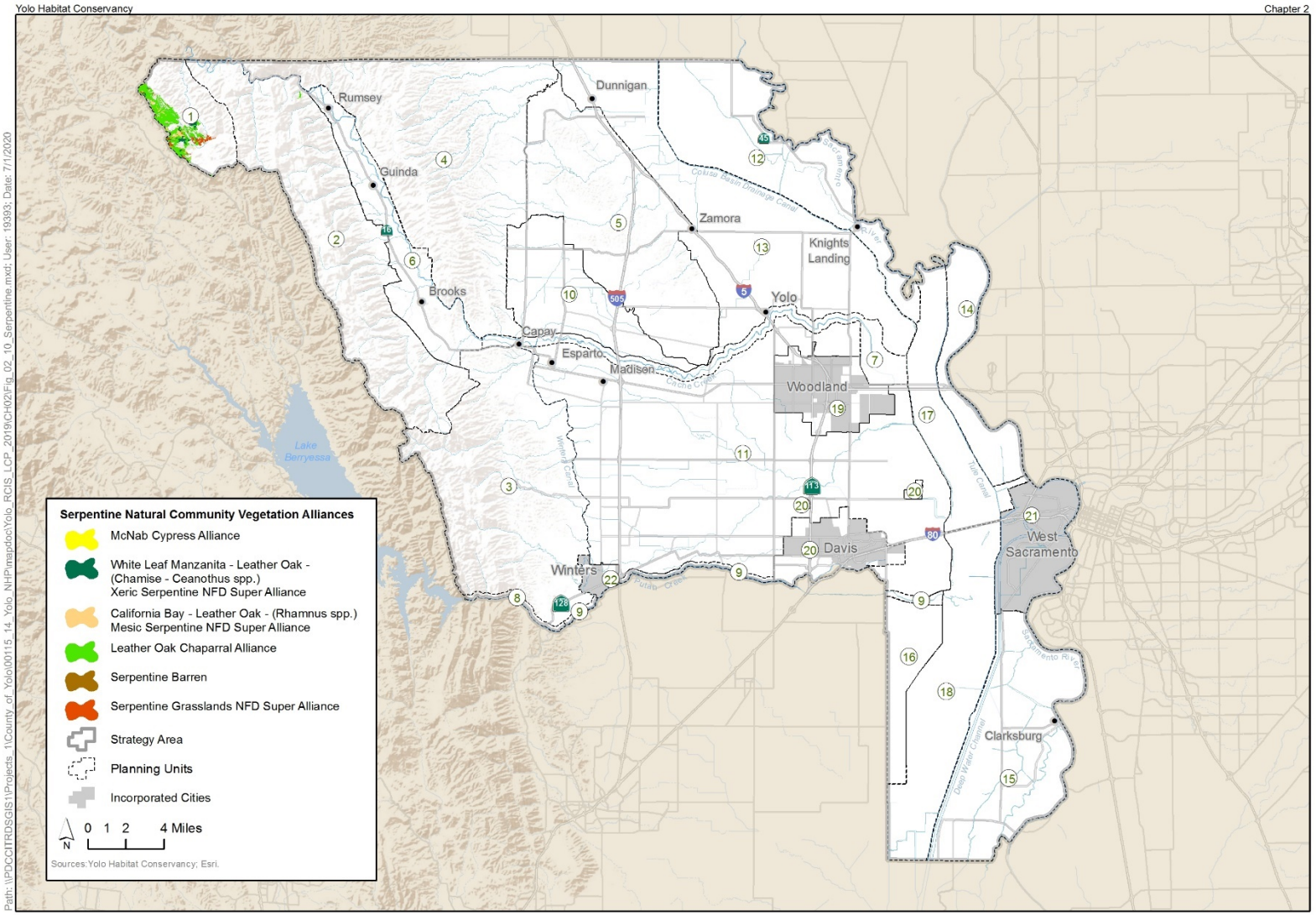


Figure 2-10
Distribution of Serpentine Natural Community

Yolo RCIS/LCP

2.6.4 Chaparral

Chaparral refers to all non-riparian shrub–dominated vegetation in Yolo County except vegetation on serpentine. Most chaparral in the county is on the Coast Range's Great Valley sequence of ancient marine sandstone and shale beds (mapped as metamorphic, intrusive, and sedimentary rocks in Figure 2-4 even though its rocks are not metamorphic or intrusive) uplifted and bent vertically to form Blue Ridge, the main Coast Range ridge along the western edge of Yolo County, and the Capay Hills, a smaller disjunct Coast Range satellite separated from the main range by the Capay Valley. Some chaparral also occurs on the much more recent and less uplifted nonmarine sediments of the Tehama formation northeast of the Capay Hills (Figure 2-11). Chaparral is adapted to a fire cycle in which it burns about every 90 years. When fire burns with this approximate frequency a rich suite of plant and animal species adapted to post-fire early succession can flourish.

The following RCIS/LCP focal and conservation species occur in and are mostly restricted to, the chaparral natural community.

-
- Bell's sparrow
- California thrasher
- Heller's bush-mallow

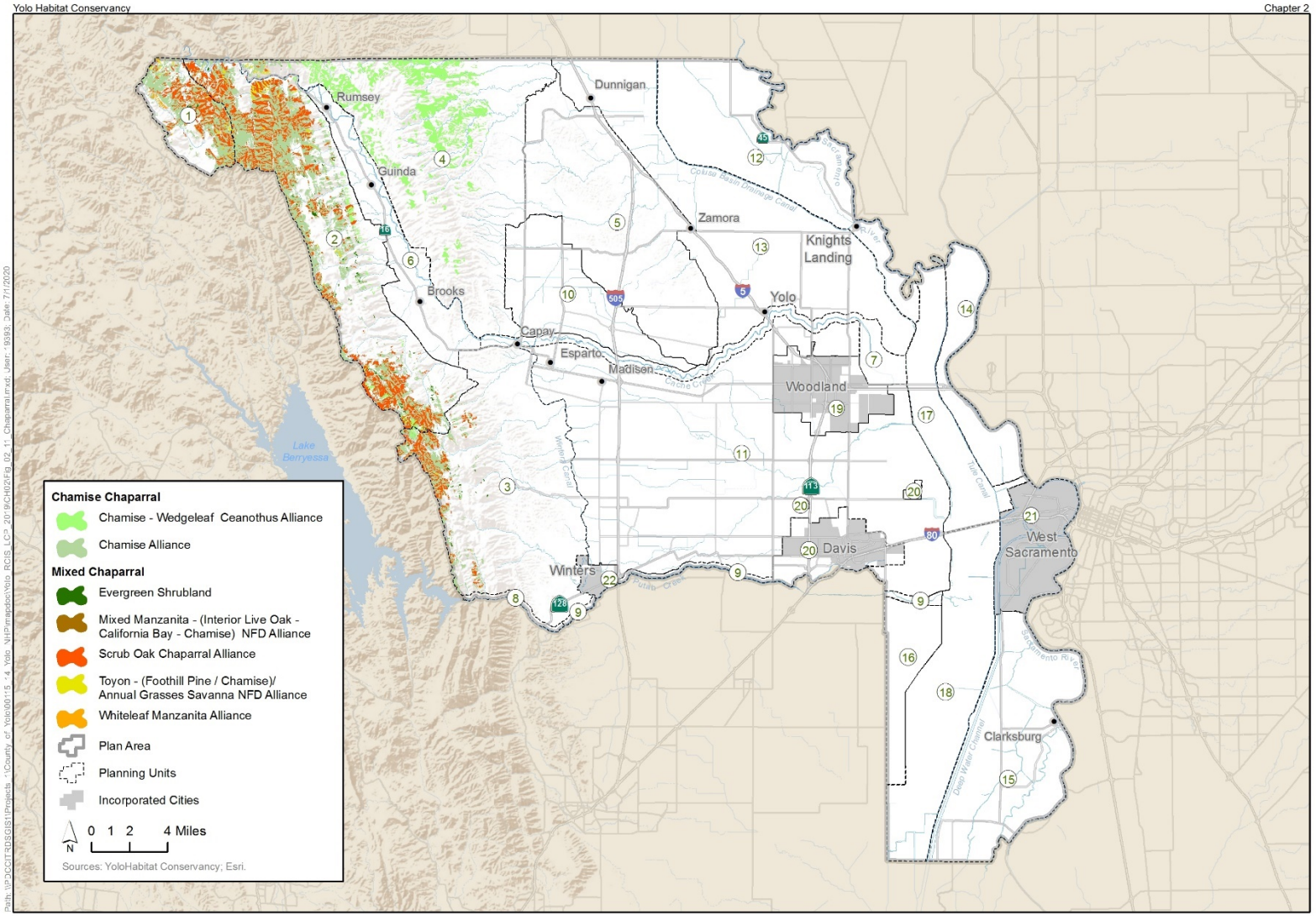
Additionally, the following RCIS/LCP focal and conservation species occur in association with rock outcrops often within the chaparral natural community but also sometimes in other natural communities.

- Pallid bat—historic
- American peregrine falcon—for nesting
- Prairie falcon—for nesting
- Modest rockcress

The strategy area includes two types of chaparral—chamise and mixed. Both types of chaparral are described in the following subsections.

2.6.4.1 Chamise Chaparral

Chamise chaparral occurs in the steepest and most arid habitats and is dominated almost exclusively by a single species—chamise. An estimated 30,137 acres, or 4.8 percent of this natural community is present in the strategy area (Table 2-2).



Yolo RCIS/LCP

Figure 2-11
Distribution of Chaparral Natural Community

2.6.4.2 Mixed Chaparral

Mixed chaparral, which occurs on moister and more shaded slopes with greater soil development and is dominated by a great variety of shrubs including scrub oak, buckbrush, and birch-leaf mountain-mahogany. Both phases of chaparral tend to occur on rocky slopes with little soil development, but soils are typically somewhat more developed on mixed than on chamise chaparral. An estimated 12,425 acres, or 2 percent, of non-serpentine mixed chaparral are present in the strategy area (Table 2-2).

2.6.5 Woodland and Forest

2.6.5.1 Oak Woodlands

Oak Woodland Types in the Strategy Area

Although Figure 2-12 lumps together on maps currently available to the Yolo RCIS/LCP, two quite distinct and extensive oak-dominated assemblages (other than riparian woodland and forests described in Section 2.6.6, *Riparian, Wetland, and Rivers and Streams*) as one unit, *Oak Woodlands*, (Figure 2-12). The RCIS/LCP conservation strategy focuses conservation on Valley oak woodland because it is the rarest and most threatened oak-dominated natural community, but the RCIS/LCP is also concerned with upland woodlands and forests that provide habitat connectivity and support RCIS/LCP focal and conservation species.

Some oak woodlands in Yolo County are a component of the working landscape, in that some of it is used for rangeland. Rangeland is located primarily in the central and eastern portions of the RCIS/LCP Area (Figure 2-7). Some oak woodlands in Yolo County therefore include working lands that provide conservation benefits. CFGC Section 1852(e)(1) requires that an RCIS consider "the conservation benefits of working lands for agricultural uses." This section of the Yolo RCIS/LCP describes the conservation benefits of oak woodlands that might also provide rangeland, consistent with CFGC Section 1852(e)(1).

The California Partners in Flight Oak Woodlands Plan (California Partners in Flight 2002) includes the following summary regarding oak woodlands:

> Oak woodlands have the richest wildlife species abundance of any habitat in California, with over 330 species of birds, mammals, reptiles, and amphibians depending on them at some stage in their life cycle [references omitted]. Wilson and others suggest that California oak woodlands rank among the top three habitat types in North America for bird richness. Oak woodlands are able to sustain such abundant wildlife primarily because they produce acorns, a high quality and frequently copious food supply. Oaks also provide important shelter in the form of cavities for nesting.

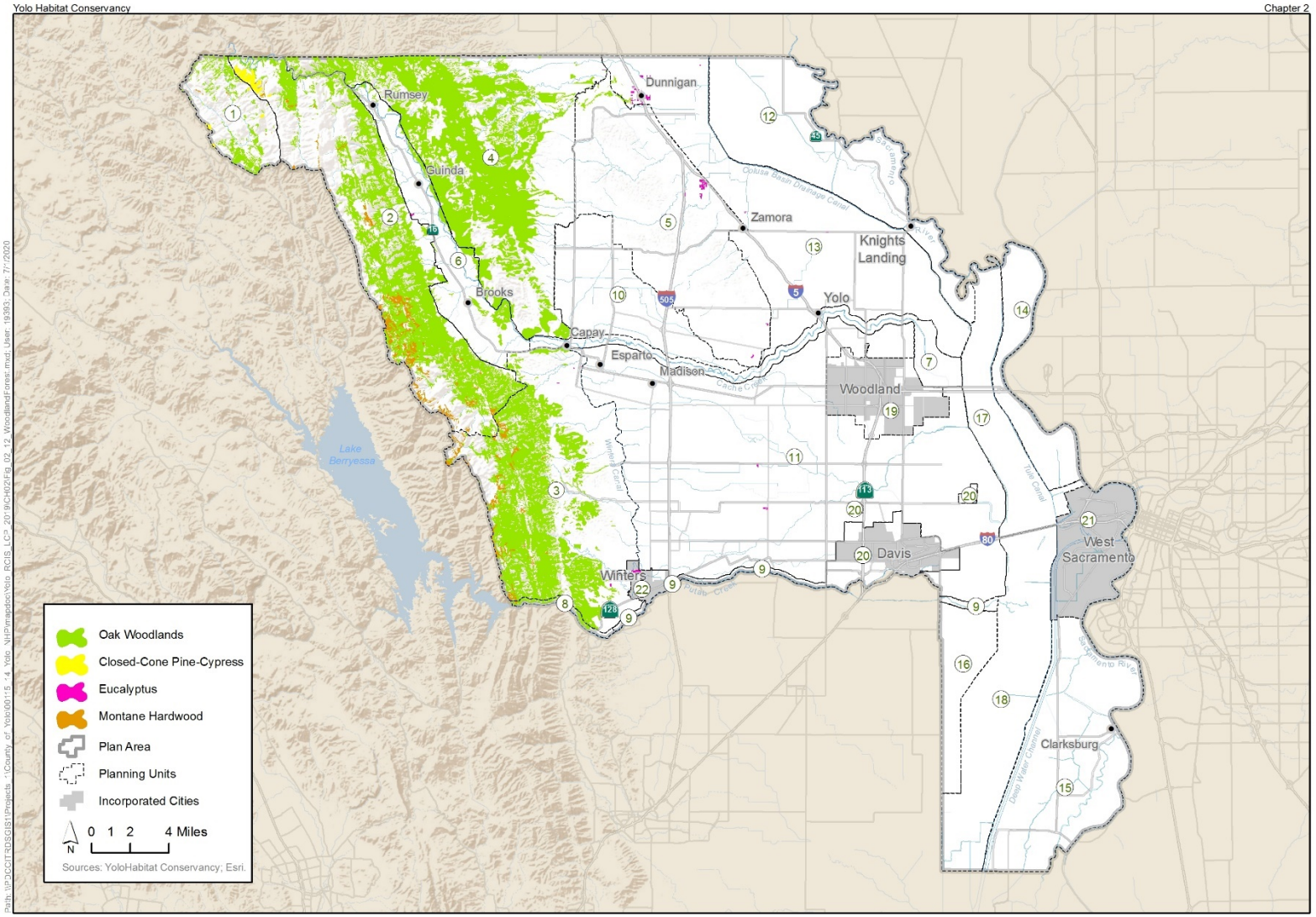


Figure 2-12
Distribution of Woodland and Forest Natural Communities

LCP First Administrative Draft

Upland Woodlands and Forests

Oak-Foothill Pine

The oak-foothill pine vegetation type as defined in the Yolo RCIS/LCP and the Yolo HCP/NCCP is dominated by a tall overstory of well-spaced foothill pine, a mid-level canopy of blue oak and interior live oak, and an understory of tall shrubs including toyon and common manzanita. This vegetation type primarily occurs on the Great Valley sequence but also, to a more limited extent, on the Tehama formation northeast of the Capay Hills and east of Blue Ridge south of Cache Creek (Holstein pers. comm.). It typically occurs adjacent to mixed chaparral on slopes that tend to be less steep, have more soil development, and are more shaded and moist.

Blue Oak Woodland

In Yolo County, blue oak woodland consists of a variably spaced overstory of blue oak with a largely herbaceous understory of moderately shade-tolerant grasses and forbs. Native species like the grasses blue wild-rye and California melic and the forb Ithuriel's spear are common in the understory, but it is also frequently dominated by nonnative species like the grasses wild oat and ripgut grass and the forb yellow starthistle. Large shrubs of common manzanita are occasional but never dominant. Blue oak woodland is widespread on the Great Valley sequence but also significant on the Tehama formation east of the Capay Hills and Blue Ridge (Figure 2-12). It occurs on sites with much greater soil development and often considerably less relief than interior live oak-gray pine woodland. Sometimes blue oak woodland is separated into "woodland" and "savanna" types, which differ largely in terms of percent canopy closure. Generally, these woodlands have an overstory of scattered trees, although the canopy can be nearly closed on some sites (Pillsbury and De Lasaux 1983). Some other occasionally associated shrub species are poison oak, California coffeeberry, and buckbrush.

Montane Hardwood

The montane hardwood natural community typically consists of a dominant hardwood tree component with a shrub understory and little herbaceous vegetation. Tree spacing ranges from 10 to more than 30 feet apart. The Yolo HCP/NCCP mapped some areas as montane hardwood natural community that might be better characterized as oak-foothill pine, as there is little black oak (cna in western Yolo County. These woodlands are found on a wide range of slopes and particularly on moderate to steep slopes. Soil depth may be shallow or deep.

Valley Oak Woodland

The Valley oak woodland natural community consists of tree stands that are dominated by valley oak. The valley foothill riparian natural community, described in Section 2.6.6.1, *Riparian Natural Community*, can be locally dominated by valley oak but encompasses streamside communities that also have other typical riparian species, such as cottonwoods, ash, and willows. The Valley oak woodland natural community occurs primarily on valley floors on sites with deep, well-drained alluvial soils with groundwater accessible to roots of the oaks. Evidence clearly indicates that woodland dominated exclusively by valley oaks was once widespread on parts of Yolo County's valley floors distant from streams in places where shallow groundwater and porous soils were present. Since such conditions also indicate highly productive farmland, agriculture has now replaced almost all Valley oak woodland in Yolo County. Only a few scattered dense groves are left

and, more commonly, small groves of scattered trees or isolated individual trees around farmsteads, agricultural work areas, roadsides, and agricultural fields. It is clear from some of these small surviving patches that beneath a variably open canopy of valley oaks a shrub stratum dominated by blue elderberry and an herbaceous understory dominated by the grass beardless wild-rye with associated forbs like soap plant characterized this natural community. However, most of the few remaining stands of Valley oak woodland in the strategy area lack this diverse understory that was present under historical conditions. Existing Valley oak woodland stands outside the strategy area, in and around the Cosumnes Reserve in Sacramento County, provide an example of historical conditions in the strategy area. Yolo County's Valley oak woodland was likely associated with Yolo-Brentwood and Sacramento soils (Figure 2-3) and recent alluvial and some Modesto formation substrates (Figure 2-4) but how completely it covered them is uncertain. It was likely once an important Yolo County natural community that provided primary habitat for Swainson's hawk, yellow-billed magpie, and valley elderberry longhorn beetle (Holstein 2001, 2003). Ancient ant (*Smithistruma reliquial*) is a species found only in Yolo County in relict valley oak woodland (Holstien pers. comm. 2019).

While valley oak occurs in mixed-oak habitats in western Yolo County primarily in riparian contexts (Section 2.6.6), early maps and relict vegetation clearly indicate that it was formerly much more abundant and widespread in the county's lowlands where abundant groundwater and porous soil were present. Valley oak woodland was formerly a more common habitat type in the county for many RCIS/LCP focal and conservation species. In addition, genetic evidence (Grivet et al. 2008) suggests that the prior occurrence of valley oak forests in eastern Yolo County was part of a biogeographically and evolutionarily significant linkage between valley oak populations in the Coast Range and the Sierra Nevada foothills to the east. This evidence indicates an increased conservation value in maintaining the viability of valley oak populations throughout the lowlands in Yolo County, particularly with respect to climate change adaptation (Sork et al. 2010).

The widespread historic distribution of Valley oak woodland in the strategy area has important conservation implications for the Yolo RCIS/LCP conservation strategy. For example, valley foothill riparian natural community in the strategy area also frequently includes typical riparian vegetation dominated by Fremont cottonwoods and willows immediately adjacent to streams. These valley oaks of the valley foothill riparian natural community are essentially the same as those of the Valley oak woodland natural community except for being more closely associated with a stream. Since these riparian valley oaks are associated with elderberries supporting the valley elderberry longhorn beetle, as are relict stands of non-riparian valley oaks both in Yolo County and at the Cosumnes Preserve, it is reasonable to assume that this beetle was more widespread and common in Yolo County when Valley oak woodland was more widespread there (Holstein pers. comm.). The same is likely also true of Swainson's hawk and white-tailed kite, both of which are associated with valley foothill riparian natural community in the strategy area. It is likely not coincidental that Swainson's hawks west of the Sierra Nevada are particularly associated with valley oaks on the Central Valley floor, including non-riparian valley oaks (Griffin and Critchfield 1972). In fact, the primary nesting and foraging area for Swainson's hawk is the large non-riparian area of the Yolo-Brentwood soil association that forms a connecting corridor between the three valley foothill riparian natural community areas along Cache and Putah Creeks and the Sacramento River, a connecting corridor that may once have been extensively vegetated with Valley oak woodland.

An estimated 181 acres of Valley oak woodland survive in Yolo County, but while there is no doubt much of the county's Valley oak woodland is lost, this small amount mapped in Figure 2-12 may

somewhat undercount what remains of this natural community because some may be included in valley foothill riparian. Despite immense losses of this natural community, it is among the easiest to restore along with its great habitat values where suitable soil is present.

Ecological Functions and Ecosystem Services

Oak woodlands, as defined in the RCIS/LCP, includes a variety of oak-dominated plant alliances corresponding to oak-dominated wildlife habitat types recognized by the CWHR. These vegetation alliances are listed in Table 2-2. Oak woodlands are shown on Figure 2-12. Oaks missing from this mapping include scattered oaks in the eastern portion of the strategy area and oaks along the margins of riparian natural communities (Figure 2-13).

The State Wildlife Action Plan (SWAP) identifies the primary conservation planning target for the Northern California Interior Coast Ranges Ecoregion in western Yolo County as "California Foothill and Valley Forests and Woodlands" (California Department of Fish and Wildlife 2015:Section 5.1 and especially Table 5.1-1). This SWAP conservation target specifically identifies the following CWHR habitat types that occur in the ecoregion: "Blue Oak Woodland; Blue Oak–Foothill Pine; Montane Hardwood; Valley Foothill Riparian; Valley Oak Woodland." All of these CWHR habitat types are included in the Yolo RCIS/LCP (Table 2-3).

The importance of oak woodland habitats for California's wildlife is well documented in the CWHR, and is well understood by wildlife ecologists. As indicated by the CWHR, many wildlife species addressed by the RCIS/LCP are properly characterized as associated with oak-dominated woodland and forest habitats in uplands of the western part of the county; few of these species are tightly linked to one or another of the oak-dominated habitats. A completely different suite of species with little overlap, however, is linked to valley oak forests and woodlands in the county's lowlands. Many wildlife species respond to a range of ecological parameters and can occur in multiple habitats. Others, however, are much more narrowly linked to specific habitats. Wildlife species do not necessarily occur in discrete "communities." Many respond to a variety of habitat elements that can occur in several habitat types, so that: (1) some species typically occur in multiple and quite different habitat types; and (2) there is often overlap in habitat use among wildlife species so that they can occur in several similar habitats. However, many wildlife species require specific habitat elements (e.g., rock outcrops or springs) and may not occur in apparently otherwise suitable habitats if these elements are not present.

SWAP Appendix C, Table C-11 identifies "Species of Greatest Conservation Need" for the California Foothill and Valley Forests and Woodlands macrogroup. Most of the identified species are included in the RCIS/LCP either as focal or conservation species. The following RCIS/LCP focal or conservation species occur in oak-dominated habitat types but sort out into specific upland oak woodland and Valley oak woodland groups. Gathering of location-specific information to determine conservation priorities for these species will be a component of the conservation strategy.

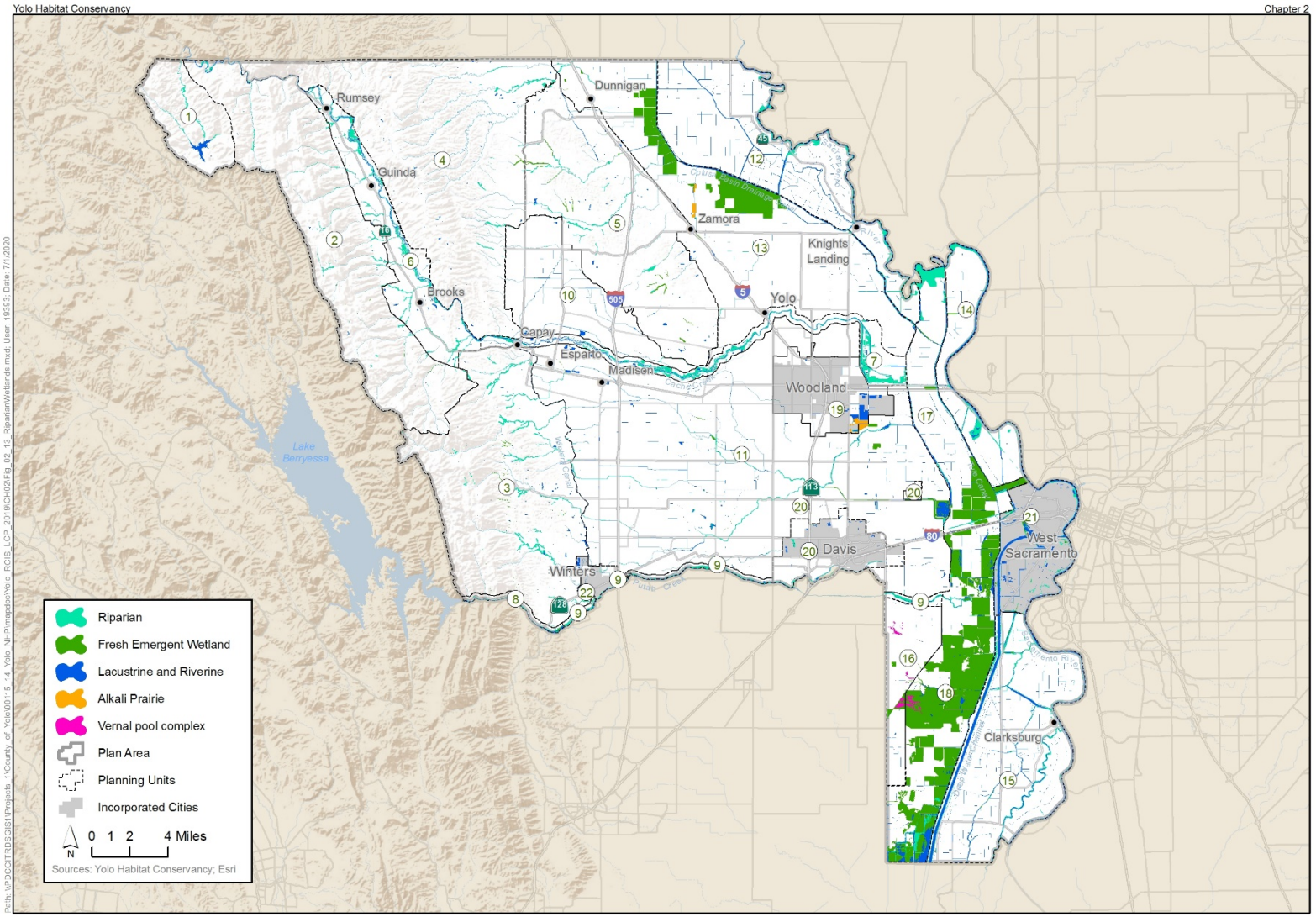


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Figure 2-13
Distribution of Riparian and Wetland Natural Communities

The following RCIS/LCP focal and conservation species occur in and are mostly restricted to the upland oak woodland natural community.

- Deep-scarred cryptantha
- Nodding harmonia
- Jepson's leptosiphon
- Sylvan microseris
- Golden eagle
- Band-tailed pigeon
- Purple martin
- Oak titmouse
- Lewis' woodpecker
- Cooper's hawk
- Black-tailed deer (planning species)
- Long-eared myotis
- Fringed myotis
- Long-legged myotis
- Yuma myotis
- Black bear
- Mountain lion (planning species)

The following RCIS/LCP focal and conservation species occur in and are mostly restricted to the Valley oak woodland natural community.

- Swainson's hawk
- White-tailed kite
- Loggerhead shrike
- Yellow-billed magpie
- Valley elderberry longhorn beetle
- Ancient ant

2.6.5.2 Other Woodland and Forest Types in Strategy Area

Closed-Cone Pine-Cypress

The closed-cone pine-cypress natural community is composed of the knobcone pine alliance and McNab cypress alliance vegetation types. Closed-cone pine-cypress is scarce in the western mountains of the strategy area but is more common in adjacent Napa County. This natural

community is commonly found on serpentine soils; in Yolo County, it often includes leather oak and foothill pine.

There are localized patches of knobcone pine alliance vegetation on the north-facing slope of the Blue Ridge and at the northern boundary of Yolo County immediately above Cache Creek. Little is known about this stand. The University of California McLaughlin Reserve at Little Blue Ridge, at the intersection of Yolo, Napa, and Lake Counties, on both sides of Rayhouse Road, supports the McNab cypress alliance vegetation. This vegetation is almost entirely confined to serpentine soils. It shares many species with the serpentine grassland natural community (Holstein 2013).

Both vegetation types contain relatively small trees that require periodic fires to stimulate the recruitment of new trees. Fire clears the overstory and causes cones to open and release their seeds, resulting in a pulse of seedling recruitment. Stands mature rapidly and typically last between 35 and 100 years, depending on local fire-return intervals (Barbour 2007). McNab cypress trees may occur in stands of mixed serpentine chaparral or may form nearly pure stands.

The closed-cone pine-cypress natural community in the strategy area generally supports the same wildlife species described for oak woodlands.

2.6.6 Riparian, Wetland, and Rivers and Streams

2.6.6.1 Riparian Natural Community

Riparian areas are ecological transitions between aquatic areas and terrestrial areas (National Research Council 2002; California Department of Water Resources 2012). Riparian areas in Yolo County include the aquatic/terrestrial ecotones associated with rivers, streams, lakes, ponds, and wetlands that have prolonged aquatic stages, such as estuarine wetlands in the northern Delta. Because riparian areas affect ecological processes for all aquatic areas, features such as altered streamcourses that provide drainage functions, constructed wetlands that connect to surface watercourses, and other seminatural aquatic features incorporate riparian areas. However, some conservation planning efforts for the Central Valley limit the application of "riparian" to the terrestrial portion of riparian ecotones (California Department of Water Resources 2016).

The riparian natural community mapped in the RCIS/LCP (Figure 2-13) is based on existing information about the distribution of woody vegetation associated with streamcourses and rivers in Yolo County. While riparian areas exist for all aquatic/terrestrial transitions, the application of *riparian* is often limited to areas dominated by woody vegetation. This approach reflects the association between woody riparian vegetation and the high habitat values provided by riparian areas for wildlife. This natural community, defined by dominance of woody vegetation, covers 12,442 acres, or 1.9 percent, of the strategy area (Table 2-2). This map likely underestimates riparian areas because narrow or discontinuous stands of riparian woodland or shrubs are often omitted from regional maps.

Mapped riparian vegetation types are highly diverse, reflecting the diversity of riparian conditions in the county (Tables 2-2 and 2-3; note that the range of variability in species composition in the county's riparian areas is not fully reflected by the table entries). Different riparian vegetation types identified in Tables 2-2 and 2-3 represent differing relative abundances of dominant tree species. When best developed, the riparian natural community consists of gallery forests dominated by Fremont cottonwood, valley oak, Oregon ash, box elder, red willow, black willow, and arroyo willow.

A dense understory of shrubs like California wild rose is also typically present and the trees are often festooned with wild grape lianas. Since these gallery forests can utilize summer streamflow, their primary productivity (as well as that of fresh emergent wetlands) is much higher than that of more widespread upland vegetation and they therefore provide habitat services to many wildlife species disproportionate to their relatively small area.

Many streams have such low seasonal or intermittent flow, however, that their riparian vegetation is much less developed and their productivity and wildlife values are significantly lower than those of the gallery forests. Vegetation of such streams is often riparian scrub dominated by narrow-leaved willow, a shrubby species also frequent on early successional sandbars adjacent to gallery forests.

A distinctive riparian chaparral community occurs along Cache Creek between the town of Capay and the Dunnigan Hills. In that location, coarse gravels depress groundwater sufficiently so that it is largely unavailable to more typical riparian species. Instead, this losing reach of Cache Creek is sparsely but nearly exclusively dominated by shrubs and perennials more typical of Coast Range uplands including California yerba santa and rayless golden aster.

Riparian natural communities are characterized by highly porous soils in zones often too narrowly linear for mapping at the plan level except for Sycamore-Tyndall soils along the Sacramento River (Figure 2-3). These communities are mapped in Figure 2-13 and according to Table 2-2 cover 12,442 acres in Yolo County. Significant nonnative invasive riparian species include smallflower tamarisk, Himalayan blackberry, and giant reed.

Riparian areas occur along streamcourses throughout Yolo County, but hydrological conditions in the western part of the county typically support less-developed riparian vegetation than in the eastern part, and species compositions in these regions often differ. While some species (e.g., valley oak, red willow) occur in many riparian areas throughout the county, other species are often more locally restricted. Riparian habitat associated with western streamcourses in the Coast Range may be dominated by blue oak, interior live oak, and gray pine. Their shrub stratum may be dominated locally by California buckeye, common manzanita, toyon, and western redbud. Riparian areas in the eastern part of the county may be dominated by a diverse mixture of tree species and have a dense shrub understory as well as wild grape lianas.

Riparian habitat is well developed along portions of the Sacramento River, Cache Creek, Putah Creek, Cottonwood Creek/Willow Slough, Dry Slough, Buckeye Creek, Salt Creek/Chickahominy Slough, Union School Slough, Enos Creek, the Colusa Basin Drain, and Sacramento-San Joaquin Delta sloughs including Babel Slough, Winchester Lake, and Elk Slough. Many other streams, sloughs, and canals also support riparian vegetation, although frequently it is less well developed structurally than along larger streams. Habitat continuity provided by riparian elements in a landscape may substantially increase ecological permeability in the entire landscape, creating a *riparian connectivity network* (Fremier et al. 2015), meaning that the network of riparian areas along watercourses in Yolo County (Section 2.9.5, *Habitat Connectivity and Linkages*) potentially constitutes a primary ecological connectivity element in Yolo County's landscape.

The conservation significance of the linkage functions currently provided by Cache Creek and Putah Creek is recognized in the California Essential Habitat Connectivity Project report (Spencer et al. 2010). The ecological linkage values of the Sacramento River, Cache Creek, and Putah Creek riparian corridors for the covered species in the Draft Yolo HCP/NCCP are identified in Chapter 6 of the HCP/NCCP; similar linkage functions are provided for the focal and conservation species in this

RCIS/LCP by other riparian areas in Yolo County. Riparian areas associated with surface watercourses also sustain other ecological services, including maintaining pollinator diversity and pollination services (Greenleaf and Kremen 2006; Morandin and Kremen 2013) and hosting natural predators and parasitoids beneficial for the seminatural agricultural landscape in the county (Kelly et al. 2016; Kross et al. 2016).

Riparian areas provide some of the highest wildlife habitat values in the strategy area. As summarized in the Riparian Bird Conservation Plan (Riparian Habitat Joint Venture 2003):

> More than 225 species of birds, mammals, reptiles, and amphibians depend on California's riparian habitats. Riparian ecosystems harbor the most diverse bird communities in the arid and semiarid portions of the western United States. Riparian vegetation is critical to the quality of in-stream habitat and aids significantly in maintaining aquatic life by providing shade, food, and nutrients that form the basis of the food chain. Riparian vegetation also supplies in-stream habitat when downed trees and willow mats scour pools and form logjams important for fish, amphibians, and aquatic insects." Numerous studies have documented relationships between bird species richness and habitat structural complexity in riparian areas; in the Central Valley, this relationship has been demonstrated for differing avian species groups in both the breeding season and the winter. Riparian areas increase bat abundance and activity patterns in agricultural landscapes, particularly for tree-dwelling species like western red bat.

As indicated by the CWHR, many wildlife species addressed by the RCIS/LCP are associated with riparian habitats. The SWAP identifies a primary conservation planning target for the Great Valley Ecoregion as "American Southwest Riparian Forest and Woodland" (California Department of Fish and Wildlife 2015:Table 5.4-1). This SWAP conservation target identifies a single corresponding CWHR habitat type that occurs in this ecoregion: "Valley Foothill Riparian." SWAP Appendix C, Table C-18, identifies "Species of Greatest Conservation Need" for the Warm Southwest Riparian Forest macrogroup. Most of the identified species that occur in the Yolo County region are included in the RCIS/LCP as focal species for the RCIS and/or as conservation species for the LCP.

The following RCIS/LCP focal or conservation species occur in riparian habitats in Yolo County, although many species also utilize other habitat types.

- Northern California (Hind's) black walnut
- Valley elderberry longhorn beetle
- Foothill yellow-legged frog
- Northwestern pond turtle
- Gopher snake
- White-tailed kite
- Western yellow-billed cuckoo
- Bald eagle
- Swainson's hawk
- Yellow-breasted chat
- Modesto song sparrow
- Bank swallow
- Least Bell's vireo

- Yellow warbler
- Pacific slope flycatcher
- Long-eared owl
- Merlin
- Osprey
- Lesser nighthawk (riparian chaparral phase)
- Western red bat
- Ringtail
- Sacramento Valley red fox
- Mink
- River otter

Riparian Habitat Joint Venture Plan (RHJV 2004) provides the following summary regarding the importance of riparian.

> The National Research Council (2002) concluded that riparian areas perform a disproportionate number of biological and physical functions on a unit area basis and that the restoration of riparian function along America's waterbodies should be a national goal.
>
> Riparian vegetation in California makes up less than 0.5 percent of the total land area, an estimated 145,000 hectares. Yet, studies of riparian habitats indicate that they are important to ecosystem integrity and function across landscapes. Consequently, they may also be the most important habitat for landbird species in California [reference omitted]. Despite its importance, riparian habitat has been decimated over the past 150 years. Today, depending on bioregion, riparian habitat covers 2 percent to 15 percent of its historic range in California.
>
> Due to their biological wealth and severe degradation, riparian areas are the most critical habitat for conservation of Neotropical migrants and resident birds in the West [references omitted]. California's riparian habitat provides important breeding and over-wintering grounds, migration stopover areas, and corridors for dispersal [references omitted]. The loss of riparian habitats may be the most important cause of population decline among landbird species in western North America.

2.6.6.2 Alkali Prairie Natural Community

Alkali prairie resembles California prairie in its domination by herbs, but its species composition is entirely different because of high salt concentration in Willows-Pescadero soils that support this natural community. Salts accumulate and create such soils where drainage across the coalesced alluvial fans of Putah and Cache Creeks is sufficiently impeded to cause their precipitation out of solution. The impediment to fan drainage creating Yolo County's extant alkali prairie was the former Yolo Basin freshwater marsh, where much fan drainage ended at its upper rim. Willows-Pescadero soils also occur west of the Dunnigan Hills and their Plainfield Ridge southern extension where these uplifts presumably also impeded fan drainage, but any alkali prairie that may have once been present there has long since been converted to cropland.

Alkali prairie vegetation is most frequently dominated by spikeplant but other prominent plants include salt-tolerant species such as salt grass, alkali heath, and San Joaquin spearscale. This natural

community is the only habitat of the focal species palmate-bracted bird's beak. An estimated 309 acres, or less than 0.1 percent, of alkali prairie are present in Yolo County (Table 2-2; Figure 2-13).

The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the alkali prairie natural community.

- Western snowy plover—historic
- Ferris' milk-vetch
- Alkali milk-vetch
- Heartscale
- Brittlescale
- San Joaquin spearscale
- Parry's rough tarplant
- Palmate-bracted bird's beak
- Heckard's peppergrass
- Saline clover
- Sticky sand-spurrey

2.6.6.3 Vernal Pool Complex Natural Community

The vernal pool complex natural community consists of complexes of seasonal pools within a grassland matrix. In the strategy area, these seasonal pools form in shallow depressions that hold water due to the slow infiltration rate of the underlying clay alluvial soil (Figure 2-13). The vernal pools on the clay alluvium soils of the floodplains contain a mixture of two general types in basins between seasonal drainages—smaller vernal pools connected by swales and larger playa-type vernal pools (Bryan 1923; Thomasson et al. 1960; Olmsted and Davis 1961). Both types of clay alluvium vernal pools are at elevations slightly above the local drainages and filled primarily by rainfall. The vernal pool complex natural community accounts for 299 acres, or less than 0.1 percent, of the strategy area.

Historically, the vernal pool complex natural community in the strategy area occurred in the flood plains of Cache and Putah Creeks and Willow Slough (Gerlach 2009, 2011). Clay alluvium vernal pools historically occurred in a very limited area; much of that area has since been developed or is intensively farmed.

As a result of their close physical association, intergrading formations and geomorphology, and similar native vegetation, it is often difficult to distinguish between vernal pool complex natural community and alkali prairie natural community. Remnant patches of a vernal pool complex natural community occur at Woodland Regional Park, Grasslands Regional Park, and the Tule Ranch Unit of the CDFW Yolo Bypass Wildlife Area.

The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the vernal pool complex natural community.

- Conservancy fairy shrimp

- Vernal pool fairy shrimp
- Midvalley fairy shrimp
- Vernal pool tadpole shrimp
- California linderiella
- California tiger salamander
- Western spadefoot
- Vernal pool smallscale
- Ferris' goldfields
- Coulter's goldfields
- Little mousetail
- Baker's navarretia
- Colusa grass
- Delta wooly-marbles
- Solano grass

2.6.6.4 Fresh Emergent Wetland Natural Community

Natural communities in what is now Yolo County appear to have included extensive areas of emergent wetlands, defined as areas with hydrological and substrate conditions that require specialized adaptations by plant species rooted in these wetlands for living in their biochemically altered conditions. Fresh emergent wetlands were once widespread in the Yolo and Colusa Basins, and despite their extensive drainage and conversion to cropland some wetlands are still extant. These basins include the lowest elevations in Yolo County and historically were nearly perennially, shallowly flooded by flows from the Sacramento River and other streams then uncontrolled by dams and unconstrained by artificial levees. The basins were separated from the river by natural levees covered by Valley oak woodland. Such wetlands are on Capay-Clear Lake soils and likely dominated most of the southeastern part of the county in 1850 (Whipple et al. 2012). Current interpretations of historical conditions indicate that most of these emergent wetlands were tidally influenced, although it is likely that the tidal influence did not involve increased salinity for most of the county's current area. The majority of the pre-settlement natural community types in southeastern Yolo County (and likely a substantial fraction of the natural communities in eastern Yolo County as far north as the Colusa County line) were fresh emergent wetlands. The ecological composition of these historical wetlands is uncertain, although historical accounts of the Delta region (Whipple et al. 2012) suggest that tule/hardstem bulrush and California/southern bulrush were dominant in large areas of emergent wetland in the northern Delta. The Delta wetland ecosystem, however, provided a wide variety of ecological conditions to which species could adapt, and fresh emergent wetlands in Yolo County may have included many additional plant species.

Since the mid-19th century most of the former wetlands have been converted to agricultural and urban uses. Currently approximately 26,299 acres, or 4 percent, of the strategy area are mapped as fresh emergent wetland (Table 2-2; Figure 2-13). Most of the currently mapped occurrences are associated with management for marsh-like wetland conditions during at least part of the year,

particularly in winter (such as for hunt clubs). Because the areas of historical emergent wetlands are not accurately known, the percentage reduction in emergent wetland area for Yolo County is uncertain, but may be close to the estimates of greater than 90 percent that have been made for wetlands in the Central Valley as a whole. However, it is likely that most existing emergent wetlands do not much resemble the habitat conditions provided in pre-settlement emergent wetlands.

Fresh emergent wetlands in the Central Valley currently are a conservation priority because of their importance as habitat for wintering bird species, particularly waterfowl and shorebirds. Current collaborative management approaches involving public agencies, nonprofit organizations, and landowners have resulted in land management approaches (e.g., flooding rice croplands) that increase wetland areas in the Central Valley in winter. The Central Valley has been identified as supporting about 60 percent of the waterfowl (exclusive of sea ducks) wintering in the Pacific Flyway, and as one of the most important regions for shorebirds in western North America, holding more birds in winter and spring than any other inland area (Shuford 2014). The 2006 Implementation Plan of the Central Valley Joint Venture identified existing wetland acreages, and target acreages for wetland acquisition, restoration, and enhancement, in Central Valley counties, including Yolo County. More recently wetland needs (acreages and habitat types) have also been articulated for other waterbird species (e.g., pelicans, egrets, cranes and rails, gulls) in the Central Valley as part of national bird conservation planning efforts (Shuford 2014).

Most of the factors that support emergent wetland restoration and enhancement are present in eastern/southeastern Yolo County, and addressing restoration or enhancement of fresh emergent wetlands in the strategy area will be consistent with strategies identified in this plan. However, historical fresh emergent wetlands were also present in other parts of the county (e.g., west-county region south of Cottonwood Creek/Willow Slough), and restoration and enhancement opportunities for emergent wetlands also exist throughout the county where adequate water is available. Smaller emergent wetlands that are dispersed throughout the county could increase Yolo County populations of several RCIS/LCP focal and conservation waterbird species (e.g., black rail, tricolored blackbird).

The SWAP identifies a primary conservation planning target for the Great Valley Ecoregion as "*Freshwater Marsh*" (California Department of Fish and Wildlife 2015:Table 5.4-1). This SWAP conservation target identifies a single corresponding CWHR habitat type that occurs in this ecoregion: "Fresh Emergent Wetland." SWAP Appendix C, Table C-18, identifies "Species of Greatest Conservation Need" for the Western North American Freshwater Marsh macrogroup. Most of the identified species that occur in the Yolo County region are included in the RCIS/LCP as focal species for the RCIS and/or as conservation species for the LCP.

The following RCIS/LCP focal and/or conservation species are among those typically occurring in fresh emergent wetland habitats.

- Lagoon sedge
- Rose mallow
- Delta tule pea
- Mason's lilaeopsis
- Suisun Marsh aster
- Giant garter snake

- Redhead
- Black tern
- Least bittern
- California black rail
- Short-eared owl
- American peregrine falcon
- Modesto song sparrow
- Tricolored blackbird
- Yellow-headed blackbird
- Double-crested cormorant
- Snowy egret
- White-faced ibis

2.6.6.5 Lacustrine and Riverine Natural Community

This natural community consists of all relatively permanent open water in Yolo County, including those waters created by human activity. Open water usually has very sparse vegetation that is limited to exclusively aquatic plants like species of *Potamogeton,* and it can occur on any soil. Stock ponds, although miniscule and humanly created examples of this community, are important as extremely critical habitat elements for breeding by species such as California tiger salamander. Lacustrine and riverine areas are mapped on Figure 2-13 and cover an estimated 13,203 acres, or 2 percent, of the RCIS strategy area (Table 2-2).

The CVFPP Conservation Strategy classifies the following seven types of landscape units in the Sacramento Valley, including Yolo County, associated with the lacustrine and riverine natural community.

- **Major River Reach.** Approximately 2-mile-wide corridors of land (i.e., corridors extending 1 mile to each side of the river's centerline) along the major rivers (Sacramento River in the strategy area) and the lowermost reaches of major tributaries.
- **Basin/Bypass.** Land in a flood basin or bypass, plus an adjacent 0.5-mile-wide buffer outside the bordering levees.
- **Other Facility/Waterway.** One-mile-wide corridors of land (i.e., corridors extending 0.5 mile to each side of the facility's centerline) along State Plan of Flood Control (SPFC) levees (and Urban Levee Evaluation nonproject levees) that are not part of any of the preceding types of landscape units.
- **Other Valley Conservation Planning Areas.** The remainder of the Sacramento and San Joaquin Valleys that is not part of a bypass, basin, or otherwise classified corridor.

The CVFPP Conservation Strategy classifies the following habitat types associated with the lacustrine and riverine natural community as targets for conservation (California Department of Water Resources 2016:4-4).

- **Shaded Riverine Aquatic Cover.** Shaded riverine aquatic cover is defined as the unique near-shore aquatic area occurring at the interface between a river (or stream) and adjacent woody riparian habitat (U.S. Fish and Wildlife Service 1992). This aquatic area includes the following key attributes.
    - The adjacent bank is composed of natural, eroding substrates supporting riparian vegetation that either overhangs or protrudes into the water.
    - The water contains variable amounts of woody debris, such as leaves, logs, branches and roots, often substantial detritus, and has variable velocities, depths, and flows.

    The following attributes of shaded riverine aquatic cover make it an important component of fish and wildlife species habitat, with each attribute providing different habitat elements (U.S. Fish and Wildlife Service 1992).
    - Overhanging riparian vegetation and sometimes riverbanks provide several types of habitat values to fish and wildlife species.
    - Shade moderates water temperatures, which is particularly important to salmonids.
        - Shade and cover also reduce visibility to predators.
        - Input of plant material provides in-stream cover for fish.
        - The terrestrial and aquatic invertebrates associated with vegetation and plant material provide food to birds and aquatic species.
        - Plant stems and branches serve as perches, and as nesting and resting areas, for birds.
    - Natural, eroding banks often have cavities, depressions, and vertical faces that support bank-dwelling species, such as bank swallow, northern rough-winged swallow, belted kingfisher, mink, beaver, and river otter, and that provide cover and shelter for fish. Bank-dwelling species may use these banks and their cavities to access the water or for nesting. Erosion of natural bank substrates provides in-stream spawning substrate for aquatic species, including salmonids.
    - In-stream cover, including overhanging or fallen trees or branches, aquatic vegetation, diverse substrate sizes, and irregular banks, provides habitat complexity to fish and wildlife, and supports a high diversity and abundance of invertebrate and fish species.
- **Riparian Habitats.** As used in the CVFPP Conservation Strategy (California Department of Water Resources 2016) and this RCIS/LCP, riparian habitats refers to the forest, woodland, and scrub vegetation characteristic of riparian areas in the Sacramento and San Joaquin Valleys. They typically occur in association with the lacustrine and riverine natural community, but are categorized for the RCIS/LCP as riparian natural community and described in Section 2.6.6.1.
- **Marshes and Other Wetlands.** Although marshes and other wetlands typically occur in association with the lacustrine and riverine natural community, they are categorized for the RCIS/LCP as fresh emergent wetland natural community and described in Section 2.6.6.4, *Fresh Emergent Wetland Natural Community.*

The following RCIS/LCP focal or conservation species occur in, but are not necessarily restricted to, the lacustrine and riverine natural community.

- White sturgeon

- Green sturgeon
- Delta smelt
- Central Valley steelhead
- Sacramento River winter-run Chinook salmon
- Central Valley spring-run Chinook salmon
- Central Valley fall- and late fall-run Chinook salmon
- Sacramento splittail
- Pacific lamprey
- River lamprey
- Longfin smelt
- Hardhead
- Sacramento perch
- Giant garter snake
- Northwestern pond turtle
- California tiger salamander (occur in stock ponds for breeding)
- Foothill yellow-legged frog

2.7 Other Land Cover Types

The land cover types described in this section are not classified as natural communities under this RCIS/LCP because they have little or no habitat value for the focal and conservation species.

2.7.1 Other Agricultural Land

The following agricultural land cover types do not provide habitat for most native species, and are not included in the cultivated lands natural community for the purpose of the RCIS/LCP. However, these lands may provide habitat value for some species, and can provide buffers between natural communities and nearby development. Furthermore, these lands have the potential to rotate into crop types that have value for focal species.

2.7.1.1 Citrus and Subtropical Orchards

Citrus and subtropical orchards in the strategy area are typically single-species, tree-dominated agricultural lands and do not support any local concern species. In the strategy area, this land use category includes olives, oranges, and kiwis. Citrus and subtropical orchards account for 1,159 acres, or 0.18 percent of the strategy area (Table 2-2; Figure 2-14).

2.7.1.2 Deciduous Fruit and Nut Orchards

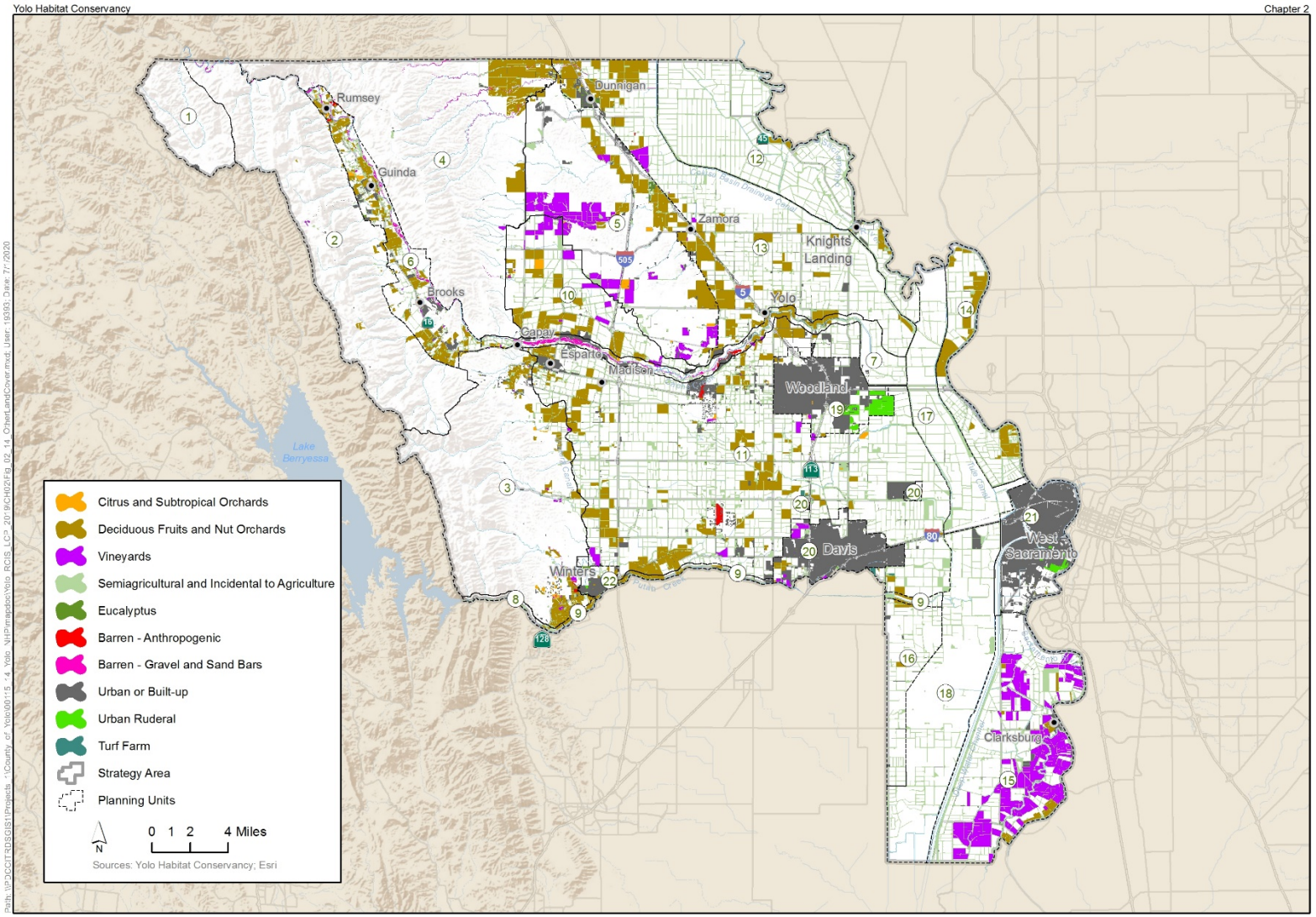
Deciduous fruit and nut orchards are typically planted with a single tree species. In the strategy area, this land use category includes various small trees such as almonds, apples, apricots, figs, peaches, nectarines, pears, pistachios, prunes, mixed deciduous fruits and nuts, and walnuts. It is most frequent on Yolo-Brentwood soils but is widespread in the county on a variety of other soils. Deciduous fruit and nut orchards support a number of common wildlife species, including American crow, American robin, and house finch. Black-tailed deer, jack rabbits and cottontail rabbits may browse on foliage, while California ground squirrels may consume fruits and nuts. Deciduous fruit and nut orchards also do provide some support for pallid bat and yellow-billed magpie. Deciduous fruit and nut orchards account for 48,092 acres, or 6.7 percent of the strategy area, but because of currently high nut prices orchards are now expanding rapidly in Yolo County (Table 2-2; Figure 2-14).

2.7.1.3 Vineyards

Grapes for wine, a vine typically grown as a shrub in vineyards, are an increasingly important Yolo County crop but provide much less habitat for its native wildlife than many others. They are primarily grown in the Dunnigan Hills on Sehorn-Balcom soils and in the southeastern part of the county on Sacramento and Sycamore-Tyndall soils (Figures 2-3 and 2-14). Vineyards cover an estimated 17,133 acres, or 2.6 percent, of the RCIS strategy area.

2.7.1.4 Turf

Turf consists of sod farms that are heavily maintained to eliminate pests. This crop undergoes frequent fertilization, watering, mowing, and vacuuming to remove grass clippings. Because of the heavy maintenance required for this crop and lack of prey base, turf has little to no habitat value for wildlife. Turf farms account for 141 acres, or less than 0.1 percent of the RCIS strategy area (Table 2-2; Figure 2-14).



Yolo RCIS/LCP

Figure 2-14
Distribution of Other Land Cover Types

2.7.2 Semiagricultural and Incidental to Agriculture

Semiagricultural areas include livestock feedlots, farmsteads, and miscellaneous semiagricultural features such as small roads, ditches, and unplanted areas of cropped fields (e.g., field edges). Feedlots are confined livestock feeding operations that are used for preparing livestock, mainly cattle, for slaughter. They may contain thousands of animals in an array of pens and support virtually no vegetation. Poultry farms raise chickens, turkeys, ducks, and geese for meat or egg production. Egg-producing farms house birds in rows of cages or batteries. Light duration, which mimics summer day length and stimulates birds to lay eggs year round, and other environmental conditions are automatically controlled. Meat chickens, commonly called broilers, are floor-raised on litter such as wood shavings or rice hulls in climate-controlled housing. Like feedlots, chicken farms generally do not support any vegetation. This land cover type incidental to agriculture covers a surprisingly high 30,494 acres according to Table 2-2 but this figure may be high because little is visibly mapped in Figure 2-14 when compared with the previous land cover type of orchards and woodlots. This cover type includes a variety of non-crop rural landscape features that contribute structural variety and thus frequently enhance habitat for native wildlife. Semiagricultural areas account for 30,494 acres, or 4.7 percent of the strategy area (Table 2-2; Figure 2-14). Most of the acreage in this land cover type consists of farmsteads and field edges, which provide habitat for Swainson's hawk, white-tailed kite, loggerhead shrike, and western burrowing owl.

2.7.3 Eucalyptus

Eucalyptus consists of monotypic eucalyptus stands that have been generally planted for wood production or as wind breaks for fields and buildings. This land cover type has a dense canopy and groundcover that consists of a thick layer of leaf litter and bark. Sparsely planted trees may have a dense, herbaceous and shrub understory. Tree spacing and species composition influence the size of mature eucalyptus groves. Eucalyptus species (primarily blue gum, *Eucalyptus globulus*) have invaded the riparian natural community in some areas, and are likely increasing, but eucalyptus is still a more localized threat than some other invasive species (e.g., tamarisk, giant reed). Eucalyptus stands account for 369 acres, or less than 0.1 percent of the strategy area, with most stands located in the town of Dunnigan and on a few isolated parcels that were planted as woodlots in agricultural lands (Table 2-2; Figure 2-14).

Eucalyptus supports several common wildlife species, including barn owl, red-shouldered hawk, American crow, and Anna's hummingbird. One eucalyptus grove north of Davis supports a large nesting colony (rookery) of egrets and herons. Some Swainson's hawks and other native raptors regularly nest in eucalyptus trees.

2.7.4 Anthropogenic Barren

This land cover type includes an estimated 414 acres of levees, or less than 1 percent, of the RCIS strategy area (Table 2-2). As discussed for the California prairie natural community, some prairie species specifically depend on a barren prairie phase caused by heavy grazing. Among the most significant of these species is the focal species western burrowing owl. As true barren prairies become scarcer in Yolo County it increasingly uses anthropogenically created barren areas as habitat. Other species are western snowy plover and mountain plover. Some of the barren areas are included here, but others are likely included under other land cover types like semiagricultural

rural. The barren land use subcategory also includes 1,372 acres of gravel and sand bars as well as 333 acres of rock outcrops.

2.7.5 Developed

Developed areas are dominated by pavement and building structures. Vegetation in developed areas generally consists of vegetated corridors (e.g., vegetation maintained adjacent to highways) and patches of mostly ornamental vegetation such as urban park tree groves, street strips, shade trees, lawns, shrubs typically supported by irrigation. Urban lands cover 45,487 acres, or 7.0 percent of the strategy area (Table 2-2). This area includes urban vegetation and all areas with structures, graded lots, roads and highway medians, anthropogenic drainage, canal vegetation, rail rights-of-way, and sewage treatment ponds that do not provide habitat. Among covered species Swainson's hawk and white-tailed kite use urban trees in this habitat for nesting and purple martin uses structures for nesting primarily in adjacent Sacramento County but also rarely in Yolo County.

2.8 Focal and Conservation Species

This section is applicable to the LCP only, and is not subject to CDFW review or approval.

The RCIS focal species are listed in Group 1. LCP conservation species are listed in Groups 2 and 3, as described in Section 1.4.5, *Focal Species and Conservation Species*. Appendix C provides species accounts for each of the focal species in Group 1 and the conservation species in Group 2. These species accounts include information on the status, life history, distribution, population trends, and habitat use of each of the focal species. The species accounts summarize the main elements of each species' life history, including habitat and species associations (e.g., vegetation communities, interspecific relationships), key habitat requirements (e.g., soils, cliffs, burrows, nest trees, flow regimes, disturbance), area requirements, dispersal abilities, reproductive requirements and abilities, forage and cover needs, temporal requirements of various needs, and relevant behavioral ecology. The species accounts are not intended to include all biological information that is known about a species. Rather, each account summarizes the scientific information that is relevant to the RCIS/LCP. The biological data presented in these accounts provide the basis for the RCIS/LCP conservation strategy.

The accounts summarize each species' overall distribution, and where in the strategy area the species is known to occur based on available GIS data, published and unpublished literature, and expert knowledge. The species accounts also identify the status and population trend for each species, and known or potential threats and other limiting factors throughout its range and specifically in the strategy area.

Information in the species accounts was used to develop species habitat models for evaluating the distribution of potentially suitable habitat in the strategy area for each Group 1 species (i.e., focal species). Information in the species accounts can be used to identify focal species conservation needs during implementation, and to inform adaptive management and monitoring. The species models are described in the species accounts. The models can be used to predict which focal species are expected to occur on lands identified for conservation, for the purpose of prioritizing lands for conservation.

For each species model, one or more of the vegetation types or soil types that are commonly associated with the species were used to predict the distribution of potentially suitable habitat. Some species required a more complex species habitat model that considered many factors and habitat associations (e.g., elevation, slope, distance to water, or other factors, in addition to vegetation community or soil type). Most models include more than one habitat category type for a given species to represent its distribution accurately. For example, the model for the Swainson's hawk incorporates known breeding locations, characterizes suitable nesting habitat, and identifies natural and agricultural foraging habitat area. Together, these data sources and modeling outcomes predict the distribution and quality of habitat for the hawk. The parameters that went into each model are described in the species accounts (Appendix C). Central elements of the model development process and its outcome are summarized here.

Known locations of occurrences of covered species, derived mostly from the California Natural Diversity Database (CNDDB), were incorporated into the GIS data and used both to formulate habitat models (e.g., identifying the mapped land cover type in which the species typically occurs) and test the habitat models (e.g., determining if all known occurrences fall within the modeled habitat). Evaluations of habitat extent were made using aerial imagery to delineate occupied, rather than modeled, habitat of covered species for which information was available. The date of baseline occurrence data was September 2015 for the CNDDB; individual surveys are listed in Appendix C, *Covered Species Accounts,* in the occurrence sources (e.g., Estep 2007, 2008 for the Swainson's hawk).

Further refinement was made to the models by using known ranges of species, as found in the extent maps of the California Wildlife Habitat Relationships Systems. This was done in coordination with CDFW staff members. Expert input from CDFW was also used to filter model outputs to known locations of suitable habitat by planning units. Additionally, Eric Hansen and species experts from USFWS and USGS validated the giant garter snake model.

Comprehensive survey information across the entire strategy area on known species locations was not available for the covered species; therefore, the species habitat models were especially useful tools for estimating the potential distribution of each species. To supplement the available species location data, the species habitat models provided the following:

- Allowed reasonably reliable prediction and extrapolation of species occurrences for areas where adequate survey data were lacking.
- Provided a basis for synthesizing and analyzing multiple data sources across the entire Plan Area.
- Provided a means for identifying and comparing biological values throughout the Plan Area (i.e., which areas are most important for species and habitat conservation, and what are their priorities for conservation).
- Provided a basis for comparing the conservation value of existing conditions and the merits of alternate preserve designs.

The species habitat models were developed with consideration of error rates for identifying actual suitable habitat. Habitat model errors include both false-negative habitat (those areas that are actually suitable habitat but are not included within the modeled habitat area) and false-positive habitat (those areas that are not actually suitable habitat but are included within the modeled habitat area). The general rule used in developing the species habitat models was to reduce false-

negatives for habitat to the greatest extent possible within the resolution of the GIS data available but not to increase false-positives for habitat to such an extent that the model provides no valuable information for conservation planning or impact assessment. The models generally overestimate the amount of actual habitat in the Plan Area because the approach for minimizing false-negatives was used. The species habitat models were developed for the purpose of preparing the conservation strategy. Implementation of the RCIS/LCP will be based on the habitat that is present on lands conserved under this RCIS/LCP rather than the habitat models.

2.9 Other Conservation Elements

This section provides a summary for each of the conservation elements identified in Section 1.4.7, *Other Conservation Elements.* These conservation elements are integrated throughout Chapter 3, *Conservation Strategy.* Appendix E, Table E-18 summarizes how the conservation strategy addresses each of these conservation elements.

2.9.1 Natural Communities and Habitat

Natural Communities and habitat are described in depth in Section 2.6, *Natural and Seminatural Communities and Associated Plant and Wildlife Species*.

2.9.2 Biodiversity

Figure 2-15a through 2-15c are maps of the biodiversity indices for the strategy area, as mapped through CDFW's *Areas of Conservation* (ACE) effort. ACE is a compilation and analysis of the best available statewide information on California's biological richness, including species diversity, rarity, and endemism. Areas with the highest overall biodiversity ratings (a rating of 5) based on the ACE include the Lower Yolo Bypass and South Yuba Basin, the Willow Slough Basin surrounding and north of the City of Davis, the Little Blue Ridge area, the northernmost portion of the North Blue Ridge area, and smaller spots along Upper Putah Creek and the Dunnigan Hills area. Other areas with high biodiversity (a rating of 4) include the Colusa Basin, portions of upper Yolo Bypass, and portions of Cache Creek. As shown on Figure 2-15a, areas with the highest species richness are in the western part of the county where natural lands are prevalent. The rarest species, however, are concentrated in several widely scattered patches, including the northwestern corner of the county (Little Blue Ridge and North Blue Ridge), the Dunnigan Hills area, along Cache and Putah Creeks, around Yolo Bypass, and surrounding the cities of Woodland and Davis where agricultural areas are prevalent (Figure 2-15b). There are four concentrated areas of irreplaceability, defined as supporting narrowly distributed endemic species (i.e., few or no other areas in the state support the same suites of species), as shown on Figure 2-16c.

2.9.3 Environmental Gradients

Section 1.4.7.2, *Environmental Gradients,* describes the importance of this conservation element in the strategy area. Important environmental gradients in the strategy area include hydrology, elevation, soils, slope, and aspect. These characteristics are described in detail in Section 2.2, *Physical Characteristics.*

2.9.4 Existing Protected Areas

Section 2.4, *Protected Areas,* describes the existing protected areas in the strategy area. Section 1.4.7.4, *Existing Protected Areas,* describes the importance of this conservation element for the Yolo RCIS/LCP.

2.9.5 Habitat Connectivity and Linkages

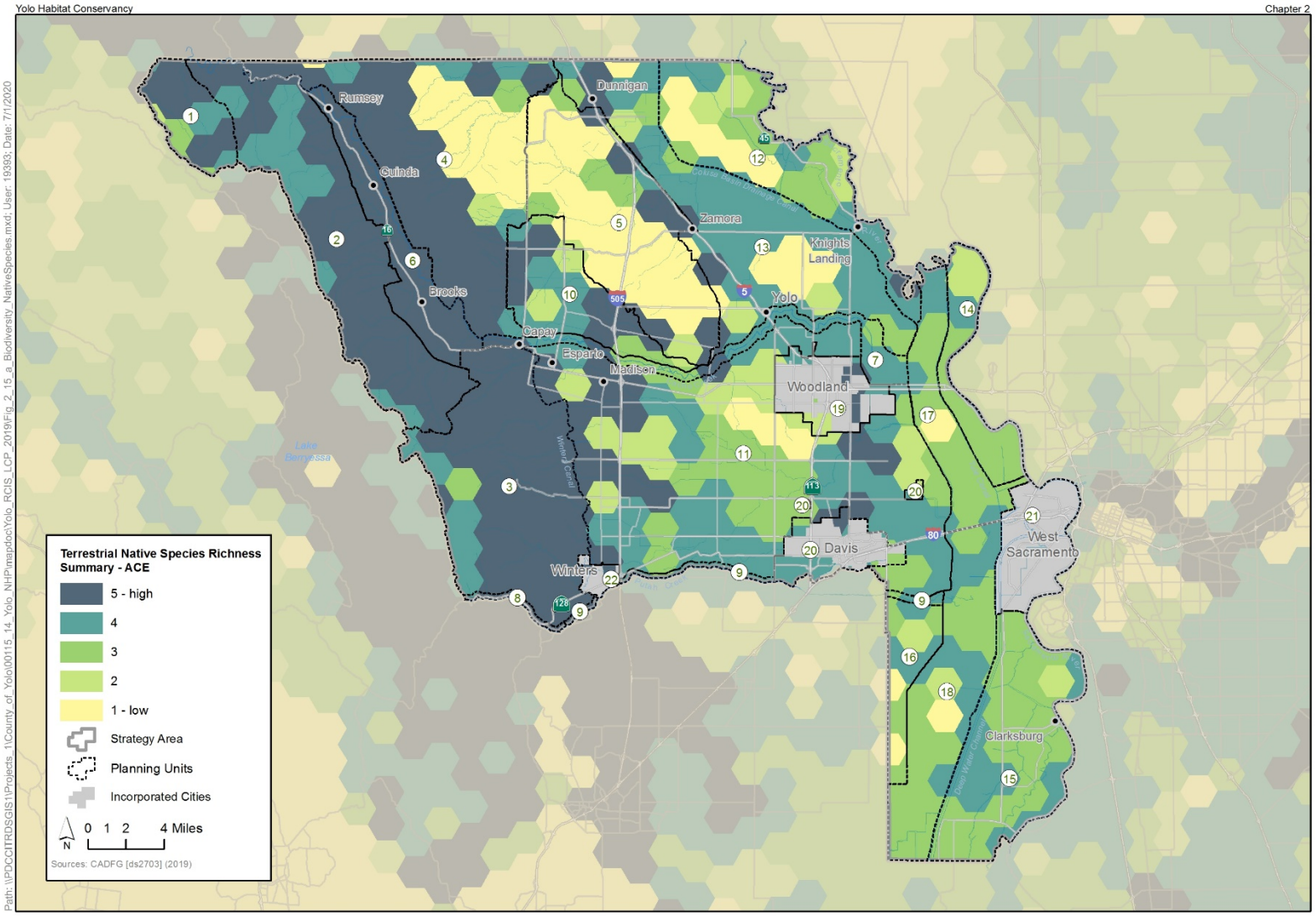
Figure 2-16 shows key connections for the strategy area. These connections include Essential Connectivity Areas identified as a component of the California Essential Habitat Connectivity Project (Spencer et al. 2010). More than 60 federal, tribal, state, and local agencies contributed to the project, a statewide assessment of large, intact blocks of natural habitat and a "least-cost" modeling of connections between them.

The California Essential Habitat Connectivity Project identifies connectivity as "the single most important adaptation strategy to conserve biodiversity during climate change" (Spencer et al. 2010:127). They reached this conclusion because of the need for connected habitat that allows organisms to respond to climate change by moving from unsuitable to suitable habitat. This movement could occur in the short term as habitat is lost or degraded, or as habitat slowly shifts to an unsuitable condition in the future because of climate change. Planning for conservation in Yolo County requires consideration of landscape connectivity in the short term (e.g., within the 10-year term of the RCIS) to assure that near-term conservation actions achieve the species and habitat goals identified in the RCIS. Achieving conservation aims within the county also requires focusing on connectivity in more remote time periods (within the next 50–100 years, the focus of the LCP), when habitat alterations driven by climate change may have altered current landscape connectivity.

Scientific conclusions regarding the conservation significance of landscape connectivity have appeared with increasing frequency in recent years, covering conservation across a full range of biological organization from genes to ecosystems (e.g., Rudnick et al. 2012; Fletcher et al. 2016). Landscape connectivity has been an important element in conservation discussions for decades, as it is a remedy for habitat fragmentation and related impacts on population viability and genetic isolation, part of the "rescue effect" (Brown and Kodric-Brown 1977) for small population size. Current understanding of ecological connectivity (e.g., Crooks and Sanjayan 2006) incorporates a combination of "structural connectivity" (corridors and other physical linkages established in a landscape) and "functional connectivity" (the behavioral ability of individual organisms, and of ecological elements and processes, to move across the physical structure of landscapes).

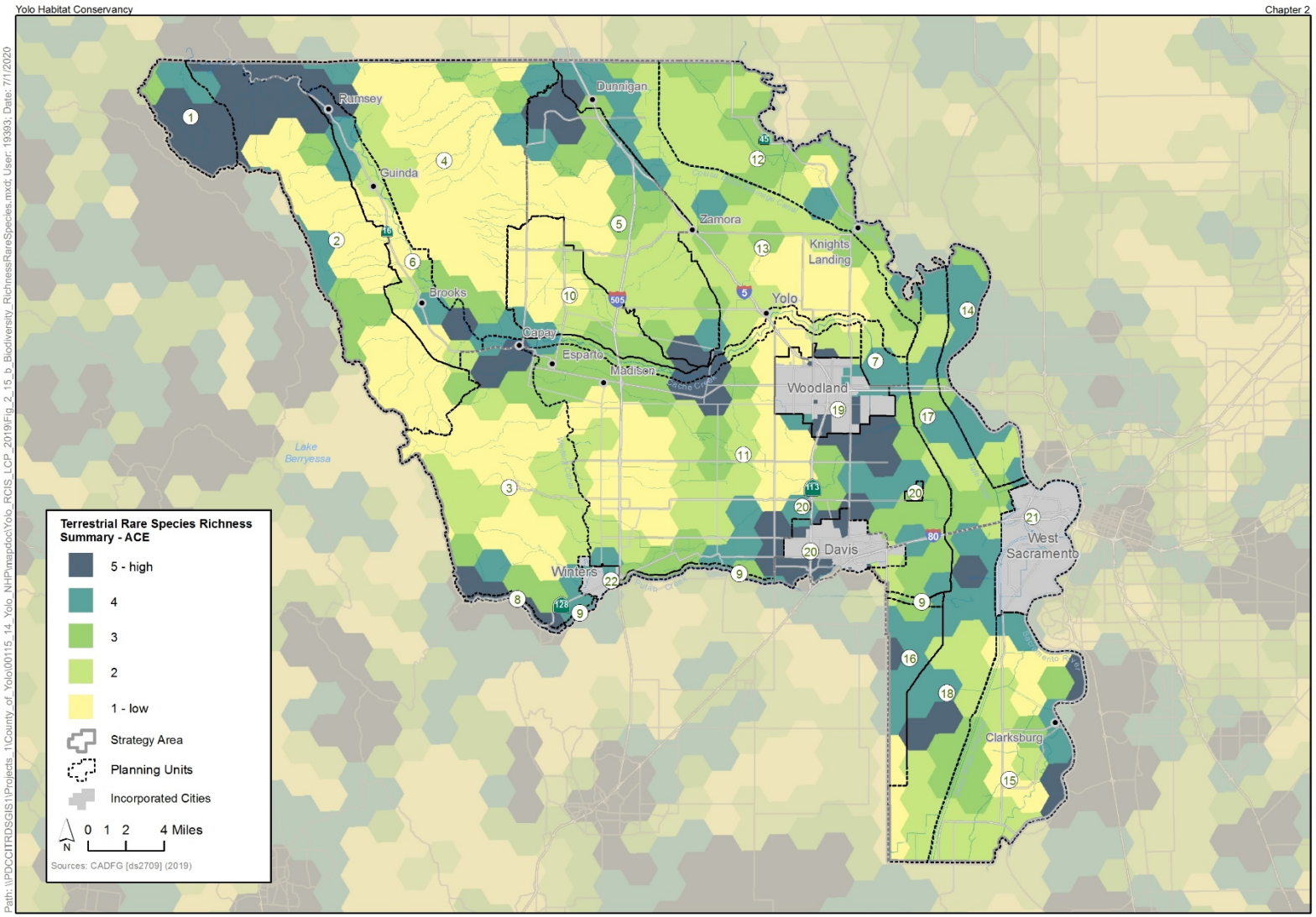
The extensive land conversion and fragmentation in the Central Valley has reduced landscape connectivity across the Central Valley, between the Coast Range and the Sierra Nevada Foothills. Essential Connectivity Areas identified by the California Essential Habitat Connectivity Project are disconnected in the strategy area, located in the western, southwestern, central, and southeastern portions of the RCIS/LCP area The RCIS/LCP area is described as including a "missing linkage" area in the eastern, more developed portion of the county; an area where extensive restoration efforts would be needed to re-establish connectivity between the small and highly fragmented natural lands that are surrounded by an agricultural matrix. The following is a brief summary of the essential habitat connectivity areas in the RCIS/LCP.

- The Blue Ridge/Rocky Ridge Capay Hills essential connectivity area, located in thewestern portion of the RCIS/LCP area, connect the natural landscape blocks in the RCIS/LCP area to the Interior Coast Ranges foothills in the northwestern corner and western edge of the RCIS/LCP area. The Blue Ridge/Rocky Ridge Capay Hills connectivity area primarily supports California prairie, woodlands, forest, and chaparral natural communities.
- The English Hills Blue Ridge/Rocky Ridge connectivity area, located in the southwestern portion of the RCIS/LCP area, connects to the Interior Coast range and Lake Berryessa to the west. This connectivity area primarily supports California prairie, woodlands, forest, and chaparral natural communities.
- The Dunnigan Hills/ Smith Creek- Dunnigan Hills, located in the central portion of the RCIS/LCP area supports mostly California prairie with scattered ponds, some of which are occupied by California tiger salamander. Grassland connectivity between ponds is essential for the conservation of California tiger salamander.
- The Yolo Bypass corridor along the eastern edge of the RCIS/LCP area links to the Yolo Bypass-Sacramento Bypass Essential Connectivity Area and the Little Holland Tracy-Yolo Bypass Essential Connectivity Area to the south, and links through the Clarksburg area to the Sacramento River corridor east of the RCIS/LCP area. These connectivity areas primarily support freshwater emergent wetland and small patches of cultivated land (i.e. rice and pasture).



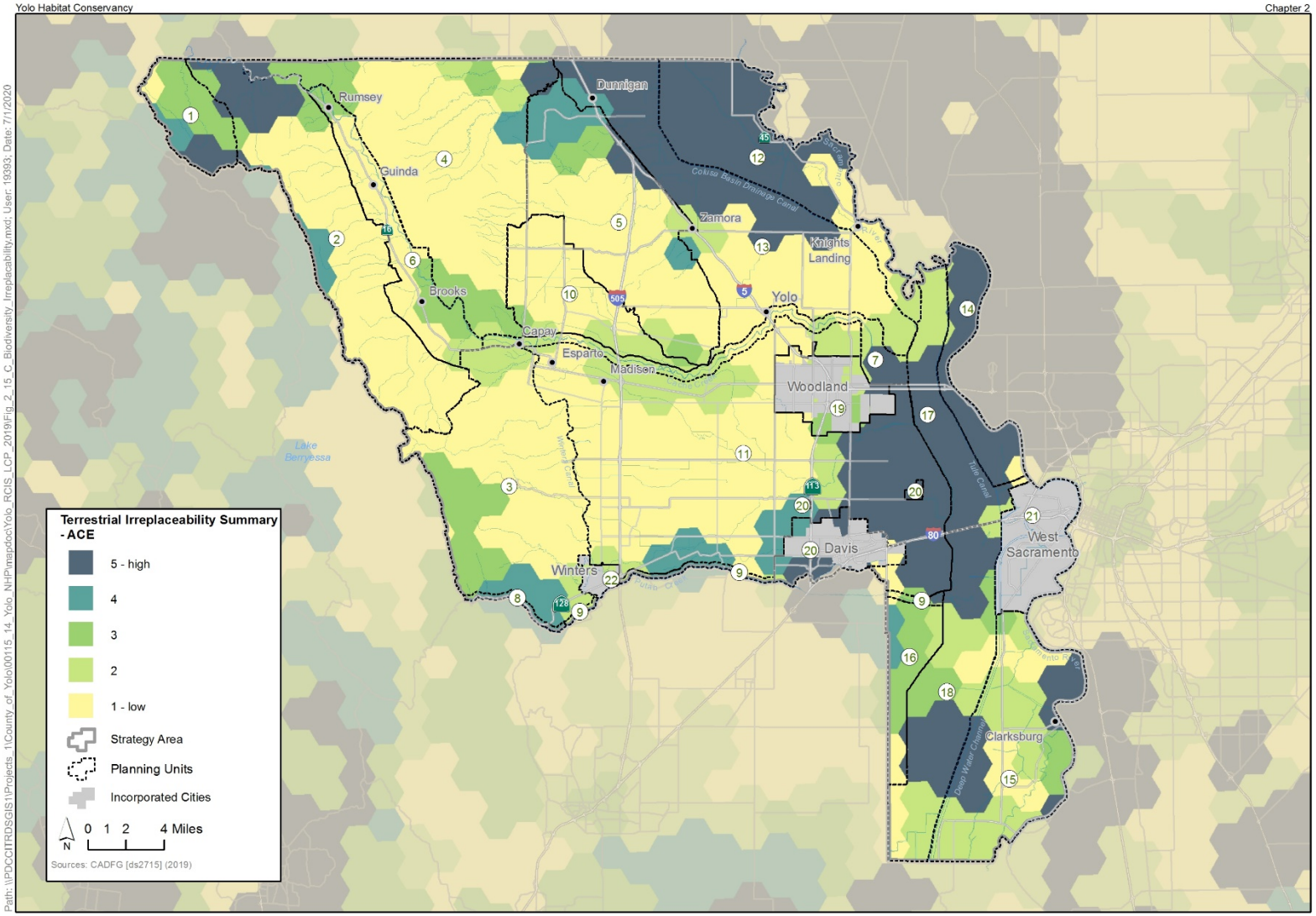
Yolo RCIS/LCP

Figure 2-15a
Native Species Richness



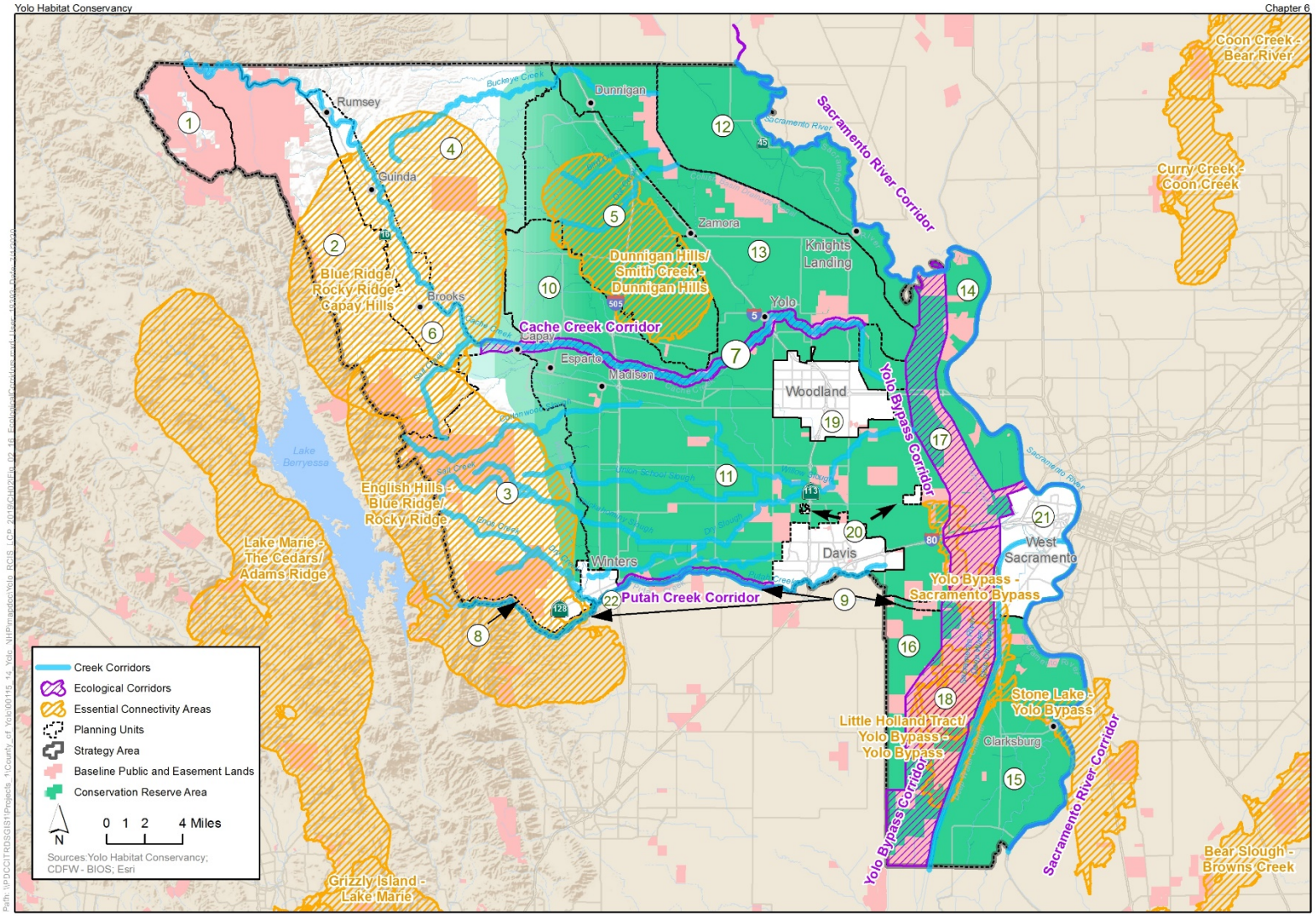
Yolo RCIS/LCP

Figure 2-15b
Rare Species Richness



Yolo RCIS/LCP

Figure 2-15c
Species Irreplacability



Yolo RCIS/LCP

Figure 2-16
Habitat Connectivity and Linkages

Figure 2-16 also includes linkages and corridors identified by scientists on the Conservancy's Advisory Committee as key elements in the LCP, based on their familiarity with the ecology of the strategy area. The primary linkages identified include the Sacramento River/Yolo Bypass, Putah Creek, and Cache Creek, while other streams and drainages in the strategy area provide secondary linkages. These linkages tend to run in an east-west direction in the strategy area, although the Sacramento River/Yolo Bypass runs in a north-south direction at the eastern end of the strategy area and provides key linkage for salmonids, sturgeon, and other fish species.

2.9.6 Important Ecological Processes

2.9.6.1 Hydrologic and Geomorphic Processes

Important geomorphic processes in riparian areas of the strategy area include lateral channel migration, channel cutoff and formation of multiple channels, bed mobility, and fine and coarse sediment transport. These processes influence floodplain dynamics such as channel, bank, and floodplain formation (CVFPP 2016). Sediment scouring, erosion and deposition, and prolonged inundation disturb existing vegetation. These disturbances create opportunities for cottonwoods, willows, and other early successional riparian species to establish from seed, thus promoting establishment of riparian vegetation, addressed in Section 2.6.6.1, *Riparian Natural Community* (DWR 2016). All these processes influence habitat conditions for fish and other aquatic and riparian species, as described in Section 3.3.2, *Focal Species*.

As described in the CVFPP Conservation Strategy, natural, eroding banks often have cavities, depressions, and vertical faces that support bank-dwelling species such as bank swallow, northern rough-winged swallow, belted kingfisher, mink, and river otter, and that provide cover and shelter for fish. Bank-dwelling species may use these banks and their cavities to access the water or for nesting. Erosion of natural bank substrates provides instream spawning substrate for aquatic species, including salmonids. Natural fluvial processes also result in diverse substrate sizes and irregular banks that provide habitat complexity for fish and wildlife, and can support a high diversity and abundance of invertebrate and fish species.

The CVFPP Conservation Strategy also describes how a diversity of flows, suitable sources of sediment, and a sufficiently broad river corridor to allow stream meandering are necessary to sustain riverine habitats and the wildlife species that depend on them. The targeted CVFPP ecosystem processes for this objective are floodplain inundation and riverine geomorphic processes (DWR 2016).

Floodplain inundation occurs when river flows exceed channel capacity and water overflows onto adjacent land. The ecosystem responses to floodplain inundation depend on flow timing, frequency, magnitude, and duration. Floodplain inundation helps create side channels, sloughs, and oxbow lakes through erosion and deposition of fluvial sediments. Sustained overbank flows also generate food for downstream aquatic wildlife. Floodplain inundation for 1–2 weeks or longer allows for the growth of microorganisms and the animals that feed on them (Opperman 2012, in DWR 2016), including anadromous fish and other native aquatic species.

2.9.6.2 Fire

Fire is a source of natural disturbance in the Hill and Ridge Landscape Unit. Disagreement over the natural role and frequency of fire is the main impediment to the application of prescribed fire

regimes. The use of prescribed fire for ecosystem management also is constrained by the presence of human assets, such as adjacent development, low-density homesteads, and agricultural development, which increase risk of loss and the cost of protection during prescribed fire.

2.9.6.3 Stream processes and conditions

Section 2.6.6.5, *Lacustrine and Riverine Natural Community,* provides a description of the stream system in the strategy area. Section 1.4.7.6, *Important Ecological Processes,* describes the ecological functions and importance of stream processes and conditions in the strategy area.

2.10Gaps in Scientific Information

The conservation strategy presented in Chapter 3 is based on the best available scientific information. However, there are many gaps in that information, even in the strategy area, which has been heavily studied. This section provides a discussion of information gaps that, if filled, could change the objectives, actions, and priorities in the strategy area. Gaps can be created from a lack of information or by shortcomings in how information is disseminated.

2.10.1 Regional Gaps

Information gaps at the regional level are not unique to the strategy area. These gaps hold true for nearly all of California.

2.10.1.1 Focal and Conservation Species Occurrence Data

The California Natural Diversity Database (CNDDB) was the primary source of species occurrence data (California Natural Diversity Database 2019), along with a few other sources. While the data are considered high quality, because of the verification process used by CDFW, there are two inherent gaps. First, only positive data are presented (i.e., where an occurrence is found). While positive occurrence data are very useful, there is no way to know where surveys have been conducted for each species with negative survey results (i.e., where an occurrence was not detected). Knowing where species do not occur in habitat that may appear suitable is also important. Because that information is not available, the species habitat models typically overpredict where species may occur. With negative survey data, those models could be refined by removing areas that had been surveyed where no species were found. Second, the CNDDB does not include data for large areas of potentially suitable habitat, in part because a large amount of California, including the strategy area, has never been surveyed. Often, surveys are driven by environmental compliance for projects. So for example, many CNDDB occurrences fall along gas and electric rights-of-way or roadways—places where infrastructure projects typically happen. As a result, conservation and mitigation projects often focus on limited areas with suitable occurrence data, potentially at the expense of other important areas that are occupied by target species, but have not been surveyed.

2.10.1.2 Knowing-Doing Gap

The knowing-doing gap is the phenomenon of information gained through scientific research not finding its way into the hands of land management practitioners. There are two areas addressed in

this RCIS/LCP where that type of gap occurs: invasive plant management and grazing management. Matzek et al. (2014) found that the majority of resource managers rarely had access to scientific, peer-reviewed literature and only found it moderately useful when they did. Instead, they frequently relied on their own experience over research-based conclusions. Additionally, when resource managers conducted research of their own, the methods rarely followed standard scientific protocols and the information was typically not disseminated to their colleagues. The same pattern can be seen in grazing management. Similar to invasive plant science, rangeland science has produced an immense amount of research on the effectiveness of grazing as a conservation management tool in the past decade. The science on grazing methods, invasive plant management using grazing, and the potential to affect water resources is ever changing. Getting that information into the hands of resource managers and ranchers is important to closing the knowing-doing gap. These gaps likely apply to other resource areas as well, but invasive plant management and grazing management are the most prevalent examples. Improving the access to, and application of, scientific research on invasive plant and grazing management by land management practitioners could improve land management practices for the benefit of native biodiversity and ecosystem processes in the strategy area.

2.10.1.3 Habitat Connectivity and Wildlife Movement

As noted in Section 2.9, the California Essential Habitat Connectivity Project identifies connectivity as "the single most important adaptation strategy to conserve biodiversity during climate change." (Spencer et al. 2010:127). Planning for conservation in Yolo County requires consideration of landscape connectivity in the short term (e.g., within the 10-year term of the RCIS) to assure that near-term conservation actions achieve the species and habitat goals identified in the RCIS. Section 2.9 lists essential connectivity areas identified by the California Essential Habitat Connectivity Project in the strategy area.

However, there is a gap in wildlife movement data in the strategy area. Specifically, information is lacking about wildlife movement through areas identified as habitat linkages. Additionally, there is a lack of data on how different wildlife species move through the agricultural lands between habitat patches in Yolo County. Knowing more about how wildlife move between these areas would allow conservation organizations to focus land acquisition and management in the most critical locations.

2.10.2 Natural Community and Species

There are many gaps in what is known about natural communities and species, both across their range and inside of the strategy area. This summary is not exhaustive, but identifies key issues in the strategy area that, if better understood, would influence how the conservation strategies were implemented.

2.10.2.1 Pond and Wetland Functionality and Longevity

Several focal species rely on freshwater wetland habitat for at least part of their life cycle—California tiger salamander, giant garter snake, tricolored blackbird. In the strategy area, particularly in the Dunnigan Hills area where California tiger salamanders occur, most of the ponds are human-made stock ponds. Like other wetlands, ponding duration and timing are important factors that affect habitat quality for a species. Under most climate change scenarios, Yolo County will get hotter and drier. That means that ponds that primarily rely on surface runoff will receive

less water and dry up sooner in a typical year. At the very least, both the timing and amount of rainfall are likely to change, meaning that ponds that are currently functioning well for species may not function in the same way in the future. Shorter ponding durations may reduce reproductive success of species such as California tiger salamander if ponding durations become too short to successfully complete reproduction and emergence from aquatic habitats. Understanding existing and future ponding durations under different climate change scenarios can inform land management and pond restoration and creation efforts in ways that may buffer aquatic species from the effects of climate change. For example, new ponds may need to be supported by well water or other sources of reliably available water, or be designed to increase water storage capacity or retention while providing suitable habitat features. Vegetation may also need to be managed differently to maintain open water habitats in warmer, drier conditions. A systematic survey of the pond resources in the strategy area, with an emphasis on their ability to provide habitat functionality for native species, would greatly inform how to prioritize land acquisitions, and restoration and enhancement actions on private and public lands.

Grazing on public lands is widespread, but the use of grazing as a management tool is still variable, particularly to manage pond vegetation. Without a well-managed grazing program, ponds often fall into disrepair, fill with sediment, and fail. This reduces the habitat quality for focal and nonfocal species over time. A better understanding of the conditions of ponds in the strategy area could inform the use of grazing to manage habitat features in ponds.

Little is known about the timing and duration of flooding in areas mapped as fresh emergent wetlands in the strategy area. Depending on the timing and duration of flooding, these wetlands may have varying levels of habitat value for focal species such as giant garter snake and tricolored blackbird. For example, many areas mapped as fresh emergent wetland are managed for migratory waterfowl, and as such experience winter flooding rather than the summer flooding necessary to support giant garter snake. Areas mapped as modeled giant garter snake habitat may therefore not contain the appropriate characteristics to support the species. Similarly, many areas mapped as fresh emergent wetland may lack the tall emergent wetland vegetation needed to support nesting tricolored blackbirds. More detailed information on the distribution of appropriate habitat characteristics are necessary to determine the actual locations of appropriate habitat for these and other focal species.

2.10.2.2 Rare Plant Distribution

The gaps in survey effort for species is discussed in Section 2.10.1.1, *Focal and Conservation Species Occurrence Data*, but the lack of survey data for rare plant species is an issue throughout the state. Plant species are under-surveyed for two reasons: (1) lack of access to private lands, and (2) plants are not state or federally listed as threatened or endangered at the same rate as wildlife, and therefore regulatory triggers are not in place to require surveys as frequently. Further, often when botanical surveys are done in areas, protocols that involve multiple surveys across the full range of blooming periods are not completed. As a result, even if surveys occur, some species could be missed if they are not flowering at that time. The lack of survey data for many rare plant species consequently limits planning efforts. More surveys on private lands and standardized survey efforts would help fill this data gap and allow for more informed conservation priorities for focal and nonfocal plant species.

2.10.2.3 California Ground Squirrel Distribution

Many native species in California rely on California ground squirrels as an important element of their life history. California tiger salamanders and burrowing owls rely on ground squirrels, and other fossorial mammals, to provide underground refugia (i.e., burrows and tunnels) and nest sites, respectively. Many species of raptors and mammals rely on ground squirrels as a food source. Grounds squirrels have successfully exploited many habitat types including, fields, pastures, grassland, open areas in oak woodland, valleys, and rocky outcrops up to an elevation of 7,218 feet (2,200 m). They can also be found in urban, suburban and agricultural areas. Ground squirrels are also know to recolonize former colonies rapidly (within a few months) if an adjacent colony is present (iNaturalist.org 2020). If the distribution of ground squirrels in the strategy area were better understood, it would allow for the refinement of species habitat models and ultimately could influence where conservation priorities are located. Gaining this knowledge would require a systematic survey effort across the strategy area repeated at regular (e.g., 5–10 year) intervals.

2.10.2.4 California Tiger Salamander Hybridization

California tiger salamanders can hybridize with invasive barred tiger salamanders resulting in a reduction in the numbers of fully native California tiger salamanders (U.S. Fish and Wildlife Service 2017). The larger, more aggressive hybrid animals routinely outcompete the native species, furthering the decline of an already rare species. While hybridization with nonnative salamanders is not currently known to occur in the strategy area, research is ongoing to understand the prevalence of hybridization in the strategy area, and throughout the species' range.. Fully understanding the distribution of hybrids is the first step. The level of hybridization, and extent of introgression of nonnative tiger salamander genes into California tiger salamanders varies, and some level of hybridization can likely be tolerated in the native population without significantly altering ecological function (Searcy et al. 2016). While the ideal scenario is to preserve native populations, it may not be feasible for populations of California tiger salamander that have already hybridized with barred tiger salamander. Experimental evidence suggests that hybrids with relatively lower levels of barred tiger salamander genes are ecologically equivalent to fully native California tiger salamanders, and should be protected alongside native California tiger salamanders (Searcy et al. 2016). More research is needed to identify the threshold of nonnative genetic introgression below which hybrids should be retained, and above which hybrids should be removed. Understanding that balance, so that management and monitoring can be designed to respond, is imperative.

2.11 Stressors and Pressures on Conservation Elements

CFGC Section 1852(c)(5) requires that an RCIS include a summary of historic, current, and projected future stressors and pressures in the strategy area, including climate change vulnerability, on the focal species, habitat, and other natural resources, as identified in the best available scientific information, including, but not limited to, the SWAP. The RCIS Guidelines (California Department of Fish and Wildlife 2017) defines stressor and pressure as follows.

Stressor is a degraded ecological condition of a focal species or other conservation element that resulted directly or indirectly from a negative impact of pressures such as habitat fragmentation. A *pressure* is an anthropogenic (human-induced) or natural driver that could result in changing the ecological conditions of the focal species or other conservation element. Stressors are negative by

definition. Pressures can be positive or negative depending on intensity, timing, and duration. Negative or positive, the influence of a pressure to the target is likely to be significant.

Understanding the pressures and stressors experienced by the focal species and their habitats in the strategy area is one of the critical steps necessary to identify conservation actions to counteract them. For the North Coast and Klamath province, Nothern California Interior Coast Ranges (western portion of the RCIS/LCP area, the SWAP identifies 5 categories of pressures: climate change; fire and fire suppression; invasive plants & animals; livestock, farming, and ranging; and recreational activities). For the Central Valley and Sierra Nevada province, the SWAP identifies 21 categories of pressures affecting conservation targets in the province. Of these pressures, 14 are identified as affecting conservation targets in the Central Valley ecoregion, and six are identified as affecting native fish. This RCIS uses the same pressure categories identified for the strategy area as those defined in the SWAP, with two exceptions. This RCIS does not include the pressures of logging and wood harvesting or mining and quarrying because these pressures generally do not currently occur in the strategy area.

The following pressures, as defined in the SWAP, are described in the following sections.

- Agricultural and forestry effluents
- Annual and perennial nontimber crops
- Climate change
- Commercial and industrial areas
- Dams and water management/use
- Household sewage and urban wastewater
- Housing and urban areas
- Invasive plants and animals
- Livestock, farming, and ranching
- Recreational activities
- Roads and railroads
- Utility and service lines
- Fire and fire supression

Each of these pressures and resultant stressors is discussed in the following subsections in a general context, as well as in relation to the focal species and other conservation elements discussed in this chapter, including stressors to natural communities, habitat connectivity, and working landscapes. The SWAP provides a general overview of each of these pressures. For some pressures, the SWAP also includes an analysis of the pressures applicable to the Central Valley ecoregion of the Central Valley and Sierra Nevada province.

Some of these pressures result in similar or related stressors and are discussed together. A matrix showing the association between pressures and each focal species is included in Table 2-4.

Table 2-4. Pressures Acting on Each Focal Species

Focal Species	Commercial and Industrial Areas; Household Sewage and Urban Waste Water; Housing and Urban Areas	Annual and Perennial Non-timber Crops; Agricultural and Forestry Effluent; Livestock, Farming, and Ranching	Climate Change	Invasive Plants and Animals	Roads and Railroads; Utility and Service Lines	Dams and Water Management/ Use	Recreational Activities	Fire and Fire Suppression
Alkali milk-vetch			X	X	X		X	X
Brittlescale	X	X	X	X	X		X	X
San Joaquin spearscale	X	X	X	X	X		X	X
Palmate-bracted bird's beak			X	X	X		X	X
Heckard's pepper-grass	X	X	X	X	X		X	X
Baker's navarretia	X	X	X	X	X		X	X
Colusa grass			X	X	X		X	X
Solano grass			X	X	X		X	X
Conservancy fairy shrimp	X	X	X	X	X	-	-	X
Vernal pool fairy shrimp	X	X	X	X	X	-	-	X
Midvalley fairy shrimp	X	X	X	X	X	-	-	X
California linderella	X	X	X	X	X	-	-	X
Vernal pool tadpole shrimp	X	X	X	X	X	-	-	X
Valley elderberry longhorn beetle	X	X	X	X	X	X	X	X
White sturgeon	X	X	X	X	X	X	X	X
Green sturgeon	X	X	X	X	X	X	X	X
Delta smelt	X	X	X	X	X	X	X	X
Central valley steelhead	X	X	X	X	X	X	X	X

Focal Species	Commercial and Industrial Areas; Household Sewage and Urban Waste Water; Housing and Urban Areas	Annual and Perennial Non-timber Crops; Agricultural and Forestry Effluent; Livestock, Farming, and Ranching	Climate Change	Invasive Plants and Animals	Roads and Railroads; Utility and Service Lines	Dams and Water Management/ Use	Recreational Activities	Fire and Fire Suppression
Sacramento winter-run Chinook salmon	X	X	X	X	X	X	X	X
Central Valley spring-run Chinook salmon	X	X	X	X	X	X	X	X
Central Valley fall/late fall-run Chinook salmon	X	X	X	X	X	X	X	X
Sacramento splittail	X	X	X	X	X	X	X	X
California tiger salamander	X	X	X	X	X	-	X	X
Western spadefoot	X	X	X	X	X	-	X	X
Northwestern pond turtle	X	X	X	X	X	X	X	X
Giant garter snake	X	X	X	X	X	X	X	-
Tricolored blackbird	X	X	X	-	X	X	-	-
Grasshopper sparrow	X	X	X	-	X	X	-	-
Western burrowing owl	X	X	X	-	X	X	-	-
Swainson's hawk	X	X	X	-	X	X	-	-
Greater sandhill crane	X	X	X	-	X	X	-	-
Northern harrier	X	X	X	-	X	X	-	-
Black tern	X	X	X	-	X	X	-	-
Western yellow-billed cuckoo	X	X	X	-	X	X	-	-
California black rail	X	X	X	X	X		X	
White-tailed kite	X	X	X	-	X	X	-	-
Loggerhead shrike	X	X	X	-	X	X	-	-
Yellow-breasted chat	X	X	X	X	X	X	-	-
Bank swallow	X	X	X	-	X	X	-	-

Focal Species	Commercial and Industrial Areas; Household Sewage and Urban Waste Water; Housing and Urban Areas	Annual and Perennial Non-timber Crops; Agricultural and Forestry Effluent; Livestock, Farming, and Ranching	Climate Change	Invasive Plants and Animals	Roads and Railroads; Utility and Service Lines	Dams and Water Management/ Use	Recreational Activities	Fire and Fire Suppression
Least Bell's vireo	X	X	X	X	X	X	-	-
Townsend's big-eared bat	X	X	X	-	X	X	-	X

2.11.1 Annual and Perennial Nontimber Crops; Agricultural and Forestry Effluents; Livestock, Farming, and Ranching

Approximately 50 percent of the RCIS strategy area is harvested croplands. The majority of these lands are on the Central Valley floor and contained in the strategy area. Conversely, less than 1 percent of county lands are designated specifically for grazing. As such, the majority of the effects on the RCIS focal species and other conservation elements are tied more to crop production than to rangeland grazing or livestock production.

As described in the SWAP (California Department of Fish and Wildlife 2015:2-36),

> Agriculture is an essential component of California's economy. The state is a major producer in the fruit, vegetable, tree nut, and dairy sectors (U.S. Department of Agriculture [USDA] 2014). Historic conversions of native habitat to agriculture in California have been significant. Today approximately 70% of the Central Valley is used for agriculture, with the vast majority of this land conversion occurring prior to the 1970s (USGS 2014). While agricultural lands no longer represent native vegetation types, they can provide important habitat for wildlife species, such as flooded rice fields of the Central Valley that provide waterfowl habitat. Habitat loss and or degradation can occur through land conversion from one type of agriculture to another, including conversion of field and row crops or grazing lands to orchards or vineyards. Deep ripping of fields to create subsurface conditions conducive to orchards and vineyards can destroy wetlands as well as essential upland habitat for sensitive species such as California tiger salamander, and lead to habitat fragmentation. Diversion of water for irrigation can contribute to altered hydrologic regimes, and nutrient laden runoff can degrade aquatic habitat. Other impacts from agricultural practices include the use of chemical fertilizers, herbicides, rodenticides, and other chemicals that can affect non-target species and degrade water quality. Illegal marijuana groves, particularly in the northern portions of the state, have similar but more pronounced impacts than other agriculture, because of their location in remote and otherwise undisturbed areas and lack of regulatory oversight.
>
> Belsky et al. (1999) found that studies overwhelmingly show that livestock grazing negatively affects water quality and seasonal quantity, stream channel morphology, hydrology, riparian zone soils, instream and streambank vegetation, and aquatic and riparian wildlife. Other researchers have found benefits from grazing and have advocated for grazing as a useful and necessary conservation tool.

Agricultural use is the primary driver of conversion of natural lands. Much of the strategy area is in active agricultural production (363,000 acres of agriculture land cover, or approximately 50 percent of the strategy area), consisting of numerous farming operations, some of which cover thousands of contiguous acres of land.

2.11.1.1 Effects on Focal Species

According to the SWAP (California Department of Fish and Wildlife 2015:2-36),

> Ongoing agricultural practices can have a range of direct and indirect ecosystem consequences, positive or negative, based on timing, duration, and intensity. In addition, different cropping systems (e.g., organic versus conventional farming, or highly diversified fields versus large monocultures) can have different levels of impacts on natural ecosystems across the landscape. Many on-farm practices for conservation can reduce impacts/benefit ecosystems. The location of certain cropping systems and crop types are important factors in moving toward a long-term sustainable agricultural system.
>
> Field crops can provide foraging habitat for raptors, such as Swainson's hawk, and rice fields and stock ponds can provide foraging and aquatic habitat for reptiles such as giant garter snake (federal and state threatened), amphibians, bats and birds, such as tricolor blackbird. Agriculture can harm

> those same species through chemical treatments, removal of nesting habitat, or direct mortality from harvesting and maintenance activities. Agricultural runoff containing fertilizers and pesticides can also pollute and degrade aquatic and marine habitat. Conversely, crop damage from wildlife can cause substantial economic loss and public health risks necessitating enhanced measures to control access to crops by wildlife.
>
> Legislation, public policies, and landowner conservation practices have helped slow impacts of agricultural practices to species and habitats. For example, farmers can apply for subsidies to avoid disruption of tricolored blackbird nesting, to restore wetlands and other waters, to implement best management practices for grazing, and to manage field crops for the benefit of wildlife (e.g., rice field management to provide habitat for giant garter snake and migratory birds) (USDA 2015).

Other effects of farming activities are also described in the SWAP (California Department of Fish and Wildlife 2015:5.3-27).

> Rain and irrigation runoff carry silt and agricultural chemicals, degrading surface water quality and reaching groundwater. For example, significant amounts of nitrogen fertilizer applied through agricultural practices have contaminated groundwater supplies in agricultural communities throughout the State (Viers et al. 2012). Herbicides and pesticides can have toxic effects on aquatic plants and animals and chemical contaminants can upset the ecological balance of aquatic systems. For example, nutrients increase aquatic plant and algal growth, resulting in lowered oxygen levels when the excessive plant matter decomposes. Elevated nutrient levels have also been implicated in amphibian deformities, because nutrient-rich environments favor the parasitic flatworm that causes deformities in many frog species (Johnson and Chase 2004). Also, pesticide drift has been shown to favor hybrid tiger salamanders over native California tiger salamanders (Ryan et al. 2012). Silt and sediment also degrade aquatic environments, increasing turbidity and shading out aquatic vegetation, along with scouring away or smothering stream-bottom sediments that are important spawning sites and invertebrate habitats. Runoff problems are particularly severe on steeply sloping, erosion-prone soils, where strawberries, artichokes, and vineyard grapes are commonly grown. Planting practices that result in large amounts of soil disturbance, such as the establishment of vineyards and strawberry and artichoke mounds, also contribute substantially to sediment runoff.
>
> (page 2-37) Central Valley agriculture contributes to the conservation of numerous species of waterfowl and shorebird along the Pacific Flyway, and significantly in the maintenance of winter habitat for the greater sandhill crane, a California-listed threatened species. In the absence of native habitats, grain crop fields provide essential winter flooded roost habitat for sandhill cranes, ameliorating the effects of ongoing conversion of farmlands to incompatible crops such as orchards and vineyards (Ivey et al. 2014). There is clearly a balance that can be achieved through incentive based, non-regulatory collaboration and partnerships with conscientious ranchers and farmers. SWAP 2015, as well as the California Climate Adaptation Strategy, relies upon fostering this balance as much as possible, but will require a concerted effort to sustain a dialog with farmers, ranchers, land managers, agency staff, and the public about the benefits of working together for the benefit of fish and wildlife.

In the Central Valley and Sierra Nevada province, the SWAP's discussion of grazing is primarily focused on the detrimental effects of grazing in the Sierra Nevada, and less on grazing in the Central Valley portion of the province. Nonetheless, some of the information provided in the SWAP is applicable to grazing, wherever it occurs (California Department of Fish and Wildlife 2015:5.4-39–5.4-41).

> The effects of grazing on wildlife vary from beneficial to detrimental, depending upon how grazing is managed, including the seasonality and duration of grazing and the type and number of livestock. These effects also depend on the relative sensitivities of individual wildlife species, because not all species respond the same way to grazing. Well-managed livestock grazing can benefit sensitive plant and animal species, particularly by controlling annual grasses and invasive plants where these have

become established, and by removing understory growth to create a fire-resilient landscape. These working lands are an essential part of the solution to conserving the state's wildlife.

While recognizing the values of compatible grazing practices, this plan focuses on the negative impacts of pressures affecting wildlife species at risk. Thus, the following discussion describes those situations where excessive grazing practices result in stresses to species. Excessive grazing, as used here, refers to livestock grazing at a frequency or intensity that causes degradation of native plant communities, reduces habitat values for native wildlife species, degrades aquatic or other ecosystems, or impairs ecosystem functions. (The term "overgrazing" has a different meaning; it usually refers to the productivity of the forage crop and range condition.)

The SNEP and the SNFPA[6] also found that aquatic and riparian habitats are particularly affected by livestock grazing. Cattle are attracted to the lush forage, water, and shade of riparian habitat. In late summer and fall, especially when upland habitats have dried out, cattle can decimate riparian plant communities, grazing and trampling meadows, converting meandering meadow streams into eroded channels, and stripping forage and cover needed by wildlife. The erosion increases sediment runoff, degrading aquatic ecosystems.

Livestock grazing is affecting the composition of plant communities important for wildlife diversity. Where livestock grazing is excessive, forage often becomes scarce, and both livestock and deer consume young aspen shoots, hindering the regeneration of aspen stands. Excessive grazing is a factor in reducing the regeneration of blue oak and many other plant species throughout the predominantly privately owned foothill region (CDFG 2005; McCreary 2001). Livestock compact soils and remove leaf litter, making conditions less than optimal for germination of acorns and new growth. Livestock also consume acorns and young oak saplings.

Loss of juvenile fish rearing habitat in the form of lost natural river morphology and function, and lost riparian habitat and in-stream cover (National Marine Fisheries Service 2014) can occur from livestock use of streams and rivers for water. Livestock enter stream channels and denude and trample riparian vegetation along the banks. Along with the loss of shaded riverine habitat, erosion occurs and can change the channel's morphology.

2.11.1.2 Effects on Other Conservation Elements

Natural communities and habitat connectivity in the strategy area have been affected by agricultural land uses within the strategy area. Habitat conversion to cropland has fragmented and isolated areas of remaining natural habitat, limiting habitat connectivity. Agricultural land uses, when not managed carefully, may also indirectly affect the quality of remaining natural lands through degradation of groundwater and surface water, overdraw of groundwater, reducing availability for remaining trees, shrubs and in-stream flows. However, the large amount of agricultural lands in the strategy area do support the working lands conservation element.

2.11.2 Industrial Areas, Household Sewage and Urban Wastewater, Housing and Urban Areas

This group of pressures generally describes those activities that result in land conversion and associated indirect effects of land conversion, including increased effluent releases into local streams. Land conversion includes the full spectrum of natural lands transformation into developed lands, often transitioning through various agricultural uses before becoming completely devoid of characteristics that support habitat for focal species.

[6] SNEP = Sierra Nevada Ecosystem Project; SNFPA = Sierra Nevada Forest Plan Amendment.

Land conversion and associated indirect effect stressors are primarily the result of growth driven by increased populations and economic prosperity. Urban and suburban development, infrastructure projects, the conversion of natural communities and habitats to agricultural uses and subsequent conversion of agricultural land to development are primary causes of land conversion in the strategy area. Urban/suburban and agricultural development in the strategy area has resulted in the loss, degradation, and fragmentation of natural habitats (both terrestrial and aquatic), and agricultural land. The continued loss of habitat, through permanent or temporary conversion to other purposes, is a key pressure on the focal and conservation species and their habitats in the strategy area. With approximately 50,000 acres (7 percent) of the strategy area developed, urbanization has caused some loss of historic open space and species habitat. Urban and suburban development, however, has been concentrated within the cities and clustered rural communities; most of the existing and planned development is in the cities of Davis, West Sacramento, Winters, and Woodland (Figure 2-14). Irrevocable loss of nearly all of the open space in the eastern portion of the strategy area has occurred due to agriculture conversion, which covers approximately 50 percent of the strategy area. While the agricultural lands provide habitat for many wildlife species, including focal species such as Swainson's hawk and giant garter snake, lands converted to some types of agricultural uses have very little habitat value. In particular, agriculture conversion has resulted in drastic reductions in the acreage of vernal pools in the strategy area. The loss of vernal pools in Yolo County between 1989 and 2005 was approximately 75 percent, with 3,617 acres of vernal pool reduced to just 901 acres. The rate of loss by 2005 was approximately 4.7 percent per year, and if the current rate of annual habitat loss were to continue, vernal pool habitat would be completely eliminated from the Great Valley by 2087 (Holland 2009).

Human population growth and the subsequent demands placed on a limited supply of land, water, and other natural resources is the primary driver of the conversion of natural and agricultural land. Irrigation and flood-control operations have channelized many of the creeks and streams in the eastern and central portions of the RCIS/LCP area. Infrastructure such as the Yolo Bypass and Fremont Weir complex and the Sacramento Weir and Bypass complex have significantly altered the creeks and streams near the Sacramento River channel. The Yolo Bypass during floods can convey up to 80 percent of the flow from the Sacramento River through Yolo and Solano Counties until it rejoins the Sacramento River near the city of Rio Vista. The Yolo Bypass includes farmland and wildlife areas that have been intentionally managed as a designated flood conveyance since 1926.

By 2040, expected population in Yolo County is approximately 258,702 people, an increase of 14 percent (from 2018) or roughly 1/2 percent per year (California Department of Transportation 2019). Focal and conservation species have different tolerances to land conversion, with many of them not adapted to habitat conditions associated with more developed land uses. Beyond direct habitat loss, converting land to more intensive human-related uses fragments habitats, isolates populations, and makes dispersal to patches of habitats across an inhospitable landscape challenging. Habitat fragmentation also has additional consequences including introduction and spread of invasive species and noise and light pollution.

Other facilities associated with urbanization including power plants, sewage plants, and other industrial facilities also contribute pollutants to local aquatic resources. An increase in the quantity of pollutants reaching local creeks through higher runoff may affect the biological and physical characteristics of aquatic habitats. High runoff temperature may also result in an increase of in-stream water temperatures when runoff enters local streams.

Urban development is also associated with an increase in garbage that finds its way into natural communities and local waterways. This issue was the primary driver behind the 2016 ban on single-use plastic bags. Urban areas also often support increased numbers of feral cats, which pose a serious threat to native birds and reptiles.

2.11.2.1 Effects on Focal Species and Habitats

In the Great Valley ecoregion of the Central Valley and Sierra Nevada province, the SWAP describes the following (California Department of Fish and Wildlife 2015:5.4-34).

> Growth and development fragment habitats into small patches that cannot support as many species as larger patches can. These smaller fragments often become dominated by species more tolerant of habitat disturbance, while less-tolerant species decline. Populations of less-mobile species often decline in smaller habitat patches because of reductions in habitat quality, extreme weather events, or normal population fluctuations. Natural recovery following such declines is difficult for mobility-limited species. Such fragmentation also disrupts or alters important ecosystem functions, such as predator-prey relationships, competitive interactions, seed dispersal, plant pollination, and nutrient cycling (Bennett 1999; ELI 2003).

Loss of habitat connectivity would affect all of the focal species in the strategy area. Loss of connectivity between open space patches that provide habitat for focal species can cause a reduction in genetic diversity due to the loss of the ability of populations to disperse and intermix. High genetic diversity can allow populations to adapt to changing environmental conditions, evolve resistance to disease, and minimize physiological and behavior problems (Falk et al. 2001). For some species with limited ranges, especially reptiles and small mammals, habitat loss and connectivity to suitable habitat can threaten survival of a population if individuals cannot migrate to suitable replacement habitat. Maintaining connectivity allows limited-range species to shift habitats to adjacent areas if populations experience loss of habitat. Barriers to movement could also extirpate local, smaller populations of focal species in the strategy area.

Each of the focal species are affected by conversion of native habitats to agricultural production or urban development (Table 2-4). For example, Swainson's hawk, tricolored blackbird, and giant garter snake have experienced dramatic declines in the strategy area due to widespread habitat loss and habitat fragmentation from the conversion of grassland habitat to the urban and agriculture uses other than livestock grazing (Gervais et al. 2008). Over 90 percent of the wetland habitat within the historic range of northwestern pond turtle has been eliminated due to agricultural development, water diversion projects, and urbanization (U.S. Fish and Wildlife Service 1992).

Focal fish species are also directly affected by habitat conversion and habitat fragmentation. Habitat loss can result in the elimination of individuals or populations of these species from the area that is converted, and these species can also be affected by proximity to converted lands from runoff and pollution associated with urban development and associated infrastructure and trampling (in the case of rangelands). Loss of juvenile fish rearing habitat in the form of lost natural river morphology and function, and lost riparian habitat and in-stream cover can occur from residential development close to streams and rivers (National Marine Fisheries Service 2014).

2.11.2.2 Effects on Other Conservation Elements

All the other conservation elements in the strategy area could be affected by land conversion within the strategy area. The major impact of new development is the conversion from undeveloped to developed land cover, which reduces biodiversity and eliminates natural

habitat. Habitat conversion may further isolate areas of remaining natural habitat, increasing the edge (i.e., boundary) and the distance between habitats, limiting habitat connectivity and landscape linkages. For example habitat fragmentation may disconnect streams and their tributaries, change hydrologic regimes, and limit or obstruct natural interactions between wetland systems. Riparian and in-stream impacts may also occur as a result of urban development. Fragmentation and resulting land management activities like fire suppression modify the natural disturbance regime that historically sustained grasslands and woodlands in the strategy area. Additionally, urban development can convert farmland and rangeland to areas with large amounts of impervious surfaces (e.g., concrete or asphalt) which have little or no value for the focal species in the strategy area.

2.11.3 Climate Change

Climate change is a major challenge to the conservation of natural resources worldwide, in California, and in the strategy area. Climatic changes are already occurring in the state and have resulted in observed changes in natural systems. For example, migrating butterflies have been appearing earlier in the year, some bird and mammal habitat use distributions have shifted (Moritz et al. 2008; Tingley et al. 2012), and some forest species are gradually moving to higher elevations (Glick et al. 2011). Projected changes in climate, may be related to events such as wildfires, droughts, floods, extreme temperatures, and storms likely to have significant impacts on habitats, species, and human communities in the near future. Sea-level rise, drought, and flooding are discussed below in the context of climate change.

In the Central Valley and Sierra Nevada province, the SWAP describes the following stressors related to climate change (page 5.4-29–5.4-30).

Temperature

Average annual temperatures in the Central Valley are expected to increase 1.4° to 2.0°C (2.5° to 3.6°F) by 2070, and 1.5° to 4.5°C (2.9 to 7.9°F) by 2100 (PRBO 2011). January average temperatures are projected to increase 2.2° to 3.3°C (4 to 6°F) by 2050 and 4.4° to 6.7 °C (8°F and 12°F) by 2100. July average temperatures are projected to increase 3.3° to 3.9°C (6° to 7°F) in 2050 and 6.7° to 8.3°C (12°F to 15°F) by 2100 (California Emergency Management Agency 2012).

Precipitation and Snowpack

In the Central Valley, lower-elevation areas are projected to experience declines in annual precipitation of 2.5 to 5 cm (1 to 2 inches) by 2050 and up to 8.9 cm (3.5 inches) by 2100, while more elevated areas are projected to experiences losses of up to 25.4 cm (10 inches).

Freshwater Hydrologic Regimes

In the Sierra Nevada, the considerable loss in snowpack is projected to decrease the duration and magnitude of flows. Approximately 20% decrease in runoff and riverflow is expected by 2090. The combined effect of changes in precipitation, temperature, and snowpack are expected to produce an earlier arrival of annual flow volume by as much as 36 days by 2071–2100; and, warmer temperatures and more precipitation falling as rain rather than as snow are also projected to cause snowmelt runoff to shift earlier under all model simulations (PRBO 2011). Declining snowpack, earlier runoff, and reduced spring and summer streamflows will likely affect surface water supplies and increase reliance on groundwater resources in the Central Valley, which are often already overdrafted (PRBO 2011).

The SWAP provides the following overview of how the climate of the Central Valley is expected to change (page 5.4-31).

> Although climate change is already affecting wildlife throughout the state (Parmesan and Galbraith 2004), and its effects will continue to increase, it has particular significance for this region's major river and estuarine systems.
>
> In general, California winters will likely become warmer and wetter during the next century. Instead of deep winter snowpacks that nourish valley rivers through the long, dry summer, most of the precipitation will be winter rain that runs off quickly. For the Central Valley, this means more intense winter flooding, greater erosion of riparian habitats, and increased sedimentation in wetland habitats (Field et al. 1999; Hayhoe et al. 2004).
>
> Hotter, drier summers, combined with lower river flows, will dramatically increase the water needs of both people and wildlife. This is likely to translate into less water for wildlife, especially fish and wetland species. Lower river flows will allow saltwater intrusion into the Bay and Delta, increasing salinity and disrupting the complex food web of the estuary. Water contaminants may accumulate during the summer as the natural flushing action decreases.

2.11.3.1 Effects on Focal Species and Habitats

Some of California's native species are more vulnerable than others to extended or frequent severe drought and may be at risk of extirpation. Small population size, short life expectancy relative to the drought duration, and inability to adequately cope with extreme events are reasons some taxa, including several of the Yolo County RCIS focal species, are more vulnerable than others. The impacts of drought on some types of animals are more obvious than others.

Climate change may alter habitats in the strategy area as temperatures and precipitation levels change, which could lead to the reduction in population sizes or extirpation of focal species that rely on those habitats, or require focal species in the strategy area to migrate to other areas. Many of the focal species in the strategy area are of special conservation concern because of their risk of extinction (Table 1-2), and are particularly vulnerable to climate change (California Department of Fish and Wildlife 2015). Species that are particularly vulnerable often occur within a limited geographic range, exist in small populations, have specialized habitat requirements, and have low dispersal ability, which make it difficult for them to migrate to more suitable areas as habitats shift with climate change. Aquatic species are particularly at risk (e.g., green sturgeon, Central Valley steelhead, Chinook salmon), because they could be extirpated by loss of aquatic breeding habitat (i.e., lethal water temperatures) during extended periods of drought. By identifying species most at risk from the effects of climate change, conservation and management efforts can be targeted to reduce and mitigate these impacts, such as by protecting and restoring existing habitat and linkages between habitats and climate change refuges, or through assisted migration. The SWAP (California Department of Fish and Wildlife 2015) identifies five of the focal wildlife species as climate vulnerable: Central valley steelhead, Sacramento winter-run Chinook salmon, Central Valley spring-run Chinook salman, Central Valley fall/late fall-run Chinook salmon, and Swainson's hawk (Table 2-4, *Pressures Acting on Each Focal Species*, see above).

Increased and prolonged droughts and decreasing habitat connectivity may increase mortality in both juvenile and adult focal fish populations where water supply and quality reach critical lows. This poses a high risk for species (e.g., winter-run Chinook salmon, green sturgeon) with limited distribution and low population size (California Department of Water Resources 2015). Decreased stream flow and water quality during summer months in rivers and estuaries may also affect migration, juvenile fish over-summer rearing, and adult spawning.

In the climate risk analysis for California's at-risk birds (Gardali et al. 2012), Swainson's hawk is listed as a species with moderate vulnerability to climate change because of their use of very specific habitats and their long-distance migratory patterns (i.e., the timing of their migration needs to be matched with suitable climate conditions). Alfalfa, a high water-use crop, provides important foraging habitat for Swainson's hawk in the agricultural landscapes of the Central Valley and the strategy area. Climate change may cause a decrease in water available for agriculture, and a consequent shift from growing alfalfa to less water-intensive crops that may provide lower quality foraging habitat for Swainson's hawk (e.g., safflower) (Friends of the Swainson's Hawk 2009).

Focal species in the strategy area could respond to climate change in a number of ways. First, the timing of seasonal events, such as migration and egg laying, may shift earlier or later. Such shifts may affect the timing and synchrony of events that must occur together. Second, range and distribution of focal species may shift (Walther et al. 2002). This is of particular concern for narrowly distributed focal species that already have restricted ranges due to urban development or altitudinal gradients. Historically, some focal species could shift their ranges across the landscape. Today, urban and rural development prevents the movement of many species across the landscape.

Increases in disturbance events, and/or the intensity of disturbance events, such as fire or drought may also occur. This could increase the distribution of disturbance-dependent land cover types, such as California annual grassland, within the strategy area (Rogers and Westfall 2007). An increase in the frequency and intensity of disturbance could increase the likelihood that these events will harm or kill individual focal species, many of which are already quite rare. Events that occur with unpredictable or random frequency (called stochastic events) such as those described in this section can have an inordinately negative effect on the focal species.

2.11.3.2 Effects on Other Conservation Elements

Temperatures are expected to increase and water availability throughout the year will decrease. This will likely affect all of the vegetated land uses in the strategy area. With less water availability, wetlands may shrink and convert to grassland and riparian areas may similarly transition to non-aquatic land cover types. These environmental stresses may also lead to increased susceptibility to disease. These affects will further reduce already affected habitat connectivity. Reduction in water availability is also likely to increase challenges associated with successfully operating working landscapes.

2.11.4 Dams and Water Management/Use

As described in the SWAP (California Department of Fish and Wildlife 2015:2-32):

> The management of water resources in California results in numerous stresses on rivers, the Delta, wetlands, estuaries, and aquifers in the state. Across all regions of the state, limited water resources are managed to meet water and power supply needs and to accommodate urban communities and agricultural production. Agriculture is the dominant user of surface and groundwater in the state. Water management activities include the operation of dams and diversions, development and operation of irrigation canal systems, extraction of groundwater, and construction of flood-control projects such as levees and channelization. Coastal lagoons and rivers suffer from the historic and ongoing conversion of tributary waterways into constructed stormwater infrastructure. The stormwater conveyances are managed to convey urban runoff and floodwater and can alter the hydrologic processes that are important to ecosystem function, such as sediment deposition, water filtration, support of riparian vegetation and wildlife movement corridors. These activities can

reduce the amount of water available for fish and wildlife, obstruct fish passage, and result in numerous other habitat alterations. In all regions of the state, aquatic, wetland, and riparian habitats support rich biological communities, including many special status species, and degradation of these habitats represents a serious threat to the state's biological heritage.

Increasing pressures from development and agriculture, as well as the expectation of longer droughts resulting from climate change, have exacerbated California's water shortages. Additionally, climate change is expected to result in more precipitation falling as rain rather than snow, which could lead to severe flooding and further straining our aging water management infrastructure. It is anticipated that additional water conservation, water recycling, watershed management, managed wetland water supply, conveyance infrastructure, desalination, water transfers, and groundwater and surface storage will be necessary. Reduction in snowpack storage, due to climate change, affects water supply reliability, hydropower, and the amount of runoff during extreme precipitation that leads to flooding. Increased flooding potentially causes more damage to the levee system and other infrastructure (DWR 2013b).

Conservation strategies in the aquatic ecosystems of the state will be heavily influenced by the ongoing efforts to manage water supplies. Many of California's water supply and flood protection infrastructure are no longer functioning properly or have exceeded their life cycles. This aging water supply and flood management infrastructure, badly in need of maintenance or replacement, has led to declines in species and ecosystems. The California Water Plan Update (DWR 2013b) identified strategies for establishing reliable water supplies and restoring ecologically sensitive areas.

In the Central Valley and Sierra Nevada province, the SWAP describes the following stressors (California Department of Fish and Wildlife 2015:5.4-25–5.4-26).

Water diversions are found throughout the Central Valley's rivers and tributaries. Water is diverted for agriculture, municipal and industrial uses, and managed wetlands. Up to 70% of the freshwater flow that would naturally enter San Francisco Bay is now diverted (Steere and Schaefer 2001). Dams are located on all of the major rivers in the Central Valley and on many of their tributaries.

Dams and diversions have dramatically affected the aquatic ecosystems of the Central Valley, altering historical flooding regimes, erosion, and deposition of sediments that maintain floodplains. They also decrease riparian habitats and coarse gravel supplies needed for salmon and other native fish reproduction. Dam operations create rapid changes in flow rates that have led to the stranding of fish and exposure of fish spawning areas (CDFG 2005).

Dams reduce the amount of water remaining in the river that is needed by fish at critical times, and they alter the flow regimes in ways that are detrimental to aquatic life. Less water in the rivers also means less water for managed wetlands. Reduced river flows down- stream also allow saltwater intrusion into the Delta, increasing the salinity levels in the San Francisco estuary and bay beyond the tolerance levels of many species (Steere and Schaefer 2001).

Agricultural diversions usually get the highest quality water, discharging salty water that is then used in wildlife areas. By the time it is discharged from some wildlife areas, its salinity triggers concerns about water quality by regulatory agencies, particularly in the San Joaquin Valley. Efforts to correct this problem are complicated, owing to a poor understanding of the historic elements of salinity and the naturally saline wetlands of the San Joaquin drainage (CDFG 2005).

Dams and diversions also block fish movement to upstream habitat, remove fish and wildlife habitat, alter water quality (i.e., temperature and flow), and kill fish through entrainment and entrapment. Dams have cut off salmon access to 70-95% of their historical range (State Lands Commission 1993; Trust for Public Land [TPL] 2001; Clemmins et al. 2008; NMFS 2014). The diversion of water through powerful pumps from the Delta to the canals heading to Southern California reverses Delta flows and confuses migrating fish trying to find their way to the ocean. At times, the young fish swim with the flowing waters toward the pumps rather than toward the open ocean.

Levee, bridge, and bank-protection structures are present along more than 2,600 miles of rivers in the Central Valley and in the Delta (DWR 2005). These structures prevent flood flows from entering historic floodplains and eliminate or alter the character of floodplain habitats, such as shaded riverine habitat, and floodplain ecosystem processes. Constrained flood-level flows increase scouring and incision of river channels and reduce or halt the formation of riparian habitat, channel meanders, and river oxbow channels.

These changes in water supply also stress many upland species. Most of the resident terrestrial animals need to find adequate water during California's long, dry summer months. As human demand for water increases, there is less water available for resident wildlife species, so they experience greater physiological stress. In some cases, water management has also led to sustained year-round flows in streams that historically dried up in the summer. Central Valley habitats rely on a large and complex drainage, involving snowmelt and land uses up to 300 miles away and water imports from and exports to other river basins.

Current water management practices exemplify interactions between pressures and resulting stresses. As urban development expands, it creates more impermeable surfaces like concrete, asphalt, and the roofs of buildings. Subsequent rainfall is then less able to soak into the ground and runs off quickly. Rapid runoff reduces the recharge of groundwater reservoirs and reduces later summer stream flows. Combined with water diversions, this reduction in groundwater causes streams to dry up more quickly, thus reducing the availability of water to wildlife during summer months. Increased urban runoff also is a major source of water pollution. Urban runoff washes various pollutants out of urban areas, depositing them into creeks, rivers, and other waterbodies, adding to wildlife stress.

2.11.4.1 Effects on Focal Species

As described in the SWAP (California Department of Fish and Wildlife 2015:5.4-27):

> Dams and diversions of the rivers that flow into the Sacramento and San Joaquin drainages have been particularly detrimental to anadromous Chinook salmon, steelhead and green sturgeon. Each of these species historically spawned in Sierra Mountain rivers and streams, their young swimming to the sea and returning a few years later as adult fish to spawn. The construction of dams and water diversions blocked fish passage, contributing to dramatic declines in salmon and steelhead populations of the Sacramento and San Joaquin drainages. Fewer anadromous fish also means fewer eggs, young fish, and fish carcasses that provide nutrients for numerous other aquatic species. Historically, one to three million Chinook salmon spawned each year in the western Sierra. Today, dams block salmon access to upstream spawning habitat in all but a few creeks. Late fall-, winter-, and spring-runs of salmon have collapsed. Steelhead and spring-run Chinook salmon are federally threatened, and winter-run Chinook salmon are listed federally and by the state as endangered. Fall- and late-fall run salmon are taxa of special concern. Natural and hatchery produced fall- run Chinook salmon continues to support ocean commercial and sport fisheries and a river fishery. Many other aquatic species are also affected by the migration impediments imposed by dams and their associated reservoirs.

Green sturgeon have also been blocked from spawning habitat in the Sacramento River by dams. Restriction of spawning habitat is considered the foremost threat for green sturgeon (National Marine Fisheries Service 2010).

General degradation of fish rearing and migrating habitat from dams and water management includes elevated water temperatures, agricultural and municipal diversions and returns, restricted and regulated flows, entrainment of migrating fish into unscreened or poorly screened diversions, depredation by nonnative species, and poor quality and reduced quantity of remaining habitat (National Marine Fisheries Service 1998). The alteration of freshwater and estuarine habitats from human activities has resulted in a loss of estuarine/delta function for green sturgeon rearing habitat

(National Marine Fisheries Service 2010). Hydropower dams and water diversions in some years have greatly reduced or eliminated in-stream flows during spring-run migration periods (National Marine Fisheries Service 1998).

2.11.4.2 Effects on Other Conservation Elements

As described above, dams and other in-stream passage impediments have the greatest effect on habitat connectivity for covered fish species. Other water management facilities may also create impediments to movement. However, water supply management facilities are not entirely detrimental to other conservation elements. For example, the Yolo Bypass both provides flood protection and supports a portion of the remaining wetland habitat in the strategy area (Yolo Bypass Wildlife Area). Dams and water supply infrastructure is also critical for the success of working lands (primarily in crop production) in the strategy area.

2.11.5 Invasive Plants and Animals

Invasive plants can be found in many different habitats in the strategy area. Introduced aquatic habitat invaders include Brazilian waterweed, Eurasian water milfoil, hydrilla, water hyacinth, water pennywort, and parrot feather. In grasslands, some of the more challenging plant invaders include barbed goat grass, Harding grass, eucalyptus, fountain grass, gorse, medusahead, tree of heaven, and yellow starthistle. In riparian and wetland areas, invading plants include giant reed (or arundo), Himalayan blackberry, pampas grass, tamarisk (or salt cedar), pennyroyal, peppergrass, and tree of heaven (California Department of Fish and Wildlife 2015). In wooded areas, invasive grasses and broom species can form dense stands that inhibit the germination of native forest species.

As described in the SWAP (California Department of Fish and Wildlife 2015:2-43–2-44),

> Human introduction (directly or indirectly) of invasive species is a critical existing pressure that is expected to continue, and be exacerbated by climate change. Introduction of invasive species into the California ecosystem has occurred since the earliest European settlements. Some of these introductions have been intentional, such as the plants imported as ornamentals for horticulture, while other introductions have been unintentional when species arrive in the state along with the movement of people and goods. As California's population and economic activity has grown into its current size, the points of origin for people and goods coming to the state now span the globe. This has led to a diverse society and economy, but also has left California vulnerable to introductions of species from all around the world.

California is particularly vulnerable to invasive species because of its diverse ecosystems and communities. This ecosystem diversity, however, also means that species from all over the world may be able to find suitable habitat somewhere in the state. When species are introduced into these habitats they often find conditions similar to their home range that will allow for the establishment of reproducing populations. For preventing the spread of invasive weeds, the area affected currently is only part of the equation; it is also important to consider the area that could be affected in the future, if a species is allowed to spread.

The quantity of potential habitat and the high volume of transportation into California from other states and countries have had the unintended effect of introducing so many invasive species into the state that management of these nonnative organisms is now a high priority for resource managers. Efforts are underway to combat invasive species and prevent new introductions such as new regulations on the release of ballast water in California waters and mandatory inspections of

recreational boats in some lakes. Although most of the thousands of species brought into our state cause no harm, a small percentage is able to thrive in California to the detriment of native plants and wildlife. The colonization by invasive species, particularly invasive grasses, is expected to increase with climate change (Sandel and Dengermond 2011).

Invasive species harm California's wildlife by disrupting native plant and animal communities. Some introduced species are voracious predators, such as introduced trout species that have significantly contributed to the decline in mountain yellow-legged frog (Hammerson 2008). Others out-compete native species for resources, some spread diseases, and some are capable of re-engineering the environment to suit their needs, changing hydrology, soil chemistry, and fire regimes. In addition, some are transmitting novel diseases into the state. Many also degrade recreational activities from hunting to boating, camping, and hiking. The introduction of invasive species has been an especially detrimental pressure on estuaries such as the San Francisco estuary, which is likely the most invaded estuary in the world with over 230 species of invasive species (Cohen and Carlton 1998). Though it is difficult to quantify harm from invasive species in financial terms, a conservative estimate places the cost to the United States at over $100 billion each year, including damage to agriculture and infrastructure (Pimentel et al. 1999). In California alone, invasive plants cost the state $82 million each year (California Invasive Plant Council 2008).

2.11.5.1 Effects on Focal Species and Habitats

Invasive plant and animal species put significant pressure on focal species within the strategy area. Invasive species often reduce habitat quality for the focal wildlife and plant species, often due to the density and monotypic habitat that is formed by particularly invasive plants. Some invasive wildlife species depredate focal wildlife species.

In the Central Valley and Sierra Nevada province, the SWAP describes the following (California Department of Fish and Wildlife 2015:5.4-36–5.4-37).

> Invasive plant and animal species are an important pressure on wildlife in this province, just as they are in other regions throughout the state (CALFED 2000; CalIPC 1999; CDFG 2005; Goals Project 1999; Hickey et al. 2003; Jurek 1994; Lewis et al. 1993; RHJV 2004).

Introduced animals have invaded both terrestrial and aquatic environments. Not all introduced vertebrates are invasive, and they have varying effects on wildlife. The species of most concern in the region parasitize songbird nests, dominate limited nesting habitat, prey on native species, or otherwise damage wildlife habitats.

Fifty-one new fish species have become established in California (Moyle 2002), dominating most of the rivers and streams in this region. These include species such as striped bass, white catfish, channel catfish, American shad, black crappie, largemouth bass, and bluegill. Many fish were historically introduced (via stocking) by federal and state resource agencies to provide sport fishing or forage fish to feed sport fish. Many introduced nonnative fish and amphibians may out-compete native fish for food or space, prey on native fish (especially in early life stages), change the structure of aquatic habitats (increasing turbidity, for example, by their behaviors), and may spread diseases (Moyle 2002). However, not all nonnative species are considered invasive, which typically refers to species whose introduction causes or is likely to cause economic or environmental harm or harm to human health (California Department of Food and Agriculture 2019). Several of the introduced predatory fish may have increased predation levels on Chinook salmon and other native fishes (CALFED 2000).

In addition to introduced fish, native aquatic species are stressed by introduced bullfrogs, red-eared sliders (a turtle), and invertebrates. Introduced invertebrates, such as New Zealand mud snail, quagga mussels, Asian clam, zebra mussel, Chinese mitten crab, and mysid shrimp, are causing significant problems for native species in rivers, streams, and sloughs. While not all of the introduced aquatic species are invasive or have significant consequences for native species, biologists are concerned about the sheer dominance of these new species and their current and potential effects on the structure and function of the estuarine ecosystem.

Depredation by nonnative species of all runs of juvenile Chinook salmon and steelhead affects these species in the lower Sacramento River and Delta where there are high densities of nonnative fish species such as striped bass, smallmouth bass, and largemouth bass. These nonnative predators prey upon outmigrating juveniles and may have a direct impact on the population (National Marine Fisheries Service 2014). Introduced nonnative prey species can also displace native prey species. The overbite clam, *Potamorcorbula amurensis*, a nonnative bivalve, became established in the San Francisco Bay Estuary in 1988 and has become the common food of white sturgeon (California Department of Fish and Game 2002). Overbite clams can pass undigested through white sturgeon and they also bioaccumulate selenium, a toxic metal that green sturgeon are highly sensitive to (Linveille et al. 2002; White et al. 1989).

Invasion of exotic pest species into habitats occupied by giant garter snake, northwestern pond turtle, and yellow-billed cuckoo is another threat to the continued survival of these focal species in the strategy area. Saltcedar or tamarisk (*Tamarix ramosissima*), an invasive pest plant species, is has establishes itself along riparian corridors. The changes in channel morphology, hydrology, and vegetation cover associated with saltcedar invasion has degraded and changed habitat suitability for pond turtles and yellow-billed cuckoo (Lovich and de Gouvenan 1998; Laymon 1998). Along the Sacramento River, domestic fig and black walnut have also become dominant tree species; these species likely offer little benefit to cuckoos as nesting or foraging habitat because the species' preferred prey are not found on these substrates and the trees do not provide good nest sites (Laymon 1998). The introduction of nonnative turtles, including red-eared sliders (*Trachemys scripta*) and painted turtles (*Chrysemys picta*), also threatened pond turtles. The bullfrog (*Rana catesbeiana*) will consume any animal it can swallow, including hatchling and young northwestern pond turtles (Holland 1994) and California tiger salamander (Ford et al. 2013). The intensity of predation from bullfrogs has been shown to eliminate recruitment in some pond turtle populations (Overtree and Collings 1997). Predation by and competition with introduced species (e.g., house cats, bullfrogs, largemouth bass [*Micropterus salmoides*], catfish [*Ictalurus* spp.]) also poses threats to giant garter snake (U.S. Fish and Wildlife Service 2017; Carpenter et al. 2002). Additionally, introduced predatory fish may compete with giant garter snake for smaller forage fish, and habitat alteration may facilitate other species of garter snake to access giant garter snake habitat, allowing them to compete more successfully with giant garter snake (U.S. Fish and Wildlife Service 1999:29).

2.11.5.2 Effects on Other Conservation Elements

In the Central Valley and Sierra Nevada province, the SWAP describes the following as related to natural communities (California Department of Fish and Wildlife 2015:5.4-36–5.4-37).

> Invasive plants can be found in many different habitats in this region. In grasslands, some of the more challenging plant invaders include eucalyptus, fountain grass, gorse, medusahead, tree of heaven, and yellow starthistle. In riparian and wetland areas, invading plants include edible fig, giant reed or arundo, Himalayan blackberry, pampas grass, Russian olive, tamarisk (or saltcedar), pennyroyal,

pepperweed, tree of heaven, Scotch broom, and French broom. Oak woodlands are invaded by plants such as Scotch broom, French broom, pepperweed, medusahead, barbed goat grass, and yellow starthistle.

Introduced plants also invade aquatic habitats. These aquatic invaders include Brazilian waterweed, Eurasian watermilfoil, hydrilla, water hyacinth, water pennywort, and parrot feather.

2.11.6 Recreational Activities

As described in the SWAP (California Department of Fish and Wildlife 2015:2-41–2-42),

> Outdoor recreation and exposure to nature is important to foster an appreciation of nature; however, recreation in sensitive habitats could result in habitat degradation. Recreational use of public lands in California involves a large number of visitors, both from state residents and out-of-state tourists. Extensive areas of federal and state lands offer high-quality outdoor recreation opportunities. Visitation data (BBC Research and Consulting 2011) from federal agencies (National Park Service [NPS], USFS, BLM, USFWS, and U.S. Army Corps of Engineers) indicate that federally managed lands in California average approximately 90 million visitor days per year. The California State Parks System averages approximately 78 million visitor days per year.
>
> Large numbers of outdoor recreation users in sensitive areas can directly damage natural systems by reducing vegetative cover, compacting soil, disturbing biotic soil crusts (i.e., cryptogams), increasing soil destabilization and erosion, disturbing breeding and foraging areas, contaminating natural lands and waterways through inappropriate disposal of trash and human waste, and by introducing non-native species. Indirect impacts may also occur to natural areas through increased development of recreational access points and supporting infrastructure such as roads, visitor facilities, and campgrounds. Visitor litter in parks and public lands can encourage increased corvid populations (jay, crow, and raven), which contributes to greater competition with and predation upon other native wildlife.
>
> Recreational off-highway vehicle (OHV) use can have adverse effects on soil conditions, native plant communities, and sensitive species. On public lands, authorized and unauthorized OHV trails open relatively undisturbed areas to increased use. The vehicles can disturb or run over wildlife, crush and uproot plants, spread invasive plants, and disturb soils, contributing to erosion and sedimentation of aquatic habitats.
>
> Concentrated recreational use in highly sensitive areas, such as streams, coastal habitats, and riparian zones by hikers, picnickers, mountain bikers, and equestrians can damage these systems, reducing vegetative cover and disturbing sensitive species. Concentrated fishing, especially in populated area can lead to localized depletion of fisheries. Illegal trampling, and collecting, can deplete floral and faunal populations, reduce biodiversity, and alter trophic and community structures in frequently visited natural habitats. The negative impacts of pressures from recreation can be reduced through proactive recreation planning and public education.

2.11.6.1 Effects on Focal Species

Demand for, and participation in, outdoor recreation is increasing at a notable rate. With increasing numbers of recreationalists, the type of recreation impacts and spatial extent of area affected are also changing (Flather and Cordell 1995). Outdoor recreation is the second leading cause of decline of U.S. threatened and endangered species on public lands (Losos et al. 1995). Wildlife can be affected by recreation in a variety of ways, including direct and indirect mortality, lowered productivity, reduced use of habitat/preferred habitat, and aberrant behaviors that can reduce reproductive or survival rates (Purdy et al. 1987). The impact from recreation depends on the frequency, intensity, location, predictability, and type of use (e.g., day-hiking, bird watching, biking,

snowmobiling, off-road vehicle), as well as the type of wildlife including group size, age, sex, and the species' sensitivity to human presence.

Birdwatching, photography, and other repeated low-impact human activity can cause an increase in the risk of nest predation of songbirds. High-use recreation areas, such as campgrounds and picnic areas, have been shown to have higher levels of nest predators, and horses can attract brown-headed cowbirds if stables or corrals are near (U.S. Fish and Wildlife Service 2002).

2.11.6.2 Effects on Other Conservation Elements

Recreational use of natural communities may degrade the quality of those lands for use by focal species. Recreational use, and high-use trails in particular, may also affect connectivity for some focal species. Working lands in this strategy area are primarily comprised of lands in rice production (5.4% percent of the strategy area and 14 percent of all cultivated agriculture). Rice fields are often flooded in the winter, creating habitat for migrating birds and also drawing hunters to some sites. This supports the income of farmers while also providing some services for migrating waterfowl.

2.11.7 Roads and Railroads; Utilities and Service Lines

As described in the SWAP (California Department of Fish and Wildlife 2015:2-29),

> Existing infrastructure, such as roads and highways, can be a barrier to wildlife movement, creating fragmented habitats and direct mortality from vehicle and wildlife collisions. Continued population growth increases the demand for transportation facilities for urban, regional, intercity, and long-distance travel. Caltrans estimates that the capacity of existing rail, air, and highway transportation systems will need to be increased (Caltrans 2015 in California Department of Fish and Wildlife 2015). The California Transportation Plan calls for an increase in intermodal transportation systems, including increased freeway reliability, express and high occupancy vehicle lanes, and increased connectivity between transportation types and across modes of transportation (Caltrans 2015 in California Department of Fish and Wildlife 2015). The majority of these connections will occur along existing transportation corridors and increase mobility between existing modes of transportation including intercity bus and rail (Caltrans 2015 in California Department of Fish and Wildlife 2015). The focus on improvements to existing corridors and connections between travel modes should minimize new habitat fragmentation from state highways. However, local roadways and other infrastructure have the potential to create additional habitat fragmentation.

2.11.7.1 Effects on Focal Species

In the Central Valley and Sierra Nevada province, the SWAP describes the following (California Department of Fish and Wildlife 2015:5.4-34).

> Growth and development, along with associated linear structures like roads, canals, and power lines, impede or prevent movement of a variety of animals. This is generally less significant than habitat loss but makes it more difficult for those species that need to move large distances in search of food, shelter, and breeding or rearing habitat and to escape competitors and predators. Animals restricted to the ground, like mammals, reptiles, and amphibians, face such obstacles as roads, canals, and new gaps in habitats. Attempts to cross these obstacles can be deadly, depending on the species and the nature of the gap (e.g., four-lane highways with concrete median barriers compared to narrow, rural two-lane roads). Fish and other water-bound aquatic species attempting to move either upstream or downstream are blocked by lack of water resulting from diversions, physical barriers like dams, and by entrainment in diverted water. Even the movement of highly mobile species like birds and bats can be impeded by such features as transmission lines and wind energy farms, particularly in focused flight corridors like Altamont Pass, and 50 new wind energy sites are currently proposed throughout

> the state on land managed by BLM (CDFG 2005) Such species either cannot see or do not avoid these structures, and many die as a result. The actual extent of bird fatalities because of power-line collision in California is unknown; however, the California Energy Commission (CEC) estimates that fatality rates because of Central Valley power-line collisions alone could reach as high as 300,000 birds per year (CEC 2002a; CEC 2002b).

Wildlife-vehicle collisions are a large and growing concern among public transportation departments, conservation organizations and agencies, and the driving public. Wildlife-vehicle collisions are a safety concern for drivers and a conservation concern for most animal species. Recently, Loss et al. (2014) estimated that between 89 and 340 million birds may die per year in the U.S. from collisions with vehicles. Many public transportation departments are trying different methods of reducing wildlife-vehicle collisions, including fencing roadways and providing crossing structures across the right-of-way to allow safe animal passage.

The California Roadkill Observation System (CROS), a site created by UC Davis's Road Ecology Center (REC), records the locations of roadkill observations on major highways and freeways and includes records of carcasses cleaned up by the California Department of Transportation (Caltrans) between 1987 and 2007. Using data from the CROS, the REC identifies stretches of California highways that are likely to be hot spots (i.e., stretches of highway that are statistically different from other stretches) for wildlife-vehicle collisions. The CROS accounts for both observed animal carcasses and traffic incidents, which can range from wildlife sightings on the roadway to wildlife-vehicle collisions. In 2016, in the strategy area, I-5, I-80, and SR 113 were analyzed by the REC. There were three hot spots identified in the southern region of the strategy area along I-80 between Sacramento and Davis, along I-5 near Woodland, and north of Woodland along SR 113. Most of the observations in the strategy area include various species of birds and medium (e.g., bobcat, coyote, raccoon) and large mammals (e.g., wild pig, mountain lion, black-tailed deer).

2.11.7.2 Effects on Other Conservation Elements

Habitat connectivity is greatly affected by linear infrastructure, including roads and utility lines. Natural communities are also affected by removal. Conversion to roads is an obvious effect of development, but roads also support introduction of pollutants (e.g., gar oil, grease), litter, and sometimes movement of invasive species. In the case of linear utilities, lands may be converted from a forested community to a grassland community along rights-of way. This is particularly true of power lines where downed trees disrupting service or starting wildfires is of great concern. Linear facilities do not have any particular adverse effects on working lands in the strategy area. Habitat value can be affected if the habitat is covered by solar panels.

2.11.8 Fire and Fire Suppression

As described in the SWAP (California Department of Fish and Wildlife 2015:2-35–2-36),

> Many of California's ecosystems are fire adapted; however, many semi-arid forests and grasslands are not experiencing fire as frequently as needed to maintain their ecological structure and function. Other ecosystems, such as coastal sage scrub and chaparral, are experiencing fires too frequently, resulting in changes to their ecology (Sugihara et al. 2006).
>
> Natural causes of fire include lightning, sparks from falling rocks, volcanic activity, and the spontaneous combustion of plant materials and other organic matter (Barbour et al. 1980). Of these, lightning is the most influential factor, and in California lightning strikes have occurred over 62,000 times a year on average (Sugihara et al. 2006). In California, the most common cause of the state's 20

largest fires was lightning, followed by human-related causes, including power lines, arson, and vehicles (CAL FIRE 2015). Lightning-caused fires typically occur above 5,000 feet in altitude, but are recorded to have occurred at much lower elevations (Burcham 1957).

Wildfire risk reduction and suppression activities are designed to address the most common fire ignition causes. Risk reduction actions can include fuel reduction through mechanical or herbicide treatment and establishment of fire breaks. Wildfire in the wildland-urban interface poses a threat to human safety and structures. Fire risk reduction and suppression activities can have variable effects on wildlife, depending on the specific management actions and environment in which the actions occur. For example, in some areas bird and mammal diversity and abundance can increase with moderate levels of forest thinning for fire fuel management, but decline with heavier levels of thinning (Verschuyl et al. 2010).

Control of invasive plants is another fire risk reduction action. For instance, red brome (*Bromus madritensis* ssp. *rubens*) and other invasive annual grasses increase fire frequencies in the western Mojave Desert in California, and cheatgrass has been part of the fuel in sagebrush fires in the Owens Valley (Lambert 2010). In a study of fires over the past decade in the Great Basin, which includes parts of California, cheatgrass fueled the majority of the largest fires and influenced 39 of the largest 50 fires (Balch et al. 2013). In cheatgrass grasslands, the average size and frequency of fire is greater compared to other vegetation types. The authors conclude that cheatgrass is creating a novel grass-fire cycle that makes future fires more likely (Balch et al. 2013).

Climate is also a primary determinant of fire patterns (Halsey 2004). Risk of large wildfires is projected to increase as a result of climate change influences, most substantially in the Sierra Nevada foothills, Trinity Alps, Great Basin, and Coast Range (CNRA 2014). In light of this, climate change will add a significant variable to efforts to understand future fire regimes and to identify fire risk management measures that can adjust to changing fire risks and maintain the mosaic of habitats (Grissino-Mayer and Swetnam 2000). Additionally, the expansion of residential communities into fire-dependent ecosystems creates a conflict between maintaining ecological integrity and protecting property. The expansion of new development into fire-dependent ecosystems can be partially mitigated through the application of smart growth principles that concentrate new development near existing communities.

2.11.8.1 Effects on Focal Species

In the Central Valley and Sierra Nevada province, the SWAP describes the following (California Department of Fish and Wildlife 2015:5.4-34).

A continuum of fire regimes exists in the various forest types. For example, ponderosa pine–dominated mixed conifer forests of the Sierra have historically had a fire regime of frequent, low- to moderate-intensity fires, with less frequent large, uncharacteristic fires. Additionally, Sierran forests consisted of highly clustered groups of trees with sparsely treed or open gap conditions but have been converted to less resilient and more fire prone habitats. (North et al. 2009). At higher elevations, lodgepole pine communities evolved with less frequent but more severe fires (McKelvey et al. 1996). Wildfire is such an influential ecological element that the regeneration of some plant communities and the survival of many plant species require fire (Kilgore 1973). Fire suppression coupled with selective harvest of large trees, re-forestation with dense plantations of young conifers, invasive weeds, and intensive grazing have dramatically reshaped forest structure and altered ecosystems over the last 100 years.

In the early 1900s, the nature and role of wildfire was not understood and was generally viewed as damaging to forests. As a result, state and national policy for the last century has been to aggressively suppress forest fires and to put them out quickly, minimizing fire on the landscape of the West (van Wagtendonk 1995). USFS's "Smokey Bear" campaign was highly successful, training generations of Americans that wildfire was synonymous with waste and destruction and that it was everyone's duty to prevent forest fires (Dombeck et al. 2004; Kaufman 2004).

To restore native plant communities, forest ecologists generally agree that fire needs to return to forests at intervals consistent with historical fire regimes. But a century of fire suppression has created an enormous backlog of forest acreage with dense tree stands and high fuel loads (Husari and McKelvey 1996). The 1964 federal Wilderness Act recognized the ecological role of fire and established a policy allowing natural fires to burn in national parks. NPS has implemented prescribed fires for many years; however, most of the forests needing fire are lower in elevation than most of the wilderness areas. In 1971, USFS policy was amended to allow prescribed fires on national forest lands as well (Caprio and Swetnam 1993; Chang 1996, Kilgore 1973; Skinner and Chang 1996). The results of prescribed fires in the Sierra have shown excellent ecological benefits (Keifer et al. 2000). Yet, while the use of prescribed fire is increasing and considered a necessary tool to restore ecosystems and reduce the risk of uncharacteristic wildfire, it is currently applied to very few forested acres of the Sierra.

Returning fire to forest ecosystems presents great challenges, because of current-day property and safety risks. The fire threat to people and expanding communities in the forests, excessive fuel loads created by fire suppression and past forest management practices, effects on air quality and conflicts with clean-air laws, and liability all impose difficult constraints on the increased use of prescribed fire and allowing natural fires to burn. Even with the best efforts to reduce fire conflicts and risks, in many areas, reintroducing fire will not be practical or politically possible, at least as a first treatment. Certainly in some locations, selective timber harvest may have to serve as the surrogate for natural fire to begin the process of restoring ecological diversity to forests. Mechanical thinning, however, will not provide all of fire's ecological benefits.

Recently, research priorities and questions relative to planning and implementing forest/fuels treatments are focusing on designing effective fuels treatment placement in landscapes under real world constraints; the historic and appropriate size of high-severity burn patches in a landscape with an active mixed-severity fire regime; planning for climate change; and better understanding historical forest conditions and fire regimes, and their relevance for management (North et al. 2012).

Fire and fire suppression can affect focal species through changes in spatial distribution of habitat types, changes in soil moisture, sediment and erosion deposition, natural community structure, changes in succession process, and through habitat fragmentation.

2.11.8.2 Effects on Other Conservation Elements

Fire is a naturally occurring process in many of the natural communities found within the strategy area. However, due to wildlands and urban interface, fire suppression is required for these areas. Fire and fire suppression can alter natural community structure, change succession processes, and can change soil moisture and create area of erosion and sedimentation. These effects will further reduce already affected habitat connectivity. Reduction in water availability is also likely to increase challenges associated with successfully operating working landscapes.

2.12 Regional Conservation Planning Environment

2.12.1 Natural Community Conservation Plans and Habitat Conservation Plans in the Strategy Area

CFGC Section 1852(c)(10) requires that an RCIS include "provisions ensuring that the strategy is consistent with and complements any administrative draft natural community conservation plan, approved natural community conservation plan, or federal habitat conservation plan that overlaps

with the strategy area." The Yolo HCP/NCCP and six other HCPs overlap with the strategy area and are described in the following subsections.

2.12.1.1 Yolo Habitat Conservation Plan/Natural Community Conservation Plan

The Yolo HCP/NCCP is a countywide plan to provide for the conservation of 12 sensitive species and the natural communities and agricultural land on which they depend. The Yolo HCP/NCCP provides a streamlined permitting process and countywide conservation strategy to address the effects of a range of future anticipated activities on the 12 covered species. These species are:

- Palmate-bracted bird's beak
- Valley elderberry longhorn beetle
- California tiger salamander
- Northwestern pond turtle
- Giant garter snake
- Swainson's hawk
- White-tailed kite
- Western yellow-billed cuckoo
- Western burrowing owl
- Least Bell's vireo
- Bank swallow
- Tricolored blackbird

The Conservancy, which consists of Yolo County and the incorporated cities of Davis, West Sacramento, Winters, and Woodland, as well as UC Davis as an ex officio member, developed the Yolo HCP/NCCP. The Yolo HCP/NCCP provides the basis for issuance of 50-year permits under the federal Endangered Species Act (FESA) and California Natural Community Conservation Planning Act that cover an array of public and private activities, including activities that are essential to the ongoing viability of Yolo County's agricultural and urban economies. Specifically, the Yolo HCP/NCCP will provide the Permittees (i.e., Yolo County, the four incorporated cities, and the Conservancy) with incidental take authorizations from both USFWS and CDFW for the 12 covered species. In addition to the Permittees, the Yolo HCP/NCCP permits may cover the activities of other entities through certificates of inclusion.

2.12.1.2 University of California, Davis Habitat Conservation Plans

UC Davis developed the La Rue Housing/Bowley Center HCP as part of its application to USFWS for an incidental take permit pursuant to FESA Section 10(a)(1)(B) to construct the La Rue Housing/Bowley Center, a new student housing facility. The permit authorized the incidental take of the valley elderberry longhorn beetle and modification of its habitat during construction of the La Rue Housing/Bowling Center and a greenhouse/education facility. Specifically, the permit authorized removal of 14 elderberry shrubs with 168 stems greater than 1 inch in diameter.

UC Davis agreed to implement the following measures to minimize and mitigate impacts that may have resulted from incidental take of the beetle: (1) conduct mitigation and monitoring of transplanted elderberry shrubs and supplemental plantings according to USFWS's Mitigation Guidelines for the Valley Elderberry Longhorn Beetle, dated September 19, 1996; (2) transplant 14 affected elderberry shrubs to a mitigation site along Putah Creek on Russell Ranch, property owned by the university; (3) plant 336 additional elderberry cuttings to compensate for any adverse impacts on the 14 elderberry shrubs resulting from the proposed project; and (4) manage the mitigation area for the purpose of long-term protection of valley elderberry longhorn beetle habitat.

Also in 2002, the UC Davis completed the Campus Projects HCP to cover impacts on the valley elderberry longhorn beetle from the following capital improvement and maintenance projects.

- Genome Launch Facility
- Cole Facility Stormwater Improvements
- Center for Companion Animal Health
- NEES Centrifuge Support Building
- Phase 2B Electrical Improvement Project

As a condition of these and other project approvals, UC Davis committed to (1) conduct project-specific surveys of valley elderberry longhorn beetle habitat; (2) avoid and protect valley elderberry longhorn beetle habitat where feasible; and (3) where avoidance is infeasible, develop and implement a mitigation plan in accordance with the most current USFWS Compensation Guidelines for unavoidable take of valley elderberry longhorn beetle (U.S. Fish and Wildlife Service 1999) pursuant to FESA Section 10(a).

Mitigation included an additional 18 acres added into UC Davis' La Rue/Bowley Center HCP mitigation (140 acres) for a total of 158 acres of mitigation between this HCP and the La Rue Housing/Bowley Center HCP. The combined impact of the two HCPs is 27 acres (17 from La Rue).

Total mitigation between the two HCPs totaled 158 acres along Putah Creek at Russell Ranch to compensate for a combined total impact of 27 acres (10 acres from the Campus Projects HCP and 17 from the La Rue HCP). UC Davis also committed to transplant affected shrubs to Russell Ranch, plant new elderberry shrubs, and monitor and manage the Russell Ranch habitat in perpetuity.

2.12.1.3 Teichert Esparto Mining Project Habitat Conservation Plan

Teichert and Son completed the Teichert Esparto Mining Project HCP in 1999 to provide coverage for take of the federally listed valley elderberry longhorn beetle incidental to mining activity for the Esparto Mining Project in Yolo County. The incidental take occurred on a 98-acre site in Yolo County. The site supported four blue elderberry shrubs, which constituted valley elderberry longhorn beetle habitat and could be occupied by the species.

To mitigate for impacts that would result from the removal of the four valley elderberry shrubs, Teichert transplanted the four elderberry shrubs to an existing mitigation site along Cache Creek in Yolo County. Additionally, Teichert achieved a 2:1 mitigation ratio, consistent with USFWS mitigation guidelines, by designating, maintaining, and monitoring 22 elderberry replacement seedlings with associated native plants.

2.12.1.4 Sacramento Municipal Utility District Habitat Conservation Plan

The Sacramento Municipal Utility District (SMUD) HCP, currently in preparation, would overlap with a small part of the southeast strategy area. SMUD is a locally controlled not-for-profit municipal utility. SMUD generates, transmits, and distributes electric power to serve an approximately 900-square-mile service area that includes almost all of Sacramento County and small portions of Placer, Amador, El Dorado, San Joaquin, and Yolo Counties. SMUD also owns and operates 76 miles of natural gas pipeline in Sacramento County and Yolo County that serves four gas-fired cogeneration power plants. SMUD's existing electrical and natural gas pipeline infrastructure requires long-term maintenance to deliver reliable electricity. SMUD also owns and operates a 200-mile telecommunication system on existing electric line poles and towers.

This HCP covers operations and maintenance of SMUD facilities for five covered species, all of which are Yolo RCIS/LCP focal species: giant garter snake, California tiger salamander, valley elderberry longhorn beetle, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

2.12.1.5 Solano County Habitat Conservation Plan

The Solano County Water Agency is preparing the Solano Multispecies Habitat Conservation Plan (Solano HCP). The Solano HCP accounts for all covered activities undertaken by or under the permitting authority and control of the Plan Participants within the approximately 585,000-acre Plan Area, which encompasses approximately 577,000 acres of Solano County and approximately 8,000 acres of Yolo County. The HCP includes a small part of Yolo County for the purposes of covering activities within the Dixon Resource Conservation District Service Area and Reclamation District 2068 Service Area. The HCP conservation actions are focused almost entirely in Solano County.

Of the 36 species covered under the Solano HCP, 22 overlap as either a focal species or conservation species in this RCIS and six overlap with the Yolo County HCP/NCCP. The Solano County HCP conservation strategy is primarily implemented through project-specific avoidance, minimization, and mitigation requirements. With a goal or preserving approximately 30,000 acres in Solano County, creating a reserve system is the backbone of the conservation strategy in the HCP. The extent to which the reserve system is preserving, supporting, and maintaining viable populations of Covered Species, biological diversity, and ecosystem functions will determine the overall success of the HCP.

2.12.2 Safe Harbor Agreements

The USFWS and National Marine Fisheries Service (NMFS) established a Safe Harbor Policy under FESA, as amended (64 *Federal Register* 32717). This policy is intended to incentivize the maintenance, enhancement, and restoration of habitat for listed species on non-federal lands by providing landowners that enroll their property under a Safe Harbor Agreement with assurances that no additional future regulatory burdens for "incidental take" will be placed on their property as a result of their voluntary conservation actions to benefit listed species.

Three Programmatic Safe Harbor Agreements that have spatial extents that overlap portions of the strategy area have been developed. These Programmatic Safe Harbor Agreements were each developed by organizations interested in partnering with landowners to conduct voluntary riparian

ecosystem management, enhancement, and restoration activities that are anticipated to provide a net conservation benefit to federally listed species.

2.12.2.1 Programmatic Safe Harbor Agreement for the Restoration of Riparian and Wetland Habitat

Audubon California entered into a 30-year Programmatic Safe Harbor Agreement with USFWS in 2007 to benefit valley elderberry longhorn beetle and giant garter snake in Yolo County. The Programmatic Safe Harbor Agreement has the following purposes.

- To promote ecosystem restoration, enhancement and management of native riparian and/or wetland habitats in Yolo County for the conservation of the valley elderberry longhorn beetle and/or giant garter snake
- To provide certain regulatory assurances to landowners participating in such restoration, enhancement, and management activities
- To accomplish the foregoing without negatively affecting farming

The lands eligible to enroll under this Safe Harbor Agreement include non-federal properties in Yolo County. The total area that may be restored to riparian and/or wetland habitat is expected to be less than 20,000 acres.

The Programmatic Audubon Safe Harbor Agreement currently has three agreements with landowners in place which are currently being overseen by the Sacramento River Forum under an Memorandum of Understanding with Audubon California.

2.12.2.2 Sacramento River Conservation Area Forum Programmatic Safe Harbor Agreement

In 2013, the Sacramento River Conservation Area Forum entered into a 30-year Programmatic Safe Harbor Agreement with USFWS. The purpose of this Safe Harbor Agreement is to provide a net conservation benefit to the federally threatened valley elderberry longhorn beetle and giant garter snake.

Properties eligible to enroll under this Safe Harbor Agreement include non-federal properties within or immediately adjacent to the Sacramento River Conservation Area. The Sacramento River Conservation Area extends along approximately 222 miles of the Sacramento River and the adjacent 213,000 acres of land extending from Keswick Dam in Shasta County south to the town of Verona in Sutter County. The Sacramento River Conservation Area crosses through Butte, Glenn, Colusa, Shasta, Yolo, Sutter, and Tehama Counties. The natural community types generally found on lands eligible for enrollment into this Safe Harbor Agreement include riparian, California prairie, Valley oak woodland, and riverine along with cultivated lands seminatural community.

The Sacramento River Conservation Area Forum Safe Harbor Agreement currently has one landowner agreement in place and three others that are being discussed.

2.12.2.3 Safe Harbor Agreement for Valley Elderberry Longhorn Beetle

Solano County Water Agency entered into a 20-year Programmatic Safe Harbor Agreement with USFWS in 2014 for the restoration and management of valley elderberry longhorn beetle habitat

within riparian areas along Putah Creek and its tributaries. Habitat conservation activities associated with this Safe Harbor Agreement include the planting of elderberry shrubs, allowing for the passive establishment of elderberry shrubs within remnant and newly created riparian corridors, removal of nonnative invasive plant species, and the implementation of avoidance and minimization measures intended to reduce incidental take of the species.

Properties eligible to enroll under this Safe Harbor Agreement include all properties adjacent to Putah Creek and its tributaries from Montecello Dam to the Yolo Bypass in Solano and Yolo Counties. The total riparian area eligible to enroll under this Safe Harbor Agreement is approximately 2,000 acres. Roughly half of that acreage is within the strategy area.

2.12.3 Other Regional Conservation Plans and Initiatives

2.12.3.1 Local Plans

Cache Creek Resources Management Plan

The Cache Creek Resources Management Plan (CCRMP) is part of the Cache Creek Area Plan, a focused planning policy document that is part of the Yolo County General Plan. The CCRMP eliminated in-channel commercial mining (i.e., mining inside of the Cache Creek channel) and established a program for implementing ongoing projects to improve channel stability and restore riparian habitat along Cache Creek. The CCRMP provides a policy framework for restoration of 14.5 miles of lower Cache Creek and includes specific implementation standards. The Cache Creek Improvement Program (CCIP), the implementation plan for the CCRMP, identifies specific categories of projects; including bank stabilization, channel maintenance, revegetation, and habitat restoration. The CCRMP and CCIP are implemented with the assistance of a Technical Advisory Committee, which is composed of scientists with expertise in geomorphology, biology, and hydraulic engineering.

The CCRMP covers agriculture, aggregate resources, riparian and wildlife resources, floodway and channel stability, open space and recreation, and the cultural landscape. The CCRMP includes specific goals and objectives for each of the elements, with suggested policies for implementation. The County of Yolo adopted the CCRMP and CCIP in 1996 and amended it in 2002. The County released an update to both documents in May 2017 and the Yolo County Board of Supervisors adopted the update in 2019.

Yolo County developed the CCIP to implement the goals, objectives, actions, and performance standards of the CCRMP related to the stabilization and maintenance of the Cache Creek channel, The CCIP provides the structure and authority for a Technical Advisory Committee, defines the procedures and methodologies for stream monitoring and maintenance activities, and identifies initial high-priority projects for stream bank stabilization. The three major elements of the CCIP intended to promote a more stable Cache Creek channel include (1) identification of major channel stabilization projects; (2) identification of expected channel maintenance activities; and (3) establishment of a hydrologic monitoring program.

Capay Valley Watershed Stewardship Plan

In 2003, the Cache Creek Watershed Stakeholders Group and the Yolo Resource Conservation District developed the Capay Valley Watershed Stewardship Plan. This plan is a result of a concerted

effort to refine a set of goals and objectives based on the resource issues defined at a series of public stakeholder meetings and an array of data available from studies in the region. The recommended actions in this plan are directed on two levels: projects and recommended studies for the Stakeholders Group to undertake, and possible voluntary actions that landowners can either individually or collaboratively undertake to address the resource issues they identify on their properties. The goals of this plan include the following.

- Goal 1: To manage watershed lands to minimize unnatural rates of erosion and sedimentation.
- Goal 2: To use and manage both surface and ground water wisely to meet current and future needs.
- Goal 3: To maintain and improve water quality for all water users.
- Goal 4: To maintain and improve watershed habitats to support a diversity of native plants and animals.
- Goal 5: To promote land management practices that maintain and improve local natural resources and habitats and support a productive and sustainable agricultural economy.
- Goal 6: To promote a watershed approach for decisions involving Cache Creek by supporting communication and collaboration among all stakeholders.

The Capay Valley Watershed Stewardship Plan focusses on the Capay Valley reach of Cache Creek. This area has been defined by the Cache Creek Watershed Stakeholders Group as including the area from the Blue Ridge of the Coast Range in the west to the ridgetops of the Capay Hills in the east and encompasses an approximately 20-mile section of Cache Creek from Camp Haswell down to the Capay Dam. The primary natural community types that occur within this plan area include: cultivated lands seminatural community, riparian, blue oak woodland, Valley oak woodland, oak-foothill pine, California prairie, chamise chaparral, montane hardwood, and mixed chaparral.

Colusa Basin Watershed Management Plan

In 2012, the Colusa Resource Conservation District developed the Colusa Basin Watershed Management Plan as a stakeholder-driven planning process. This Plan provides a nonregulatory, community-driven framework intended to promote projects that serve multiple benefits and will sustain and enhance watershed functions in the Colusa Basin watershed while balancing human and natural resource needs.

Eight goals identified by the Colusa Basin Watershed stakeholders and technical advisory committee are included in the Colusa Basin Watershed Management Plan as priority concerns.

1. Protect, maintain, and improve water quality
2. Promote activities to ensure a dependable water supply for current and future needs
3. Preserve agricultural land and open space
4. Manage and reduce invasive plant populations
5. Reduce destructive flooding
6. Enhance soil quality and reduce erosion
7. Preserve and enhance native habitat

8. Address unknown future effects of climate change

The Colusa Basin Watershed Management Plan includes approximately 1,045,445 acres. Approximately 175,483 acres of this plan are located in the northern portion of the strategy area.

Hungry Hollow Watershed Stewardship Plan

In 2011, the Hungry Hollow Watershed Stakeholders Group and the Yolo County Resource Conservation District developed the Hungry Hollow Watershed Stewardship Plan. Hungry Hollow is a small agricultural region within a sub-watershed of the Lower Cache Creek Watershed in the strategy area. The oak-covered ranchlands of the Capay Hills feed the watershed in the rainy season with a series of intermittent streams that cut through the alluvial plains and level out into a matrix of cropland, sloughs, canals, and irrigation ditches. With Yolo County's mild climate, highly managed irrigation systems, and naturally deep and rich soils, Hungry Hollow is a productive agricultural landscape.

The Hungry Hollow Watershed Stewardship Plan takes a comprehensive look at the health of the natural resources of Hungry Hollow and offers a collection of recommended actions. The plan provides a community-based framework for maintaining and improving watershed health in Hungry Hollow and can be used to guide the development of individual or collaborative action plans. It also provides the opportunity for neighboring landowners to work together to address important issues on their property. While the plan is focused on the Hungry Hollow watershed, it was developed to be complementary and supportive of other watershed work and plans that are underway or in place throughout the entire Cache Creek Watershed and the larger Bay-Delta watershed.

The goals of Hungry Hollow Watershed Stewardship Plan are as follows.

- To manage watershed lands to minimize unnatural rates of erosion and sedimentation.
- To use and manage surface, groundwater, and stormwater wisely to meet current and future needs.
- To maintain and improve water quality for all water users.
- To maintain and improve watershed habitats to support a diversity of native plants and animals.
- To promote land management that supports a sustainable and productive agricultural economy.
- To promote a watershed approach for decisions involving Hungry Hollow by supporting communication and collaboration among all stakeholders.

The plan also contains a detailed list of objectives and actions, which are included in Appendix E.

Lower Putah Creek Watershed Management Action Plan

The Lower Putah Creek Watershed Management Action Plan was developed by the Lower Putah Creek Coordinating Committee, with input from watershed stakeholders, to provide a framework that identifies priority restoration and enhancement opportunities based on a comprehensive assessment of the watershed's resources. The Lower Putah Creek Coordinating Committee completed the resource assessment phase of the plan effort in 2005 and the project identification phase of the effort in 2008. The overarching goal of the Lower Putah Creek Watershed Management Action Plan is to restore and enhance the lower Putah Creek watershed to a self-sustaining ecological condition in a manner that is compatible with and respectful of landowner priorities,

interests, and concerns. Lower Putah Creek is identified in this plan as the main channel and riparian corridor of Putah Creek from Monticello Dam to the Yolo Bypass. The "lower Putah Creek watershed" includes the tributaries of the main channel. The project types included in the plan are primarily focused on the instream and riparian areas of lower Putah Creek and include: channel restoration, bank stabilization, habitat enhancement, invasive plant removal, and trash cleanup.

Willow Slough Watershed Integrated Resources Management Plan

The Willow Slough Watershed Integrated Resources Management Plan was developed in 1996 as the culmination of a 2-year planning process that was initiated by the Yolo County Resource Conservation District, Yolo County Flood Control and Water Conservation District, Yolo County Community Development Agency, and the California Wildlife Conservation Board to evaluate and identify opportunities to manage natural resources throughout the Willow Slough watershed in an integrated manner.

The overarching goal of this plan is to enhance the natural resources throughout the watershed through a combination of small-scale projects implemented by individual landowners and the joint management of stormwater, erosion, sedimentation, agriculture, wildlife habitat, and groundwater recharge. The management goals in support of this overarching goal are as follows.

- Improve the quantity and quality of wildlife habitat.
- Maintain and enhance the physical and economic conditions for agriculture.
- Decrease problems associated with flooding.
- Decrease the cost of vegetation maintenance along roads and canals.
- Minimize undesirable sediment deposition.
- Minimize erosion and topsoil loss.
- Improve water quality.
- Increase groundwater recharge.

The Willow Slough Watershed Integrated Resources Management Plan covers approximately 104,960 acres of land, all of which is within the strategy area. The natural community types that occur within this plan area include: cultivated lands seminatural community, fresh emergent wetland, riparian, blue oak woodland, Valley oak woodland, oak-foothill pine, montane hardwood, California prairie, chamise chaparral, and mixed chaparral.

Yolo County Oak Woodland Conservation and Enhancement Plan

In 2007, Yolo County developed the Yolo County Oak Woodland Conservation and Enhancement Plan to promote voluntary efforts to conserve and enhance oak woodlands in Yolo County. This plan covers the entire strategy area although the primary focus of this plan is on the 107,000 acres of oak woodland remaining in Yolo County. Oak woodlands are primarily located in the western portion of the county along with some small remnant stands and isolated patches scattered on the valley floor in areas adjacent to riparian areas. The natural communities that are subject to the conservation efforts of this plan include, oak-foothill pine, blue oak woodland, montane hardwood, and Valley oak woodland. While the Yolo County Oak Woodland Conservation and Enhancement Plan does not specifically target any focal or conservation species associated with the RCIS/LCP, the following

RCIS/LCP focal/conservation species are identified within this plan as being commonly found in the natural communities targeted by the plan: American badger, Cooper's hawk, golden eagle, oak titmouse, pallid bat, yellow-billed magpie, Swainson's hawk, northwestern pond turtle, valley elderberry longhorn beetle, yellow-billed cuckoo.

The following are the stated goals of the Yolo County Oak Woodland Conservation and Enhancement Plan.

- Protect existing oak woodlands by creating a voluntary system, including landowner incentives, for conservation and enhancement of oak woodlands.
- Encourage the development of land use and infrastructure planning strategies that are consistent with oak woodland conservation efforts.
- Direct conservation and enhancement funding and effort to areas that have the highest oak woodland resource values.
- Direct mitigation for oak woodland impacts on areas that have the highest oak woodland resource values and are in need of protection.
- Encourage the long-term stewardship of existing oak woodlands to maintain or improve oak woodland resource values.
- Provide funding and technical assistance for oak woodland enhancement efforts that help achieve multiple benefits.
- Increase the area covered by valley oak and other oak species that are now uncommon in Yolo County because they have been cleared from much of their historical range in the county.
- Maximize the total amount of oak woodland canopy cover to achieve erosion, flood, and air quality protection benefits, while recognizing the importance of including a variety of canopy cover levels within conserved and restored woodlands to provide habitat diversity.
- Coordinate oak woodland conservation and enhancement efforts with the Yolo HCP/NCCP, the CCRMP, and other local and state applicable conservation plans.

2.12.3.2 State Plans and Initiatives

Central Valley Flood Protection Plan and Conservation Strategy

The CVFPP is a strategic and long-range plan for improving flood risk management in the Central Valley. Prepared by DWR in accordance with the Central Valley Flood Protection Act of 2008 and adopted by the CVFPB in June 2012 , the CVFPP is a critical document to guide California's participation (and influence federal and local participation) in flood risk management in the Central Valley (California Department of Water Resources 2012). The CVFPP proposes a systemwide investment approach for sustainable, integrated flood management in areas currently protected by facilities of the SPFC. The CVFPP is required to be updated every 5 years, with each update providing support for subsequent policy, program, and project implementation (California Department of Water Resources 2012).

The 2017 CVFPP Update (California Department of Water Resources 2017) is the first major 5-year update to the CVFPP in accordance with the Central Valley Flood Protection Act. It updates and refines the overall near- and long-term investment needs established in the 2012 CVFPP, and

includes recommendations on policies and funding to support comprehensive flood risk management actions. The planning efforts supporting the 2017 CVFPP Update (California Department of Water Resources 2017) were developed in close coordination with state, federal, and regional partners, and were informed by a multiyear stakeholder engagement process initiated in 2012.

The approach for developing the 2017 CVFPP Update (California Department of Water Resources 2017) focused on refining the systemwide investment approach through several technical studies, regional plans, and flood management system document updates completed since 2012, all supported with robust and ongoing communications and engagement with partners and stakeholders. CVFPP also aligned its approach with major statewide strategic plans and desired outcomes: the California Water Action Plan, California Water Plan, and California's Flood Future. This update process brings together technical and policy-level information to refine the systemwide investment approach and its associated cost estimates, funding, and phasing over the next 30 years. The resulting 2017 refined systemwide investment approach portfolio provides a comprehensive set of management actions and investments needed to manage floodwaters for the SPFC and produce desired outcomes in the Central Valley.

Central Valley Flood Protection Plan Conservation Strategy

The Conservation Strategy (California Department of Water Resources 2016) is an important component of the 2017 CVFPP Update (California Department of Water Resources 2017). It is a planning document that focuses on the improvement of ecosystem functions and describes the basis for recommending conservation actions and setting long-term goals and measurable objectives.

The goals of the CVFPP Conservation Strategy focus on promoting ecosystem functions.

- Ecosystem Processes—Improve dynamic hydrologic (flow) and geomorphic processes in the SPFC.
- Habitats—Increase and improve the quantity, diversity, and connectivity of riverine and floodplain habitats.
- Species—Contribute to the recovery and sustainability of native species populations and overall biotic community diversity.
- Stressors—Reduce stressors related to the development and operation of the SPFC and negatively affect at-risk species.

The CVFPP Conservation Strategy identifies and provides focused conservation plans for 19 target species; 13 of these target species are included as focal or conservation species in this RCIS. The CVFPP Conservation Strategy identifies specific tools and approaches to improve riverine and floodplain ecosystems to benefit fish and wildlife through multi-benefit projects. The CVFPP Conservation Strategy identifies five Conservation Planning Areas; the strategy area is within the Lower Sacramento River Conservation Planning Area (California Department of Water Resources 2016).

Lower Sacramento/Delta North Regional Flood Management Plan

The RFMP for the Lower Sacramento/Delta North Region (Region) is the regional follow-on to the 2012 CVFPP. The RFMP establishes the flood management vision for the region and identifies regional solutions to flood management problems at a prefeasibility level. FloodProtect, a regional

working group comprised of the counties, cities, flood management agencies, LMAs, water agencies, emergency response agencies, citizen groups, tribes, and other interested stakeholders in the region developed the RFMP, which focuses on a geographic area including portions of Solano, Yolo, Sacramento, and Sutter Counties. One of the RFMP's objectives is to develop solutions that promote agricultural preservation, environmental enhancement, and protection of existing cultural resources, while anticipating the effects of climate change. In support of this objective, the FloodProtect team worked closely with stakeholders to identify multi-benefit flood control projects that combine flood risk reduction with habitat restoration, agricultural sustainability, recreational opportunities, and cultural resource protection. During the planning process, the FloodProtect team identified 15 Potential Conservation Sites, which are detailed in Appendix A, *Potential Conservation Sites of the RFMP.* Nine of the Potential Conservation Sites are located in Yolo County. The RFMP planning process also led to the development of the Yolo Bypass/Cache Slough Integrated Water Management Plan, which seeks to provide systemwide flood benefits through modifications to the Yolo Bypass while simultaneously implementing significant habitat conservation, water supply, and agricultural sustainability improvements.

Sacramento River Basin-Wide Feasibility Study

The Sacramento River BWFS evaluates options for improving the bypass system, including potential expansion of the Yolo Bypass and Sacramento Bypass within the strategy area. It includes detailed feasibility evaluations of various combinations of levee setbacks, weir expansions, new bypass channels, and storage management opportunities, with integrated ecosystem restoration actions. The integrated ecosystem restoration actions are described in and analyzed in two appendices to the BWFS.

- Appendix I-E, *Yolo Bypass Ecosystem Concept Development and Modeling*, describes the purpose, methodology, and results of integrating refined ecosystem enhancements with flood improvements in the Yolo Bypass
- Appendix I-J, *Yolo Bypass Ecosystem Restoration Benefit Analysis*, describes in detail the ecosystem benefit analyses for ecosystem enhancements within the Yolo Bypass at conceptual level.

Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan

On June 4, 2009, NMFS issued a Biological Opinion and Conference Opinion on the Long-Term Operation of the CVP and SWP (NMFS Operation BO). The NMFS Operation BO concluded that, if left unchanged, CVP and SWP operations were likely to jeopardize the continued existence of four federally listed anadromous fish species: Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, and southern distinct population segment (DPS) North American green sturgeon. The NMFS Operation BO sets forth Reasonable and Prudent Alternative (RPA) actions that would allow continuing SWP and CVP operations to remain in compliance with the FESA. DWR and the U.S. Bureau of Reclamation (Reclamation) jointly prepared the *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Draft Implementation Plan (*2012*)* to address two specific RPA Actions set forth in the NMFS Operation BO.

- RPA I.6.1: Restoration of floodplain rearing habitat, through the increase of seasonal inundation within the lower Sacramento River basin.

- RPA I.7: Reduction of migratory delays and loss of salmon, steelhead, and sturgeon, through the modification of Fremont Weir and other structures of the Yolo Bypass.

RPA Action I.6.1 (Restoration of Floodplain Rearing Habitat) requires increased seasonal inundation in the lower Sacramento River Basin, and RPA Action I.7 (Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon at Fremont Weir and Other Structures in the Yolo Bypass) requires multispecies fish passage improvements and assessment of their performance. While there are some differences in the requirements of the NMFS (2009) Operations BiOp, RCIS actions will be consistent with and/or complement those required as RPAs.

In addition to proposing improvements to fish passage at the Fremont Weir in the Yolo Bypass consistent with the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan, Reclamation and DWR are proposing to build an operable gate in the Fremont Weir to increase the frequency and duration of flooding for endangered fish species in the Yolo Bypass. The agencies released the Public Review Draft EIS/EIR in December 2017 and expect to construct the project in 2020 or 2021.

Yolo Bypass Wildlife Area Land Management Plan

The Yolo Bypass Wildlife Area Land Management Plan guides the management of habitats, species, appropriate public use, and programs in the Yolo Bypass Wildlife Area. The Yolo Bypass Wildlife Area is located in the historic Yolo Basin of the Sacramento Valley and is part of CDFW's Bay-Delta Region. It lies almost entirely within the Yolo Bypass in Yolo County, between Davis and West Sacramento. The Yolo Bypass Wildlife Area is made up of 17 different management units totaling approximately 16,770 acres of managed wildlife habitat and agricultural land within the Yolo Bypass.

The Yolo Bypass Wildlife Area is known to support special-status wildlife species, including many RCIS focal species. Common vegetation communities found within the Yolo Bypass Wildlife Area include seasonal and permanent wetlands, California prairie, riparian scrub and woodlands, vernal pools and swales, and row crop-seasonal wetlands. The primary purpose of the Yolo Bypass Wildlife Area is to manage and maintain habitat communities for waterfowl species, shorebird and wading bird species, upland game species, and many other bird species. Although management of habitat for waterfowl, shorebirds, and other bird species is a primary management goal in the Yolo Bypass Wildlife Area, the plan recognizes the importance of the Wildlife Area to other purposes, some of which are illustrated in the following goals.

- **Agricultural Resources Goal 1 (AR-2).** Manage agricultural lands to contribute to the agricultural community, to maintain agriculture as a viable economic activity in Yolo County, and to provide revenue for continued operation of the Wildlife Area.
- **Special Species Goal 1 (SS-1).** Without specifically managing for special-status species, the communities at the Yolo Bypass Wildlife Area should be managed in a way that generally improves overall habitat quality for species abundance and diversity while not discouraging the establishment of special-status species.
- **Public-Use Goal 1 (PU-1).** Increase existing and provide new long-term opportunities for appropriate wildlife dependent activities by the public.
- **Facilities Goal 1 (F-1).** Management and operation of the Yolo Bypass Wildlife Area in coordination with state and federal flood operations in the Yolo Bypass.

- **Scientific Research and Monitoring Goal 1 (SRM-1).** Support appropriate scientific research and monitoring and encourage or conduct research that contributes to adaptive management strategies and management goals of the Yolo Bypass Wildlife Area.
- **Management Coordination Goal 1 (MC-1).** Coordinate with federal, state, and local agencies regarding plans and projects that may affect habitats and/or management at the Yolo Bypass Wildlife Area.

California *EcoRestore*

California Natural Resource Agency is coordinating California *EcoRestore*, a state initiative to help coordinate and advance 30,000 acres of habitat restoration in the Delta by 2020, which is mandated by NMFS 2009 Operations Biological Opinion requirements and other existing state and federal projects. Driven by the best available science, guided by adaptive management, and implemented through multiagency coordination and management, California *EcoRestore* intends to implement habitat restoration projects with clearly defined goals, measurable objectives, and financial resources to help ensure success.

The program includes a broad range of habitat restoration projects, including aquatic, sub-tidal, tidal, riparian, floodplain, and upland ecosystems. The first project under the *EcoRestore* initiative was the Wallace Weir Fish Rescue Facility, near the downstream end of the Knights Landing Ridge Cut where it enters the Yolo Bypass, near Woodland in the strategy area. The project started construction in August 2016[7] and was finished in January 2018.

Delta Plan

In November 2009, the State of California enacted comprehensive legislation to address the range of challenges facing the Delta, including those involving water supply reliability and ecosystem health. The legislation enacting the Delta Plan advances several broad goals with regard to the Delta and specifies a range of actions to meet those goals. Among the several goals stated in the Sacramento-San Joaquin Delta Reform Act of 2009, Section 29702 is the following:

> Achieve the two co-equal goals of providing for a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The co-equal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.[8]

The Delta legislation includes the Sacramento–San Joaquin Delta Reform Act of 2009 (California Water Code § 35), which provides for the establishment of an independent state agency, the Delta Stewardship Council, to further the goals of ecosystem restoration and a reliable water supply. The council, which became operational on February 3, 2010, is charged with the development and implementation of the comprehensive Delta Plan, and is vested with the authority to review actions of state and local agencies and advise on their consistency with the Delta Plan.

The Delta Plan outlines six zones where conservation measures are needed: the Yolo Bypass; the floodplain west of Sacramento into which the Sacramento River spills in wet years; the Cache Slough Complex, where the Bypass rejoins the body of the Delta; a nexus in the eastern Delta, where the

[7] See http://www.rd108.org/wallace-weir-redevelopment/

[8] Sacramento-San Joaquin Delta Reform Act 2009, Section 29702 of the Public Resource Code. It is available at < http://www.leginfo.ca.gov/pub/09-10/bill/sen/sb_0001-0050/sbx7_1_bill_20091112_chaptered.html>.

Mokelumne River and the Cosumnes River add their strands to the Delta's web; a zone in the southern Delta along the San Joaquin River; a collection of small tracts at the western apex of the Delta, where it narrows to meet Suisun Bay; and finally the Suisun Marsh, fringing that bay to the north. Conservation measures under the Delta Plan that would occur within the strategy area include:

- **Yolo Bypass**. Enhance the ability of the Yolo Bypass to flood more frequently to provide more opportunities for migrating fish, especially Chinook salmon, to use this system as a migration corridor that is rich in cover and food.

  No encroachment shall be allowed or constructed in the Yolo Bypass unless it can be demonstrated by appropriate analysis that the encroachment will not have a significant adverse impact on floodplain values and functions.

- **Cache Slough Complex**. Create broad nontidal, freshwater, emergent-plant-dominated wetlands that grade into tidal freshwater wetlands, and shallow subtidal and deep open-water habitats. Also, return a significant portion of the region to uplands with vernal pools and grasslands.

Delta Conservation Framework

CDFW, along with federal, state, and local agencies and the Delta stakeholder community, developed a high-level conservation framework for the Delta, Yolo Bypass, and Suisun Marsh. Building on prior Delta planning efforts, the draft *Delta Conservation Framework,* which was released in January 2018*,* will serve as the long-term continuation of *California EcoRestore*, a recent Delta restoration implementation initiative led by California Natural Resources Agency. The *Delta Conservation Framework* will be one of the documents used to update the ecosystem elements of the Delta Stewardship Council's Delta Plan in 2018 and guide Delta conservation efforts to 2050.

The Delta Conservation Framework will do the following.

- Provide a shared vision and overarching goals for Delta conservation.
- Offer a forum for collaborative engagement and broad buy-in.
- Inform the amendment of the ecosystem elements of the Delta Plan.
- Lay out a path for integrating stakeholder concerns into landscape scale goal setting and regional conservation strategies.
- Acknowledge challenges, potential regulatory conflicts, and other barriers to conservation project implementation.
- Solicit and integrate local, state, and federal agency feedback to ensure alignment with HCPs/NCCPs and other conservation opportunities.
- Inform state funding priorities.

Implementation goals of the Delta Conservation Framework are focused on achieving desired conservation and Delta community benefits by: (1) integration of Delta community and conservation goals; and (2) preservation, enhancement, restoration, and adaptive management of the function of Delta ecosystems. Conservation benefits of the framework include the following.

- ***Ecosystem Function*** includes Delta conservation practices that improve or reestablish ecological processes as a result of expected changes and major associated uncertainties in the future. This will nurture ecosystem resilience in the face of continued pressures.
- ***Delta Community and Agricultural Benefits*** include agricultural sustainability, low-impact recreation and tourism, including fishing, hunting, bird watching, and flood protection.
- ***Biophysical Benefits*** include natural functional flows, improved water quality, subsidence reversal, and carbon sequestration.
- ***Ecological Benefits*** include natural communities dominated by native species, self-sustaining populations of special-status species, expanding total available habitat and patch size for targeted species and communities, improving connectivity, and reestablishing mosaics of complementary habitat types.
- ***Multiple-Outcome Benefits*** result from projects that promote strategies that combine biophysical, ecological, and Delta community benefits. Examples include wildlife-friendly farming and low-impact outdoor recreation including boating, birding, fishing, and hunting.

Within the RCIS strategy area, the Delta Conservation Framework addresses opportunities for conservation as well as offering potential solutions for recognized challenges of conservation. The Yolo Bypass offers notable conservation value for wildlife species associated with floodplains, tidal wetlands, and riparian zones. This includes resident and anadromous fish and focal species such as spring-run and fall-run Chinook salmon, green sturgeon, white sturgeon, and Sacramento splittail. Other RCIS focal wildlife species that utilize the Yolo Bypass habitats include Swainson's hawk, giant garter snake, and tricolored blackbird. The UC Davis Center for Watershed Sciences has identified Yolo Bypass as a primary component of the North Delta Habitat Arc (California Department of Fish and Wildlife 2018). It consists of a reconciled ecosystem strategy to create an arc of habitats connected by the flows of the Sacramento River. The Yolo Bypass is the upstream end of the arc, which continues through the Cache-Lindsey Slough-Liberty Island region, down the Sacramento River including Twitchell and Sherman Islands, and into Suisun Marsh. There are also opportunities for collaborative habitat restoration planning in the bypass, through the development and implementation of HCPs and HCP/NCCPs, including the Yolo County Natural Heritage Program HCP/NCCP, the South Sacramento HCP, and *California EcoRestore*.

The Delta Conservation Framework also discusses several challenges to conservation within the Yolo Bypass as well as potential solutions. Land ownership and land uses within the Yolo Bypass are varied and should be taken into account when planning and implementing conservation projects. Public access in the Yolo Bypass is available at the Fremont Weir Wildlife Area for hunting, and the Yolo Bypass Wildlife Area is managed for hunting, wildlife viewing, and environmental education, as well as agricultural activities. Parcels in the northern Bypass (north of I-80) are owned by four private landowners and the state (Fremont Weir Wildlife Area), whereas a large portion of the southern part (south of I-80) is state-owned (Yolo Bypass Wildlife Area) and includes a lot of smaller parcels and landowners. In the north, land uses are focused on fisheries management, larger-scale agriculture, and some waterfowl hunting.

In the Yolo Bypass, floodplain-related conservation goals to provide extended inundation to promote juvenile salmonid rearing habitat, or tidal restoration–related goals to improve the Delta food web, have the potential to conflict with existing agricultural land uses and improved recreation and public access, particularly for hunting, nature viewing, and education. Increased tidal

restoration in the southern Bypass may also create the need for mosquito control and the potential for mercury contamination.

The Delta Conservation Framework proposed potential solutions to these conservation challenges identified within the Yolo Bypass and include the following.

- Wildlife-friendly agriculture
- Integrated flood management
- Low-impact recreation
- Climate change adaptation

The Delta Conservation Framework is a high-level conservation planning framework with a landscape-scale focus across the entire Delta, Suisun Marsh, and Yolo Bypass. It provides overarching goals and landscape-scale strategies with targeted objectives that could be integrated at the finer scale by regional conservation planning partnerships that develop regional conservation strategies. Together, the existing partnerships in the Yolo Bypass could lead to the development of a long-term Yolo Bypass RCIS. This would afford landscape-scale integration of the existing Yolo Bypass plans, tying them in with the Delta Conservation Framework's landscape scale goals and strategies.

Fish Restoration Program Agreement Implementation Strategy

The Fish Restoration Program Agreement (FRPA) is a joint effort between DWR and CDFW in coordination with USFWS, NMFS, and Reclamation to satisfy DWR's requirements for habitat restoration and related actions to benefit fish.

The goals of FRPA, as mutually agreed upon by DWR and CDFW, are as follows.

- Restore 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh, including 800 acres of mesohaline habitat to benefit longfin smelt and to enhance food production and availability for native Delta fishes.
- Restore processes that will promote primary and secondary productivity and tidal transport of resources to enhance the pelagic food web in the Delta.
- Increase the amount and quality of salmonid rearing and other habitat.
- Increase through-Delta survival of juvenile salmonids by potentially enhancing beneficial migratory pathways.

DWR and CDFW, along with other agencies and interested stakeholders will collaborate on the planning and design of project alternatives as well as developing monitoring and adaptive management plans for each restoration site. DWR will assume the lead role in project oversight, construction, contracting, and management with assistance from CDFW. Restoration targets in the RCIS strategy includes areas within the Cache Slough Complex and Yolo Bypass.

Planned restoration projects within the Cache Slough Complex include the following.

- Lower Yolo Restoration Site
- Prospect Island
- Calhoun Cut

Within the Yolo Bypass, near-term habitat restoration actions include the following.

- Fremont Weir
- Tule Canal Connectivity
- Putah Creek
- Lisbon Weir

Environmental compliance and permitting is an integral component of action implementation. Individual projects will be subject to California Environmental Quality Act and possibly National Environmental Policy Act analysis. DWR is anticipated to be lead for most FRPA restoration actions. However, CDFW or other project proponents may implement actions. The FRPA program is funded in whole by DWR through SWP funding to meet permit compliance for SWP Delta operations. Plans for individual restoration projects will include DWR funding sufficient to accomplish full implementation of the action.

2.12.4 Species Recovery Plans

Recovery of endangered or threatened animals and plants to the point where they are again secure, self-sustaining members of their ecosystems is a primary goal of CESA and FESA, as amended (16 U.S.C. § 1531 et seq.). Recovery means improvement of the status of listed species to the point that listing is no longer appropriate under the criteria specified in Section 4(a)(1) of FESA. A recovery plan is one of the most important tools in the recovery process. It provides a sound scientific foundation and guides decision-making for partners implementing the plan and its actions. Recovery plans provide a framework for targeting conservation efforts and modifying actions based on new science and changing circumstances. Recovery plans provide guidance and are voluntary; they do not have the force of law. As such, the success of recovery efforts ultimately depends on partnerships and cooperation to ensure the implementation of actions to advance species' long-term recovery.

A species recovery plan includes scientific information about the species and provides criteria that enable USFWS to gauge whether downlisting or delisting the species is achievable. Recovery plans help guide recovery efforts by describing actions that USFWS consider necessary for each species' conservation and by estimating time and costs for implementing needed recovery measures.

Recovery plans focus on restoring the ecosystems on which a species is dependent, reducing threats to the species, or both. A recovery plan constitutes an important USFWS document that presents a logical path to recovery of the species based on what we know about the species' biology and life history, and how threats affect the species. Recovery plans help to provide guidance to the USFWS, states, and other partners on ways to eliminate or reduce threats to listed species and measurable objectives against which to measure progress toward recovery. Recovery plans are advisory documents, not regulatory documents, and do not substitute for the determinations and promulgation of regulations required under Section 4(a)(1) of FESA. A decision to revise the listing status of a species or to remove it from the Federal List of Endangered and Threatened Wildlife (50 Code of Federal Regulations [CFR] § 17.11) or Plants (50 CFR § 17.12) is ultimately based on an analysis of the best scientific and commercial data available to determine whether a species is no longer an endangered species or a threatened species.

2.12.4.1 California Tiger Salamander

The Central California DPS of the California tiger salamander was listed as threatened on August 8, 2004 (U.S. Fish and Wildlife Service 2004). USFWS published a final rule designating critical habitat for the Central California tiger salamander on August 23, 2005 (U.S. Fish and Wildlife Service 2005). California listed the California tiger salamander throughout its entire range as threatened on August 19, 2010 (California Fish and Game Commission 2010). In 2017 USFWS published the *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander*. The Central California tiger salamander is restricted to disjunct populations that form a ring along the foothills of the Central Valley and Inner Coast Range from San Luis Obispo, Kern, and Tulare Counties in the south, to Sacramento and Yolo Counties in the north.

The strategy to recover the Central California tiger salamander focuses on alleviating the threat of habitat loss and fragmentation to increase population resiliency (i.e., ensure each population is sufficiently large to withstand stochastic events), redundancy (i.e., ensure a sufficient number of populations to provide a margin of safety for the species to withstand catastrophic events), and representation (i.e., conserve the breadth of the genetic makeup of the species to conserve its adaptive capabilities). Recovery of this species can be achieved by addressing the conservation of remaining aquatic and upland habitat that provides essential connectivity, reduces fragmentation, and sufficiently buffers against encroaching development and intensive agricultural land uses. Appropriate management of these areas will also reduce mortality by addressing threats not related to habitat, including those from nonnative and hybrid tiger salamanders, other nonnative species, disease, and road mortality.

The goal of this recovery plan is to reduce the threats to the Central California tiger salamander to ensure its long-term viability in the wild and allow for its removal from the list of threatened and endangered species. The following are recovery objectives of the plan.

1. Secure self-sustaining populations of Central California tiger salamander throughout the full range of the DPS, ensuring conservation of genetic variability and diverse habitat types (e.g., across elevation and precipitation gradients).
2. Ameliorate or eliminate the threats that caused the species to be listed, and any future threats.
3. Restore and conserve a healthy ecosystem supportive of Central California tiger salamander populations.

2.12.4.2 Delta Smelt and Other Fish

USFWS listed Delta smelt as a threatened species in 1993 (U.S. Fish and Wildlife Service 1993). USFWS released the *Sacramento-San Joaquin Delta Native Fishes Recovery Plan* in 1996 to outline a recovery strategy for eight species—Delta smelt, as well as the following seven fish species.

- Sacramento splittail (listed as threatened in 1999 and changed to a species of special concern in 2003)
- Longfin smelt (listed in 2009 under the California Endangered Species Act (CESA)
- Southern green sturgeon (listed in 2006)
- Spring-run Chinook salmon (listed as threatened in 1999)
- Late-fall-run Chinook salmon (species of special concern)

- San Joaquin fall-run Chinook salmon (species of special concern)
- Sacramento perch (species of special concern)

The *Sacramento-San Joaquin Delta Native Fishes Recovery Plan* proposed not only to recover delta smelt (as required by FESA), but to provide a strategy for the conservation and restoration of the entire Delta, focusing on native fishes. The plan outlines a recovery strategy to manage the estuary in a way that provides better habitat for native fish in general and delta smelt in particular. According to the plan, improved habitat would increase the distribution of the delta smelt throughout the Delta and Suisun Bay. At the time of publication, most of the fish covered by the plan (with the exception of delta smelt) were species of special concern. Three of the species have been listed under either CESA or ESA (or both) since the plan was published.

The Sacramento-San Joaquin Delta Native Fishes Recovery Plan provides restoration objectives and restoration criteria for each of the eight species, with a focus on restoring delta smelt to a population and distribution pattern similar to those that existed from 1967 through 1981 because data demonstrated that populations stayed reasonably high in most years during this period. The recovery plan outlines an ambitious implementation schedule to accomplish over 70 management actions. The management actions in the plan focus on reestablishment of spawning habitat, migration corridors, and rearing areas in upstream areas, the Delta, and Suisun Bay and Marsh. The actions cover a broad range of activities, such as increasing freshwater flows, reducing entrainment losses to water diversions, reducing the effect of contaminants, regulating ship ballast discharges, and other measures. The plan stresses that active management will be required for the near future to enhance and restore aquatic habitat to reverse declines of native fish and recover numbers and distributions to historical levels.

2.12.4.3 Giant Garter Snake

USFWS listed giant garter snake as a threatened species on October 20, 1993 (U.S. Fish and Wildlife Service 1993) under FESA, as amended. Since the 1993 listing rule, threat assessments and reviews of the biological status for the species were conducted in 5-year increments in 2006 and 2012 (U.S. Fish and Wildlife Service 2006a, 2012). FESA requires the development of recovery plans for listed species, unless such a plan would not promote the conservation of a particular species. In 2015, USFWS released the *Revised Draft Recovery Plan for Giant Garter Snake* and in October 2017 USFWS released the final and signed *Recovery Plan for the Giant Garter Snake* (*Thamnophis gigas*)[9] (U.S. Fish and Wildlife Service 2017). The recovery plan provides a framework for the recovery of species so that protection under the act is no longer necessary.

The goal of the recovery plan is to improve the status of giant garter snake so that it can be delisted. To meet the recovery goal of delisting the species, USFWS identified the following objectives in the *Recovery Plan for Giant Garter Snake.*

1. Establish and protect self-sustaining populations of the giant garter snake throughout the full ecological, geographical, and genetic range of the species.
2. Restore and conserve healthy Central Valley wetland ecosystems that function to support the giant garter snake and its community members.

[9] https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C057

3. Ameliorate or eliminate, to the extent possible, the threats that caused the species be listed or are otherwise of concern, and any foreseeable future threats.

The recovery strategy for the giant garter snake focuses on protecting existing, occupied habitat and identifying and protecting areas for habitat restoration, enhancement, or creation, including areas necessary to provide connectivity between populations. Appropriate management for all giant garter snake conservation lands will ensure the maintenance of stable and viable populations in occupied areas and promotes the colonization in restored and enhanced unoccupied habitat. USFWS defined nine recovery units that correspond directly to the nine geographically and genetically distinct populations to aid in the recovery planning: Butte Basin, Colusa Basin, Sutter Basin, American Basin, Yolo Basin, Delta Basin, Cosumnes–Mokelumne Basin, San Joaquin Basin, and Tulare Basin.

According to the recovery plan, habitat must be preserved in multiples of two block pairings of habitat. Each block pair should consist of one, at least 539-acre block of contiguous buffered perennial wetland habitat (existing, restored, or enhanced) and one at least 1,578-acre block of contiguous active rice lands separated by no more than 5 miles. Alternatively, a pair of blocks may consist of two 539-acre blocks of buffered perennial wetlands. All pairs of habitat blocks must be connected with the other pairs of habitat blocks within and between the management units by corridors of suitable habitat, and recovery units should be connected to one another by similar corridors. The recovery plan selected paired habitat blocks because perennial wetlands are known to support core populations of giant garter snake throughout a wide range of hydrologic conditions, and rice fields and the associated water conveyance infrastructure provide habitat for the species when the fields are in active production. The size requirement of the perennial wetland habitat block is derived from Wylie et al. (2010, in USFWS 2017), which reported a self-sustaining population of giant garter snake is supported by 539-acres of perennial wetlands; additionally, this amount of perennial wetland is similar to amounts preserved in several giant garter snake conservation banks. The size requirement of the rice lands also originates from Wylie et al. (2010, in USFWS 2017). These values represent the target sizes for perennial wetlands and rice lands, not the minimum or maximum acreage.

2.12.4.4 Salmon and Steelhead

In July 2014, NOAA Fisheries released the Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead. The recovery plan is guided by the best available science. It includes a range of actions to restore winter- and spring-run Chinook salmon, steelhead, and their habitats. It sets priorities to guide investments and incorporates an adaptive management approach to make adjustments based on new information. Recovery of winter-run Chinook salmon, spring-run Chinook salmon, and steelhead across such a vast and altered ecosystem as the Central Valley will require a broadly focused, science-based strategy. The scientific rationale for the strategy in this plan focuses on two key salmonid conservation principles. The first is that functioning, diverse, and interconnected habitats are necessary for a species to be viable. That is, salmon and steelhead recovery cannot be achieved without providing sufficient habitat. Anadromous salmonids persisted in the Central Valley for thousands of years because the available habitat capacity and diversity allowed species to withstand and adapt to environmental changes including catastrophes such as prolonged droughts, large wildfires, and volcanic eruptions. To help return the habitat capacity and diversity in the Central Valley to a level that will support viable salmon and steelhead, NOAA Fisheries identified and

prioritized recovery actions based on a comprehensive life stage specific threats assessment. Minimizing or eliminating stressors to the fish and their habitat in an efficient and structured way is a key aspect of the recovery strategy.

The second salmonid conservation principle guiding the recovery strategy is that a species' viability is determined by its spatial structure, diversity, productivity, and abundance (McElhany et al. 2000). Abundance and population growth rate are self-explanatory parameters that are clearly important to species and population viability, while spatial structure and diversity are just as important, but less intuitive. Spatial structure refers to the arrangement of populations across the landscape, the distribution of spawners within a population, and the processes that produce these patterns. Species with a restricted spatial distribution and few spawning areas are at a higher risk of extinction from catastrophic environmental events (e.g., a single landslide) than are species with more widespread and complex spatial structure. Species or population diversity concerns the phenotypic (morphology, behavior, and life-history traits) and genetic characteristics of populations. Phenotypic diversity allows more populations to use a wider array of environments and protects populations against short-term temporal and spatial environmental changes. Genetic diversity, on the other hand, provides populations with the ability to survive long-term changes in the environment. It is the combination of phenotypic and genetic diversity expressed in a natural setting that provides populations with the ability to adapt to long-term changes (McElhany et al. 2000).

2.12.4.5 Vernal Pools

The *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* features 33 species of plants and animals that occur exclusively or primarily within a vernal pool ecosystem in California and southern Oregon. The 20 federally listed species include 10 endangered plants, 5 threatened plants, 3 endangered animals, and 2 threatened animals. These vernal pool species occur primarily in vernal pool, swale, or ephemeral freshwater habitats largely confined to a limited area by topographic constraints, soil types, and climatic conditions. Surrounding (or associated) upland habitat is critical to the proper ecological function of these vernal pool habitats. The primary threats to the species are habitat loss and fragmentation due to urban development and associated infrastructure, agricultural conversion, altered hydrology, nonnative invasive species, inadequate regulatory mechanisms, exclusion of grazing in areas where grazing has been a historic land use, and inappropriate grazing regimes (overgrazing or undergrazing). Resulting small population sizes are subject to extinction due to random, naturally occurring events.

This recovery plan presents an ecosystem-level strategy for recovery and conservation because all of the listed species and species of concern co-occur in the same natural ecosystem and are generally threatened by the same human activities. The likelihood of successful recovery for listed species and long-term conservation of species of concern is increased by protecting entire ecosystems. This task can be most effectively accomplished through the cooperation and collaboration of various stakeholders.

2.12.4.6 Valley Elderberry Longhorn Beetle

In 1984, the USFWS published the Valley Elderberry Longhorn Beetle Recovery Plan (U.S. Fish and Wildlife Service 1984). In 2006, USFWS published a 5-year review of the valley elderberry longhorn beetle (U.S. Fish and Wildlife Service 2006a) and in 2017 the Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) was published. (U.S. Fish and Wildlife Service 2017). Since the publication of the 1984 recovery plan, new information

regarding the beetle's distribution, biology, and ecology indicate that the recovery criteria may no longer be appropriate for the species. In 2019, USFWS published the Revised Recovery Plan for the Valley Elderberry Longhorn Beetle (U.S. Fish and Wildlife Service 2019).

The 2019 recovery plan updates biological information known of the valley elderberry longhorn beetle, including the species' life history, distribution, habitat requirements, and threats to the species (i.e. Argentine ants). The 2019 recovery plan also includes additional threats from climate change and pesticides that were not included in the 1984 recovery plan.

The 2019 recovery strategy focuses on what the USFWS believes are the largest threat and actions that have the greatest potential for recovery of the species. The recovery strategy includes: 1) the establishment of sufficiently large populations throughout the species' range to ensure population resiliency; 2) maintaining the species' current level of genetic and ecological diversity to allow adaptation to future environmental change; 3) increasing the species' level of redundancy through establishment of sufficiently large number of local- and meta-populations widely distributed throughout the species' range to withstand catastrophic events. USFWS envisions the long-term viability for the valley elderberry longhorn beetle as a high level of resiliency, redundancy, and representation through protection of healthy beetle populations throughout suitable habitat in the Central Valley. Two main recovery objectives are identified – 1) Preserve resilient populations of valley elderberry longhorn beetle across the historical range of the species by maintaining occupancy in at least 80% of HUC8 subbasins within each management unit (i.e., Sacramento River Management Unit, San Joaquin River Management Unit, and Putah Creek Management Unit); 2) Protect and manage a system of connected habitat patches along each river or major drainage within each HUC8 subbasin.

2.12.4.7 Bank Swallow

In 1992, CDFW published a recovery plan for the bank swallow (California Department of Fish and Wildlife 1992). The goal of the recovery plan is the maintenance of a self-sustaining, wild population. The primary objectives necessary to achieve this goal include 1) ensuring that the remaining population does not suffer further declines in either range or abundance, and 2) preservation of sufficient natural habitat to maintain a viable wild population. The plan did not specify a specific population target for recovery or recovery units.

The recovery plan identifies numerous actions needed to protect the banks swallow, including the following.

- Preserving major portions of the remaining bank swallow habitat in California.
- Avoiding impacts to natural bank habitats through use of alternatives to bank stabilization.
- Mitigating impacts from bank stabilization projects.
- Using set-back levees reestablishing river meander-belts.
- Modifications of current preserve plans to include habitat requirements of bank swallow.
- Evaluating the use of artificial bank nesting habitat.

In reviewing existing bank swallow management activities, the Bank Swallow Technical Advisory Committee[10] (BANS-TAC) found that "few of the recommendations included in the recovery plan were implemented to a significant degree" (Bank Swallow Technical Advisory Committee 2013). In response to the continued decline of bank swallow populations, the BANS-TAC published a conservation strategy in 2013 to guide the preservation, protection, and restoration of natural river processes along the Sacramento River to support the conservation and recovery of bank swallow, as well as benefit other natural river system-dependent species. The conservation strategy emphasizes that natural river processes need to be restored on a significant portion of the Sacramento River and its tributaries to recovery the bank swallow population in California.

The Banks Swallow Conservation Strategy makes the following recommendations.

- Avoid new impacts to river processes, as well as to existing nesting habitat and colonies.
- Use alternatives to bank stabilization.
- Maintain non-impacting flow regimes during the nesting season.
- Maintain appropriate buffers between construction activities and nest colonies.
- Protect suitable habitat and reestablish and connect river floodplains.
- Restore nesting habitat and river processes on the Sacramento and Feather Rivers by removing revetment, restoring floodplains, and managing flow regimes to improve floodplain connectivity and reduce inundation of active bank swallow nest colonies.
- Mitigate unavoidable impacts to bank swallow habitat and river processes by removing revetment and conserving nesting habitat.

2.12.5 Critical Habitat Designations

FESA defines critical habitat as aspecific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection. Critical habitat may also include areas that are not currently occupied by the species but will be needed for its recovery.

To be included in a critical habitat designation, the habitat within the area occupied by the species must first have features that are ''essential to the conservation of the species.'' Critical habitat designations identify, to the extent known using the best scientific and commercial data available, habitat areas on which are found those physical and biological features essential to the conservation of the species (primary constituent elements), as defined at 50 CFR Section 424.12(b)). Five focal species in this RCIS/LCP have designated critical habitat that occurs in the strategy area, as described below.

2.12.5.1 California Tiger Salamander

In 2005, the USFWS designated approximately 199,109 acres of critical habitat for the Central population of the California tiger salamander (70 FR 49380). The areas designated as critical habitat for the Central population of the California tiger salamander represent occupied aquatic and upland

[10] The BANS-TAC is a coalition of State and Federal agency and non-governmental organization staff, created in response to the continued decline of bank swallow populations on the Sacramento River.

habitat throughout the range of the population. The individual areas of critical habitat are identified as critical habitat units and are distributed among four regions that were developed based on genetic variation across the population. The Central Valley Geographic Region includes an area of approximately 4.9 million acres that spans from northern Yolo County south to include eastern Solano and Contra Costa counties and extends generally southeast to the northern half of Madera County. Of the twelve critical management units within the Central Valley Geographic Region, the Dunnigan Hills Unit (Unit 1), is the only one located within Yolo County. This unit is in the Dunnigan Hills region of the county and represents the northernmost portion of the species' range. It includes approximately 2,730 acres contained entirely within the strategy area. The California prairie natural community and cultivated lands semi-natural community are the dominant natural community types within this critical habitat unit.

All lands within the Dunnigan Hills Unit are currently under private ownership and are predominantly used for agricultural purposes. USFWS has identified the primary threats specific to the Dunnigan Hills Critical Habitat Unit as being agricultural land conversion and the introduction of nonnative predators, such as mosquito fish, to ponds that California tiger salamanders rely on for aquatic habitat

2.12.5.2 Delta Smelt

In 1994, the USFWS designated critical habitat for the delta smelt (59 FR 65256). The total acreage of the critical habitat area is not explicitly stated in the critical habitat designation; however, it is described as being "areas of all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cuttoff, First Mallard (Spring Branch), and Montezuma sloughs; and to the existing contiguous waters contained within the Delta as defined in Section 12220 of the California Water Code." The critical habitat designation for this species includes the entire range for the species, without exclusion, to provide for the habitat necessary for all life stages of the species. The applicable areas within the strategy area generally consist of the locations containing contiguous riverine and fresh emergent wetland natural community types within portions of Yolo County located south of Interstate 80 in the area identified as the Legal Delta as per the 1959 Delta Protection Act.

2.12.5.3 Green Sturgeon

In 2009, NMFS designated critical habitat for the threatened Southern DPS of the North American green sturgeon (74 FR 52300) as spanning marine areas and certain coastal bays and estuaries from Cape Flattery, Washington south to Monterey Bay, California; the baylands of San Francisco, San Pablo, and Suisun; and the Sacramento River, lower Feather River, and lower Yuba River. The portions of the designated critical habitat for Green Sturgeon that overlap with the strategy area include all portions of the Sacramento River that are within or immediately adjacent to Yolo County and the Yolo Bypass.

2.12.5.4 Salmonid Evolutionarily Significant Units and Distinct Population Segments

In 2005, NMFS designated critical habitat for two evolutionarily significant units (ESUs) of Chinook salmon and five DPSs of steelhead (70 FR 52488). An *ESU* is defined as a sub-population of a species

that is substantially reproductively isolated from other sub-populations of the species. A *DPS* is defined as a species that is separable from the rest of its species and biologically and ecologically significant. Of the seven salmonids identified in the critical habitat designation, the Central Valley spring-run Chinook salmon and Central Valley steelhead are the only two whose migratory range occurs within the strategy area.

2.12.5.5 Vernal Pool Species

In 2005, USFWS updated the critical habitat designation for four vernal pool crustaceans and eleven vernal pool plants for a total of 858,846 acres designated for critical habitat for vernal pool species (70 FR 46924). RCIS/LCP focal species included in this critical habitat designation are: vernal pool tadpole shrimp, Conservancy fairy shrimp, vernal pool fairy shrimp, Colusa grass, and Solano grass. In 2006, USFWS subsequently published species-specific critical habitat designations for each of these individual species (71 FR 7118). RCIS/LCP focal species found within the vernal pool complex natural community that have all or a portion of their designated critical habitat located within the strategy area include vernal pool tadpole shrimp, Colusa grass, and Solano grass. Approximately 440 acres of the 228,785 acres designated as critical habitat for vernal pool tadpole shrimp are located within the strategy area. Approximately 440 acres of the 152,093 acres designated as critical habitat for Colusa grass are located within the strategy area. The entire 440 acres designated as critical habitat for Solano grass is located within the strategy area. While Conservancy fairy shrimp and vernal pool fairy shrimp are also found within the strategy area, the critical habitat designated for these species is located outside of the strategy area.

2.12.6 Mitigation and Conservation Banks

California Fish and Game Code Section 1852(c)(12) requires an RCIS to include a summary of mitigation banks and conservation banks approved by the department or USFWS that are located within the strategy area or whose service areas overlaps with Yolo County. Several mitigation banks operate in Yolo County that have conservation credits for focal species, including Swainson's hawk, giant garter snake, and valley elderberry longhorn beetle. Three mitigation banks in Yolo County target salmonids and other fish species. Table 2-5 lists 25 mitigation banks in Yolo County or banks with service territories that overlap with the strategy area.

Up-to-date information on approved conservation and mitigation banks, including available credits, can be found at the following websites.

- USFWS: https://www.fws.gov/sacramento/es/Conservation-Banking/Banks/In-Area/es_conse-bank-in-area.htm
- CDFW: https://www.wildlife.ca.gov/Conservation/Planning/Banking/Approved-Banks
- USACE: http://www.spn.usace.army.mil/Missions/Regulatory/Mitigation-Banks/Approved-Banks-for-the-San-Francisco-Regulatory-Di/
- Westervelt Ecological Services: https://www.wesmitigation.com/available-credits/search-our-banks-map/

Table 2-5. Mitigation Banks in Yolo County or with Service Area

Bank	Bank Purpose	Bank Located in Yolo County	Status[a]	Total Credits[b] (Acres)
Bullock Bend Mitigation Bank	Chinook salmon; Central Valley steelhead; Swainson's hawk	Yes	Active	120
Burke Ranch Conservation Bank	California tiger salamander; vernal pools; Swainson's hawk; burrowing owl	No	Active	962
Campbell Ranch Conservation Bank	Vernal pool restoration	No	Active	160
Colusa Basin Mitigation Bank	Giant garter snake; seasonal wetlands	No	Active	163
Dolan Ranch Conservation Bank	Vernal pool restoration	No	Active	251
Elsie Gridley Mitigation Bank	California tiger salamander; vernal pool crustaceans; vernal pool restoration	No	Active	1,800
Fremont Landing Mitigation Bank	Chinook salmon; Central Valley steelhead	Yes	Active	100
French Camp	Valley elderberry longhorn beetle	No	Active	188
Goldfields Conservation Bank	Vernal pool ecosystems	No	Active	152
Kimball Islands Conservation Bank	Delta smelt, winter-run chinook salmon	No	Sold Out	109
Laguna Creek Conservation Bank	Valley elderberry longhorn beetle	No	Active	780
Liberty Island Conservation Bank	Chinook salmon; Central Valley steelhead; Delta smelt; longfin smelt;	Yes	Active	186
Mountain House Conservation Bank	California red-legged frog	No	Sold Out	145
Muzzy Ranch Conservation Bank Phase 1	California tiger salamander, vernal pool ecosystems	No	Active	735
Noonan Ranch Conservation Bank	California tiger salamander	No	Active	190
Nicolaus Ranch VELB Conservation Bank	Valley elderberry longhorn beetle	No	Active	42
North Bay Highlands Conservation Bank	California red-legged frog	No	Active	450
North Suisun Mitigation Bank	California tiger salamander; vernal pool preservation	No	Active	609

Bank	Bank Purpose	Bank Located in Yolo County	Status[a]	Total Credits[b] (Acres)
Ohlone West Conservation Bank	California red-legged frog	No	Active	640
Orchard Creek Conservation Bank	Vernal pool preservation (vernal pool fairy shrimp)	No	Sold Out	632
Oursan Ridge Conservation Bank	California red-legged frog	No	Active	430
Pope Ranch North Swainson's Hawk Preserve	Swainson's hawk	Yes	Sold out	287
Pope Ranch Conservation Bank	Giant garter snake	Yes	Sold out	387
River Ranch Valley Elderberry Longhorn Beetle Conservation Bank	Valley elderberry longhorn beetle	Yes	Active	188
Ridge Cut Giant Garter Snake Bank (Teal)	Giant garter snake	Yes	Active	186
River Ranch Wetland Mitigation Bank	Wetlands	Yes	Active	101
River Ranch Swainson's Hawk Preserve	Swainson's hawk	Yes	Active	838
Putah Creek Mitigation Bank	Wetlands and riparian	Yes	Approved	434

[a] Status as of October 2019.
[b] Total credits in bank. For available credits, contact the bank.

2.12.7 Williamson Act

In 2013 there were 312,984 acres of land tied to Williamson Act contracts in Yolo County (California Department of Conservation 2015). The primary purpose of the Williamson Act is to provide a state program for the retention of private land in agriculture and open space use. The Williamson Act provides for arrangements whereby private landowners enter into a 9- or 10-year contract with counties and cities to maintain their land in agricultural and compatible open-space uses in exchange for a reduction in property taxes. The contract is automatically renewed for an additional year unless it is cancelled. The contract may be cancelled if the land is being converted to an incompatible use.

2.13 Development and Major Infrastructure

2.13.1 Local Government Planning Boundaries and General Plans

The RCIS strategy area includes the incorporated areas of Davis, West Sacramento, Winters, and Woodland and unincorporated areas of Yolo County. Yolo County has a rural character, consisting almost entirely of undeveloped land, with both existing and planned development clustered primarily in the incorporated cities. This section includes information on general plans for each city and unincorporated areas of Yolo County. Its population, housing, and employment conditions and projections provide an overview of existing and planned development for each city and unincorporated Yolo County. This section also describes the conservation and open space policies in the general plans for each city and unincorporated Yolo County.

2.13.1.1 Yolo County

Yolo County is located in the agricultural region of the Central Valley and Delta. The county line is directly west of Sacramento, northeast of the Bay Area counties of Solano and Napa, south of Colusa County, and west of Sutter County. Approximately half of Yolo County's unincorporated population and housing units are located within existing unincorporated communities. Existing urban development makes up approximately 20,000 acres, or approximately 3 percent, of the 621,224 acres in the unincorporated area. The county's total size is 653,549 acres (or 1,021 square miles). This includes both the incorporated area (the cities of Davis, West Sacramento, Winters, and Woodland), which totals 32,325 acres, and the unincorporated area.

The total population of the unincorporated areas of Yolo County was 29,293 (out of 209,035 total in Yolo County) in 2010. The total countywide population is projected to reach 290,558 in 2035, an increase of 39 percent (Sacramento Area Council of Governments 2005a). Assuming a consistent growth rate beyond 2035 (the last year from which the Sacramento Area Council of Governments [SACOG] projections are available), the population of Yolo County as a whole will reach 471,100 in 2065, an increase of 135 percent compared with 2010 levels.

The number of housing units in unincorporated Yolo County totaled 7,825 (approximately 70,000 total in Yolo County) in 2012. The number of housing units is projected to reach 10,258 in 2036, an increase of 31 percent (Sacramento Area Council of Governments 2014). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in Yolo County will reach 14,228 in 2065, an increase of 82 percent compared to 2012 levels.

General Plan

On November 10, 2009, the Yolo County Board of Supervisors adopted the 2030 Countywide General Plan, which determines land use planning throughout the unincorporated area (County of Yolo 2009). The General Plan provides comprehensive and long-term policies for the physical development of the county and is often referred to as "the constitution" for local government. The Yolo County General Plan is guided by seven separate elements that establish goals, policies, and actions for each given topic. These elements include: Land Use and Community Character,

Circulation, Public Facilities and Services, Agricultural and Economic Development, Conservation and Open Space, Health and Safety, and Housing Element.

Many elements of this RCIS/LCP are responsive to policies and other components of the Yolo County General Plan. A partial list appears in Section 3.2.3, *Multi-Benefit Approach*.

2.13.1.2 City of Davis

Davis is located in the southeast part of Yolo County, along Interstate (I-) 80 and the main Union Pacific railroad line. Davis is northeast of the San Francisco Bay Area and 15 miles west of Sacramento. Davis is separated from surrounding cities in Yolo and Solano Counties by 10 to 15 miles of agricultural land. Surrounding cities in Yolo County are: Woodland to the north, West Sacramento to the east, and Winters to the west. Located between Davis and West Sacramento is the 2-mile-wide Yolo Bypass, one of the overflow drainageways that provide flood protection for the Sacramento River valley.

The current population of Davis is approximately 70,000 (Sacramento Area Council of Governments 2019a) and is projected to reach approximately 95,000 in 2036 (Sacramento Area Council of Governments 2019b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the population of Davis will reach approximately 120,000 in 2065, an increase of 86 percent compared with 2019 levels.

The current number of housing units in Davis is approximately 27,000 (Sacramento Area Council of Governments 2019a) and is projected to reach approximately 34,000 in 2036 (Sacramento Area Council of Governments 2019b), an 21 percent Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in Davis will reach approximately 50,000 in 2065, an increase of 93 percent compared with 2019 levels.

General Plan

The City of Davis's General Plan is the community's vision of its long-term physical form and development (City of Davis 2007). The general plan is comprehensive in scope and represents the city's expression of quality of life and community values; it should include social and economic concerns as well. General plans are prepared under a mandate from the State of California, which requires that each city and county prepare and adopt a comprehensive, long-term general plan for its jurisdiction and any adjacent related lands.

The general plan area consists of approximately 160 square miles. The general plan area is bounded on the north by County Road 27 and the City of Woodland planning area, on the east by the easterly boundary of the Yolo Bypass, to the south by Tremont Road and the Pedrick Road–I-80 interchange in Solano County, and on the west by an extension of County Road 93. This boundary generally matches the easterly boundaries of the general plan areas of Dixon and Woodland. Because Davis is located in the corner of Yolo County, a portion of the planning area is in Solano County. The City of Davis General Plan, amended in 2007, guides community development using the following elements: Land Use, Circulation, Housing, Conservation, Open Space, Noise, and Safety.

2.13.1.3 City of West Sacramento

West Sacramento is located across the Sacramento River from the state capital, Sacramento, in the eastern part of Yolo County. The city is bounded by the Sacramento River on its northern and eastern borders and the Sacramento Deep Water Ship Channel and Yolo Bypass to the west.

The current population of West Sacramento is approximately 54,000 (Sacramento Area Council of Governments 2019a) and is projected to reach approximately 87,000 in 2036 (Sacramento Area Council of Governments 2019b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the population of West Sacramento will reach approximately 143,000 in 2065, an increase of132 percent from 2019.

The current number of housing units is approximately 20,000 (Sacramento Area Council of Governments 2019a) and is projected to reach approximately 35,000 in 2036 (Sacramento Area Council of Governments 2019b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in West Sacramento will reach approximately 64,000 in 2065, an increase of 160 percent compared with 2019 levels.

General Plan 2035

The West Sacramento General Plan 2035 will guide growth in West Sacramento over the planning period (City of West Sacramento 2016). The City will continue to urbanize with most of the growth focused on infill and refill opportunities in the Bridge District, Washington, Pioneer Bluff, and the Central Business District. Southport will continue to grow as well. West Capitol Avenue and Sacramento Avenue will move in a more flexible, mixed-use direction. The General Plan 2035 focuses on 10 elements that guide growth in the city through 2035: Land Use, Urban Structure and Design, Housing, Economic Development, Mobility, Public Facilities and Services, Parks and Recreation, Natural and Cultural Resources, Safety, and Healthy Community.

2.13.1.4 City of Winters

Winters is located in the southwestern corner of Yolo County, approximately 14 miles west of Davis and just east of the Vaca Mountains. The city is bordered by Dry Creek and Putah Creek on the south and southwest. I-505 and SR 128 are located in and near the city, serving as key links to I-80 approximately 10 miles to the south, and I-5 approximately 23 miles to the north. SR 128 intersects the city and serves as a major access route to Lake Berryessa.

The current population of Winters is approximately 7,500 (Sacramento Area Council of Governments 2019a) and is projected to reach 12,000 in 2036 (Sacramento Area Council of Governments 2019b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the population of Winters will reach approximately 21,000 in 2065, an increase of 140 percent compared with 2019 levels.

The current number of housing units in Winters is approximately 2,500 (Sacramento Area Council of Governments 2019a) and is projected to reach approximately 4,000 in 2036 (Sacramento Area Council of Governments 2019b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in Winters will reach 7,000 in 2065, an increase of 140 percent compared with 2019 levels.

General Plan

The City of Winters adopted its most recent general plan in 1992. There have been minor amendments since that time; the Housing Element was revised in October 2013. The horizon year for the City of Winters General Plan is 2021 for the Housing Element and 2018 for the other elements of the general plan. The General Plan Policy Document includes a land use diagram that outlines the standards of population density and building density for land designations within the Urban Limit Line. The plan seeks to maintain the traditional small-town qualities and agricultural heritage of Winters while focusing on contained development (City of Winters 1992). The general plan addresses 10 subject areas: land use; housing; population; economic conditions and fiscal considerations; transportation and circulation; public facilities and services; cultural and recreational resources; natural resources; health and safety; and scenic resources and urban design.

2.13.1.5 City of Woodland

Woodland is located in southwestern Yolo County, 20 miles northwest of Sacramento at the intersection of I-5 and SR 113. The Yolo Bypass lies approximately 3 miles east of the city, Willow Slough is 1 mile southeast, and Cache Creek is 2 miles north.

The current population of Woodland is approximately 60,000 (Sacramento Area Council of Governments 2019a) and is projected to reach 69,000 in 2036 (Sacramento Area Council of Governments 2019b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the population of Woodland will reach approximately 92,000 in 2065, an increase of 75 percent compared with 2019.

The current number of housing units in Woodland is approximately 21,000 (Sacramento Area Council of Governments 2019a) and is projected to reach 25,500 in 2036 ((Sacramento Area Council of Governments 2019a). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in Woodland will reach approximately 34,000 in 2065, an increase of 80 percent compared with 2019.

General Plan

The City of Woodland released a public draft of its General Plan Update on July 11, 2016 for review. The Draft General Plan Update envisions Woodland maintaining its small-town atmosphere, rich historical buildings, and commitment to the protection of agricultural soils. The plan has a horizon year of 2035 (City of Woodland 2016). The General Plan applies to the entire incorporated city (totaling 9,624 acres) plus a 3,148-acre area outside the city, within the unincorporated area of Yolo County. The General Plan Update contains elements that guide the Woodland's future development through a list of goals and policies. The Draft General Plan Update contains the following elements: Land Use, Community Design, Historic Preservation, Healthy Community Element, Conservation and Open Space, Safety, and Housing.

2.13.2 Major Infrastructure

The CFGC Section 1852(c)(6) requires that an RCIS consider "major water, transportation and transmission infrastructure facilities . . . that accounts for reasonably foreseeable development of major infrastructure facilities, including, but not limited to, renewable energy . . . in the [RCIS] strategy area." This section describes existing and reasonably foreseeable development of major

infrastructure facilities in the strategy area, including major water, transportation, transmission facilities, and renewable energy projects.

2.13.2.1 Transportation

This section describes the reasonably foreseeable transportation projects in the RCIS strategy area, focusing on lands outside the incorporated cities. Figure 2-17 shows existing major transportation infrastructure within the RCIS strategy area, including airports, transit hubs, transit priority areas, state highways, passenger railways, and rail stations.

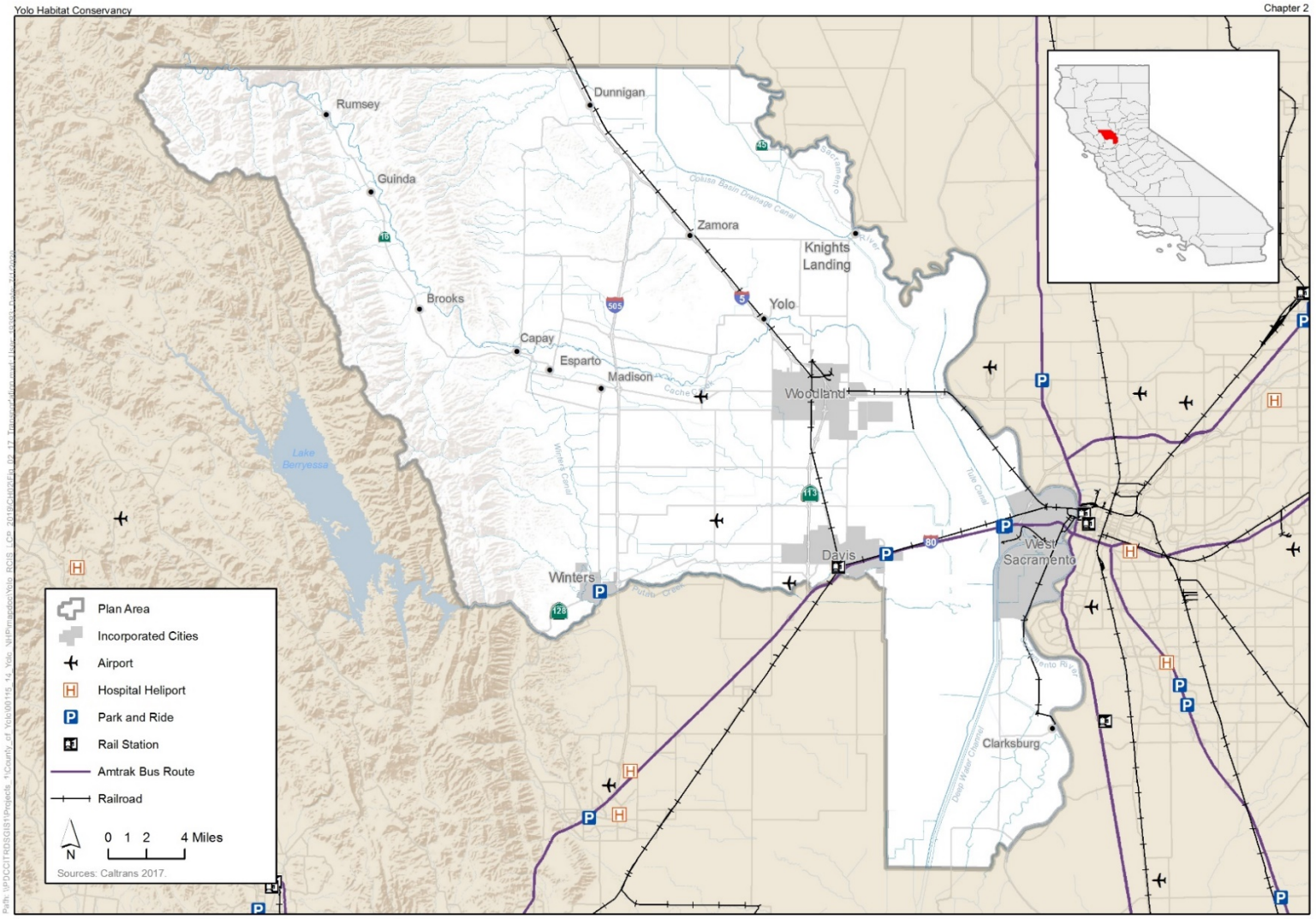


Figure 2-17
Transportation Infrastructure

Transportation Projects Identified in Yolo County General Plan

Caltrans has completed transportation or route concept reports for a number of State freeways and highways in Yolo County, including I-5, I-80, I-505, SR 16, SR 84, SR 113, and SR 128 (Yolo County 2008).

Caltrans' Interstate 5 (I-5) Transportation Concept Report (TCR) (Caltrans, 1997 as cited in Yolo County 2008) identifies a concept for maintaining the four-lane freeway from the Yolo/Sacramento County line to the Yolo/Colusa County line. The ultimate facility concept for the corridor is a six-lane freeway through Yolo County (Yolo County 2008). A Corridor System Management Plan (CSMP) has also been developed for I-5 which addresses the freeway between Sacramento County line and the City of Woodland in Yolo County.

The Interstate 80 (I-80) TCR (Caltrans 2001 as cited in Yolo County 2008) identifies a widening of the exiting facility through Yolo county, including the Yolo Causeway) to include high occupancy vehicle (HOV) lanes, increasing transit service, ramp metering, and message signs along the corridor. The CSMP for I-80 identifies HOV lanes in Davis at Mace Boulevard and in West Sacramento at Enterprise Drive along I-80.

The State Route 16 (SR-16) TCR identifies maintaining the existing highway with the addition of passing lanes, left-turn lanes, and bicycle facilities where feasible. The TCR also proposes a safety improvement project at three separate locations on SR 16 in Yolo County between Cadenasso and the I-505 interchange. The project proposes to widen shoulders to 8 feet, install shoulder rumble strips, and provide a 20-foot clear recovery zone (that includes the shoulder) at all three locations. In addition, the project would add a left turn pocket at Location 1, a two-way left turn lane at Location 3, flatten horizontal curves at Locations 1 and 2, and potentially add another access to the Madison Migrant Center from County Road 89. The safety improvement project at Location 2 was completed in 2016. The projects at Locations 1 and 3 are expected to be completed by November 2020. The locations are as follows (limits are approximate).

- Location 1—In Cadenasso at County Road 79 (from 0.3 mile west to 0.4 mile east of County Road 79)
- Location 2—2.2 miles west of Capay near County Road 82B (from 0.3 mile west to 200 feet west of County Road 82B); completed in 2016
- Location 3—Esparto to 0.2 mile west of I-505 (from 400 feet west of County Road 21A to South Folk Willow Slough)

Caltrans plans to maintain State Route 45 through Yolo County. The Interstate 505 (I-505) TCR (Caltrans 2007 as cited in Yolo County 2008) identifies maintaining the existing four-lane freeway. No Caltrans improvements are planned for SR 84 per the Yolo County 2030 General Plan (Yolo County 2008). The SR 113 TCR identifies widening the four-lane freeway to a six-lane freeway (Caltrans 2000 as cited in Yolo County 2008). Caltrans plans to maintain the existing SR 138 (Caltrans 2001, as cited in Yolo County 2008).

Other Reasonably Foreseeable Transportation Projects

The Conservancy reviewed the following sources to identify foreseeable transportation projects in the strategy area not identified in the Yolo County General Plan.

- Caltrans State Transportation Improvement Program (Caltrans 2020)
- Caltrans State Highway Operation and Protection Program (SHOPP) and Minor Program (Caltrans 2019)
- Sacramento Region Metropolitan Transportation Plan for 2035 (SACOG, March 2008)

These sources do not identify any major new transportation infrastructure in the Yolo RCIS strategy area beyond what is identified in the Yolo County General Plan. They identify plans to improve the following transportation facilities/infrastructure:

- SR 16 – Near Capay, from Capay Canal Bridge to 0.2 mile west of County Road 85; In Esparto, from Orleans Street to County Road 21A; near Esparto, from Cache Creek Bridge to 0.3 mile west of Cache Creek Bridge (Caltrans SHOPP).
- I-5- Near Sacramento, at Sacramento River Bridge No. 22-0025 L/R; in and near Woodland from Sacramento County line to Colusa County line; near Woodland at Wye Line Road Overcrossing; in and near Woodland from East Main Street to County Road 13; near Woodland at County Road 96 various overcrossings; additional repair locations and installation of permanent automatic vehicle classification truck data collection stations (Caltrans SHOPP).
- I-505 - Near Madison, form 0.3 mile north of County Road 19 and on Route 16 at 0.4 mile east of Road 42B and 0.1 mile east of Road 81 (Caltrans SHOPP).
- I-80- In West Sacramento at the Sacramento River Bridge and Overhead No. 22-0026L/R (Caltrans SHOPP).
- I-84 – Near West Sacramento from 3.7 miles north of Clarksburg Road to 4.0 miles north of Babel Slough Road (Caltrans SHOPP).

2.13.2.2 Water

Water Resources Association of Yolo County

The Water Resources Association of Yolo County (WRA) is a consortium of entities authorized to provide a regional forum to coordinate and facilitate solutions water infrastructure issues in Yolo County. It was widely recognized that managing water supplies from the standpoint of quantity, quality, and environmental considerations could not be done by individual agencies and that collaboration was essential. The WRA was formed in 1994 to provide regional leadership in the development of water resources management for the county. Members of the WRA include the following agencies.

- City of Davis
- Dunnigan Water District
- Reclamation District 2035

- University of California, Davis
- City of Winters
- City of West Sacramento
- City of Woodland
- Yolo County
- Yolo County Flood Control and Water Conservation District

In 2007, the WRA published the Yolo County Regional Integrated Water Management Plan (IRWMP), which provides a wide-ranging vision for the future water management in Yolo County. High-priority water management actions including projects, programs, or policies identified to improve water management in Yolo County. The IRWMP describes integrated water management actions that combine elements of five water management categories.

1. Water Supply and Drought Preparedness
2. Water Quality
3. Flood Management and Storage
4. Aquatic and Riparian Ecosystem Enhancement
5. Recreation

The WRA currently has no future large-scale water infrastructure development plans.

2.13.2.3 Flood Protection

West Sacramento Levee Improvement Program

The West Sacramento Area Flood Control Agency (WSAFCA) is implementing a multi-year plan to meet the 200-year level of flood protection requirement imposed by new state law and new federal levee standards. The Southport Levee Improvement Project, currently under construction, involves the construction of flood risk–reduction measures along 5.6 miles of the Sacramento River South Levee in the city of West Sacramento. Levee improvements will include a combination of fix in place and a new setback levee construction. The project will provide significant opportunities for ecosystem restoration and public recreation. This project is covered under the Yolo HCP/NCCP.

Central Valley Flood Protection Plan

The CVFPP is a strategic and long-range plan for improving flood risk management in the Central Valley. It was prepared by DWR in accordance with the Central Valley Flood Protection Act of 2008 and adopted by the Central Valley Flood Protection Board (CVFPB) in June 2012. The CVFPP is a critical document to guide flood risk management in the Central Valley (DWR 2012). The CVFPP proposes a systemwide investment approach for sustainable, integrated flood management in areas currently protected by facilities of the SPFC. The CVFPP is required to be updated every 5 years, with each update providing support for subsequent policy, program, and project implementation (DWR 2012).

The 2017 CVFPP Update (DWR 2017) is the first major 5-year update to the CVFPP in accordance with the Central Valley Flood Protection Act of 2008. It updates and refines the overall near- and

long-term investment needs established in the 2012 CVFPP, and includes recommendations on policies and funding to support comprehensive flood risk management actions. The planning efforts supporting the 2017 CVFPP Update (DWR 2017) were developed in close coordination with state, federal, and regional partners, and were informed by a multiyear stakeholder engagement process initiated in 2012. The 2017 CVFPP update (DWR 2017) incorporates new information and provides greater specificity to help guide both short-term and long-term investments in the Central Valley flood management system. This new information is documented in a series of detailed studies, including two BWFSs for the Sacramento River Basin and the San Joaquin River Basin, respectively, six RFMPs, a conservation strategy, a CVFPP investment strategy, and other studies. The CVFPP-related documents relevant to the Yolo RCIS strategy area are described in the following subsections.

Sacramento River Basin-Wide Feasibility Studies

The Sacramento River BWFS evaluates options for improving the bypass system, advancing the CVFPP planning and implementation process by updating and refining the options for improving the flood management system. It includes detailed feasibility evaluations of various combinations of levee setbacks, weir expansions, new bypass channels, and storage management opportunities, with integrated ecosystem restoration actions. Many of the major flood system improvements evaluated in the Sacramento River BWFS (DWR 2016) are located in the strategy area, including potential widening of the Fremont Weir and Sacramento Weir, and expansion of the Yolo and Sacramento Bypasses.

Lower Sacramento River/Delta North Regional Flood Management Plan

The RFMP for the Lower Sacramento/Delta North region is the regional follow-on to the 2012 CVFPP. The RFMP, prepared in 2014, establishes the flood management vision for the region and identifies regional solutions to flood management problems at a prefeasibility level. The RFMP focuses on a geographic area that includes portions of Solano, Yolo, Sacramento, and Sutter Counties, and was developed by FloodProtect, a regional working group comprised of the counties, cities, flood management agencies, LMAs, water agencies, emergency response agencies, citizen groups, tribes, and other interested stakeholders in the region. The RFMP identified a list of 116 regional improvements, many of which are located in Yolo County, with over $2 billion in total cost.

Lower Elkhorn Basin Levee Setback Project

DWR is proposing the Lower Elkhorn Basin Levee Setback project in Yolo County to reduce flood risk to the Cities of Sacramento, West Sacramento, and Woodland, and improve system performance consistent with the 2012 CVFPP and the 2017 CVFPP Update (DWR 2017). The project would set back approximately 7 miles of levees in the Lower Elkhorn Basin, including the Sacramento Bypass North Levee and a portion of the Yolo Bypass East Levee, thereby increasing the capacity of the Yolo and Sacramento Bypasses and reducing flood risks on the upper Yolo Bypass and Sacramento River. The project would also implement several ecosystem project elements to increase habitat for special-status species. The Lower Elkhorn Basin Levee Setback project is currently scheduled for construction beginning in 2020.

Sacramento River General Reevaluation Report

The Sacramento River General Reevaluation Report was initiated in October, 2015 by USACE, with CVFPB and DWR as partner agencies. The general reevaluation will assess a combination of one or more ecosystem restoration and flood risk management measures, including widening existing bypasses, modifying existing weirs, optimizing weir operations, constructing setback levees, developing floodplain management plans, restoring riverine aquatic and riparian habitat, removing barriers to fish passage, and restoring natural geomorphic processes. Some of these measures are being contemplated in the Yolo Bypass.

American River Common Features General Reevaluation Report

The American River Common Features Project was initiated following major flooding that occurred in 1986. The American River Common Features General Reevaluation Report was finalized by USACE in December 2015. The purpose of the study is to improve flood protection for the Sacramento and West Sacramento urban areas. While most of the measures identified in the American River Common Features General Reevaluation Report focus outside the strategy area, it does include an expansion of the Sacramento Weir and Bypass in Yolo County. Widening the Sacramento Weir and Bypass by 1,500 feet would divert increased flows to the Yolo Bypass to reduce the water surface elevation in the Sacramento River.

2.13.2.4 Gas and Electric Transmission

Transmission lines in the RCIS strategy area include those supporting distribution of natural gas and electricity. Figure 2-18 shows transmission facilities in the RCIS strategy area, including operational hydroelectric power plants, transmission lines, and natural gas pipelines.

Pacific Gas and Electric Company

Pacific Gas and Electric Company (PG&E) owns and operates most of the gas and all of the electric transmission lines in the RCIS strategy area. The company provides natural gas and electric service to approximately 16 million people throughout a 70,000-square-mile service area in northern and central California. PG&E currently has no large-scale transmission/utility projects planned in the RCIS strategy area.

2.13.2.5 Renewable Energy

Yolo County has a high potential for photovoltaic solar energy production. National Renewable Energy Laboratory data indicates that solar energy is the most promising option for future renewable energy generation in the county. According to the National Renewable Energy Laboratory, Yolo County receives enough energy from the sun to produce approximately 5.0 to 5.5 kilowatt hours per square meter per day. In 2013, Yolo County joined with SunPower to install 6.8 megawatts of solar power facilities at three locations in the county. Another solar facility, the 18-acre Putah Creek Solar Farm in Winters, produces 2.6 megawatts of electricity.

Currently, there are no large-scale (i.e., commercial) renewable energy projects planned in the RCIS strategy area. Instead, renewable energy projects tend to be at the scale of individual residences of approximately 10 acres or less.

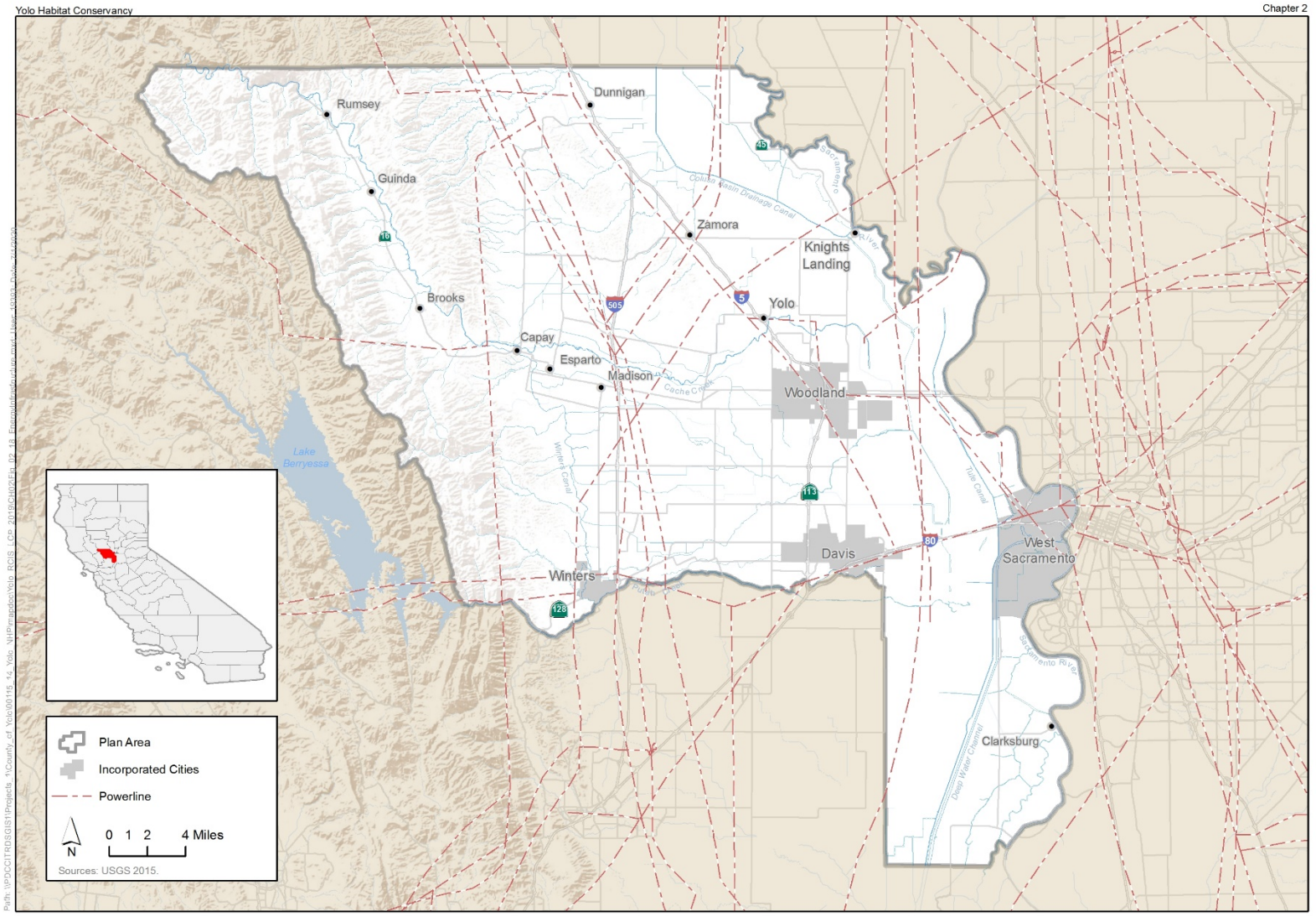


Figure 2-18
Energy Infrastructure

2.13.2.6 Capital Improvement Programs

Yolo County Capital Improvement Plan 2017-2019

The Yolo County Capital Improvement Plan (CIP) includes capital projects that are in the stages of implementation and those projects to be implemented within the next 3 fiscal years. The CIP continues to be used as a tool for the implementation of projects included in various plans adopted by the Yolo County Board of Supervisors, including the Yolo County General Plan. All projects meeting the definition of a capital asset project are included in the CIP along with detail regarding project funding. Considered a strategic planning tool, the CIP may be used by the Board of Supervisors to prioritize countywide capital projects. While the CIP does not indicate approval of specific projects, only projects included in the Board-approved CIP will be considered for funding, with the exception of emergency needs at the Board of Supervisor's direction.

City of Davis Capital Improvement Program

The Capital Improvement Program includes the following projects that the City of Davis has planned (or is currently implementing) for the downtown area of Davis.

- Third Street: This project represents comprehensive streetscape improvements of the two-block segment of Third Street between A and B Streets at the western entrance to the Downtown Core. The primary project objectives include improving bicycle and pedestrian safety/access, beautifying the street to create a sense of place, establishing a City/UC Davis gateway, upgrading infrastructure to support current and planned mixed use infill, and improving stormwater drainage to reduce localized flooding while employing sustainable stormwater quality management practices.
- Centennial Plaza: The Centennial Plaza Improvements Project will update Centennial Plaza, located on the southeast corner of Second Street and G Street, with new concrete flatwork, truncated domes and ramp installations, relocations of bike racks and other street furniture, landscaping and irrigation, street lighting and electrical, and redesigning of the corner to allow for art installations.
- Tim Spencer Alley: This project will will resurface the alley and update the utilities.
- Bike Path Rehabilitation: This project will replace the remaining asphalt bike paths in Covell Park. This work will include three areas: 1) the north portion of the pathway between Balboa Ave and Encina Ave and Huerta Place; 2) the pathway between Catalina Ave on the west side of the park and between Cortez Ave and Baja Ave on the east side of the park; and 3) the area between Covell Blvd and the bike/pedestrian overcrossing (west side of the overcrossing).
- Bike Pump Track: This project will construct a Bike Pump Track that will be approximately 9,000 square feet, with a perimeter fence and entry gates for both cyclists and maintenance equipment. The track provides a safe space for kids and adults to enjoy the benefits of off-road cycling in a relatively small and controlled space, offering participants a local place to get cardiovascular exercise, good core work out for the upper and lower body, and achieve personal empowerment through the navigation of obstacles. On December 5, 2017, City Council selected Community Park as the location for the future bike pump track. Construction is scheduled to begin in fall of 2019.

- Canary Grade Separated Crossing: This project will construct a grade separated crossing at Covell Boulevard to provide a safer crossing to the Cannery development. Improvements will also update an existing path along Covell Boulevard to make it compliant with the Americans with Disability Act (ADA) requirements.
- Veterans Memorial Center Renovation: This project will update the Veterans Memorial Center with a multipurpose room, lobby, vestibule, restrooms, kitchen game room and club rooms as well as upgrading lighting and amenities.
- Mace Boulevard Corridor: This project will resurface and restripe Mace Boulevard and install buffered protected cycle track on the east side of the Mace/Cowell intersection and a buffered bike lane on the west side of the Mace/Cowell intersection.
- Russell Boulevard Green Street Demonstration: This project will redesign the existing landscaping of City Hall to facilitate ground water re-charge and reduce storm water runoff, including replacement of turf with native vegetation, construction of a bio-swale to treat storm water runoff, and installation of benches and other features to encourage community use.
- Tulip/Ponterverde Multi-Use Path Improvements Project: This project will design and construct a bi-directional multi-use path extension of the Mace Ranch bike trail through the intersection of Tulip Lane and Ponteverde Lane to improve bicycle and pedestrian connectivity and safety, as identified in the Walk Bike Audit Report for Korematsu Elementary School.

City of West Sacramento Capital Improvement Program

The City of West Sacramento's Public Works Department delivers capital improvement projects that help maintain and improve infrastructures, transportation, maintenance, and public safety. Current major capital improvement projects include the following.

- ADA Transition Plan and Access Improvements, no set completion date.
- Broadway Bridge. The project team expects to initiate the final design and right-of-way acquisition by 2020, with construction completion between 2025 and 2030.
- California Indian Heritage Center. Construction began in 2017 and is expected to be completed by 2020.
- South River Road Bridge and Village Parkway Extension. No start set for the project. Project will take approximately 24 months to complete.
- Sacramento River Crossings Study. Expected to be completed by 2025.

Chapter 3
Conservation Strategy

3.1 Overview

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

This chapter identifies and prioritizes conservation opportunities in Yolo County. The Yolo County RCIS/LCP uses the best available science to identify conservation goals and objectives (defined in Section 3.2.4.1, *Conservation Goals and Objectives*), conservation actions, and conservation priority areas (defined in Section 3.2.4.2, *Conservation Actions and Priority Areas*) to aid California's declining and vulnerable species by protecting, restoring, creating, enhancing, and reconnecting habitat.

Consistent with Yolo County's longstanding emphasis on preserving agricultural land and a vibrant agricultural economy, the RCIS/LCP conservation strategy described in this chapter is intended for implementation in a manner that achieves its objectives on working agricultural lands where feasible. This will often require consideration of available means to further multiple public objectives through a single "multi-benefit project." Such multi-benefit projects are defined herein as projects designed to achieve a primary public objective (by way of example only, reducing flood risk) while also creating additional public benefits such as enhancing fish and wildlife habitat, sustaining agricultural production, improving water supply and water quality, increasing groundwater recharge, and providing public recreation and educational opportunities, or any combination thereof.

This RCIS/LCP has the following six primary conservation purposes, as identified by the Advisory Committee and Steering Committee.

1. To conserve the sustainability of all native species, reduce environmental stressors, and maintain or enhance the resilience[11] of natural communities (plants and animals, terrestrial and aquatic) in Yolo County.
2. To maintain or create habitat connectivity for movement, dispersal, and migration of native plant and animal species.
3. To allow, maintain, and enhance ecological processes that create and sustain habitats for naturally occurring species.
4. To reduce or eliminate stressors on wildlife health and natural communities.
5. To conserve agricultural habitat values for focal species and natural communities.

[11] Resilience is defined as the capacity of an ecosystem to return to its original state following a perturbation, including maintaining its essential characteristics of taxonomic composition, structure, ecosystem functions, and process rates. In the context of climate change, resilience is defined as the ability of an ecosystem to recover from or adjust easily to change, measured more in terms of overall ecosystem structure, function, and rates and less in terms of taxonomic composition (California Landscape Conservation Cooperative https://lccnetwork.org/sites/default/files/Resources/CA%20LCC%20Scientific%20Management%20Framework%20hyperlink%20single%20pages%20FINAL.pdf)

6. To protect and enhance habitat features throughout the county that sustain pollinator organisms, including but not limited to insects, birds, and bats.

3.2 Methods and Approach

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

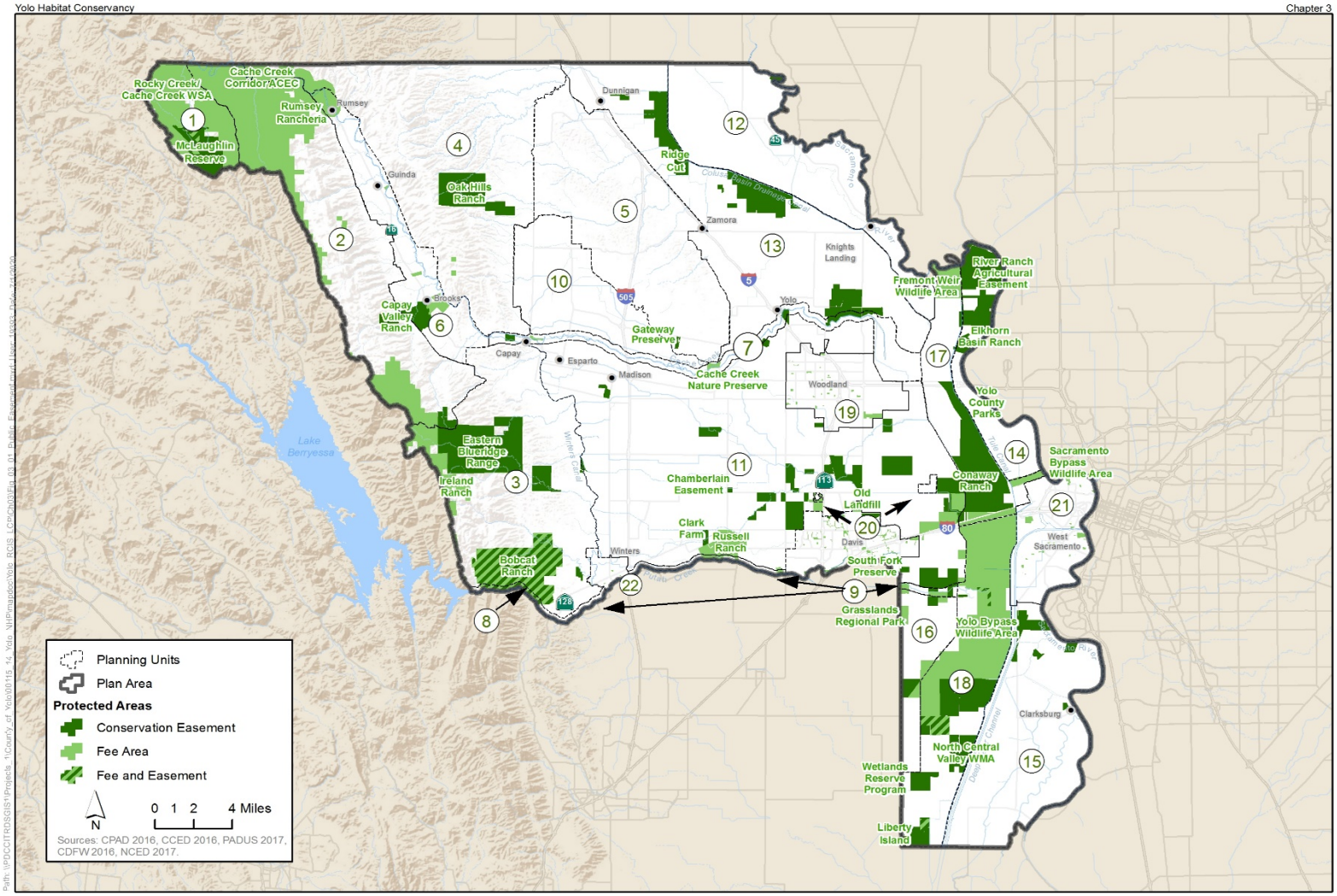
3.2.1 Conservation Gap Analysis

A key step in the development of a regional conservation investment strategy is to determine the existing level of protection for natural communities, landscape connectivity, and focal species. Species or natural communities with low levels of existing protection or those lacking functional landscape connectivity may require greater emphasis in the strategy to ensure their conservation in Yolo County. In contrast, well-protected species or natural communities which occur within functionally well-connected landscapes may need little or no additional conservation focus in the strategy. For well-protected species, the conservation goals and objectives may focus on habitat restoration or improved habitat management in existing protected areas.

The analysis conducted to determine the levels of existing protection of species and natural communities is called a *conservation gap analysis*. The methods used were based on similar approaches that have been applied at the national, state, and local levels (Yolo Habitat Conservancy 2017; Wild 2002). Some aspects of landscape connectivity assessment are included in gap-analysis assessments, particularly those aspects important in identifying larger high-quality habitat areas (sometimes considered "reserves").

Conservation biology theory holds that by protecting a wide range of ecosystems and natural communities or land cover types at a broad scale, the majority of the biological diversity contained within these natural communities will also be protected (Noss 1987). This approach is complemented by then focusing on finer scale resources such as species occurrences, species habitat, or unique physical features to conserve biological diversity not protected by the broader-scale approaches. That additional focus is incorporated through prioritizing conservation of areas supporting focal and planning species. Recent developments in conservation biology theory incorporate the importance of landscape connectivity (both structural and functional; Crooks and Sanjayan 2007) in planning for conservation for biological diversity at multiple scales (Rudnick et al. 2012; Theobald et al. 2012; Fletcher et al. 2016); however, protected-land assessment does not address connectivity directly, and this plan considers landscape connectivity as an additional conservation component (Table 3-3, Goal L1).

To determine the gaps in protection in Yolo County, GIS data layers for the natural communities and Group 1 species (i.e., focal species) were overlaid with a GIS layer of protected areas as of 2018 (Figure 3-1). The protected areas data is from the California Protected Areas Database and California Conservation Easement Database; data used for the protected areas database include the following – Protected Areas Database of the United States, CDFW-owned/managed lands, and National Conservation Easement Database. The amount of each natural community type to be protected through the Yolo HCP/NCCP was also included in the analysis.



Yolo RCIS/LCP

Figure 3-1
Protected Areas

3.2.2 Geographic Units of Conservation

To facilitate the development of a spatially explicit conservation strategy, Yolo County is divided into two landscape units composed of 22 planning units (Figure 3-2, *LCP Landscape Units and Planning Units*). The Yolo HCP/NCCP established the landscape units to reflect the elevation break and associated ecological differences between the hills and ridges in the western strategy area and the valley floor and floodplains dominating the remainder of Yolo County. The Hill and Ridge Landscape Unit encompasses planning units 1–6 and 8, and is characterized by the dominant woodlands and forest, California prairie, and chaparral natural communities. This landscape unit generally encompasses the Bailey (USDA) Ecoregion identified in Chapter 2 as the "Northern California Interior Coast Ranges." The Valley Landscape Unit encompasses planning units 7 and 9–22 and is dominated by farmed lands. Yolo County's urbanized areas within incorporated cities are located within the Valley Landscape Unit in planning units 19–22. This landscape unit generally encompasses the Bailey (USDA) Ecoregion identified in Chapter 2 as the "Great Valley."

The planning units were delineated to capture lands that support similar ecological, topographical, natural community, and land use conditions.[12] The planning units identify the specific areas in which conservation actions (such as land acquisition and habitat restoration) will occur without identifying individual parcels for the actions. While planning units were generally identified for major natural geomorphic and ecological features, the specific planning unit boundaries were delineated using clearly recognizable features, such as roads and parcel boundaries that best approximated natural geomorphic and ecological boundaries. Using readily identifiable existing features as boundaries facilitates clear recognition of boundaries for planning and implementing the RCIS/LCP. In this way, the RCIS/LCP uses the planning units to identify conservation actions in a spatially explicit manner while maintaining the flexibility to implement conservation actions on different parcels to meet the same conservation objectives (e.g., to respond to willing sellers where they arise). Planning units used in the RCIS/LCP are the same as those used in the Yolo HCP/NCCP, to help ensure consistency between the conservation strategies of the two plans.

3.2.2.1 Hill and Ridge Landscape Unit—Planning Unit Descriptions

Planning Unit 1—Little Blue Ridge. The Little Blue Ridge Planning Unit (Figure 3-2) incorporates unique geomorphic, geologic, and soil conditions that support specialized vegetation types. The RCIS/LCP defines the boundaries as the Yolo County boundaries with Napa, Lake, and Colusa Counties on the north, south, and west, and Lang's Peak Road on the east. The 11,832-acre area is dominated by chamise and mixed chaparral natural communities, with lesser amounts of oak woodland and California prairie. Little Blue Ridge also supports the only occurrences of serpentine natural community and closed-cone cypress woodland natural community in Yolo County.

Planning Unit 2—North Blue Ridge. The North Blue Ridge Planning Unit encompasses 52,853 acres of mostly steep, rugged terrain. This planning unit is bounded on the north by State Highway 16 and the Colusa County line; on the east by flatter lands, used predominantly for agriculture in the Capay Valley; on the south by lower Cache Creek watershed boundary; and on the west by Napa County. The Planning Unit supports abundant chamise and mixed chaparral natural communities and oak-dominated woodland, with lesser amounts of California prairie. The North Blue Ridge

[12] As described in Chapter 2, the term "natural communities" also includes semi-natural communities such as agricultural lands.

Planning Unit includes nearly two-thirds of the montane hardwood natural community in Yolo County and a substantial proportion of the small amount of closed-cone pine-cypress natural community in Yolo County.

Planning Unit 3—South Blue Ridge. The South Blue Ridge Planning Unit supports topography, geology, and vegetation similar to the North Blue Ridge Planning Unit. South Blue Ridge consists of 56,259 acres of mostly steep, rugged terrain dominated by chaparral, oak woodland, and California prairie. This planning unit is defined on the north by lower Cache Creek watershed boundary and on the east by the Winters Canal and the flatter lands that are used predominantly for agriculture. To the south, this planning unit is bounded by the Upper Putah Creek Planning Unit (Planning Unit 8). The Napa County line forms the western boundary. The South Blue Ridge Planning Unit supports abundant California prairie and oak woodland, with lesser amounts of chamise and mixed chaparral natural communities and riparian woodland. This planning unit includes nearly one-third of the montane hardwood natural community in Yolo County.

Planning Unit 4—Capay Hills. The Capay Hills Planning Unit encompasses the hill formation that separates Capay Valley from Hungry Hollow and the Dunnigan Hills. The area consists of 66,934 acres of mostly steep land. This planning unit extends north to the Colusa County line, with its eastern boundary demarcated by the lowlands adjacent to the Dunnigan Hills, County Road 85, the south fork of Buckeye Creek, the Tehama-Colusa Canal, and flat terrain of the Hungry Hollow Basin (Planning Unit 10). The southern and western boundaries are the Hungry Hollow Canal and the floor of Capay Valley, respectively. Oak woodland and California prairie are the dominant natural communities, with substantial amounts of chaparral, and small amounts of lands farmed in grain.

Planning Unit 5—Dunnigan Hills. The Dunnigan Hills Planning Unit is delineated to recognize this hilly topographic area. The planning unit is demarcated on the north by the county line, on the southeast and south by the Acacia and West Adams Canals, County Road 85, and a lowland area separate the northwest boundary of the Dunnigan Hills from the Capay Hills. This 48,038-acre planning unit is dominated by California prairie and agricultural lands, including dryland farmed grains and vineyards.

Planning Unit 6—Upper Cache Creek. The Upper Cache Creek Planning Unit consists of the narrow (0.5- to 3-mile-wide) Capay Valley bottomland area located between North Blue Ridge and the Capay Hills, and northwest of the town of Capay. The 17,919-acre area supports a wide variety of natural communities, including Cache Creek and its associated riparian woodland and scrub, numerous small farms, areas of California prairie, upland woodland, and Valley oak woodland typical of adjacent planning units, and some developed areas.

Planning Unit 8—Upper Putah Creek. The Upper Putah Creek Planning Unit consists of 1,023 acres of the creek, the adjacent floodplain, and associated lands in the steeper upland portion of Putah Creek. This narrow planning unit is bounded on the south by the Solano County boundary and on the north by steep topography, generally delimited by Highway 128. The planning unit supports riparian woodland and scrub and aquatic habitats, but also includes substantial areas of upland oak woodland, California prairie, and farmland.

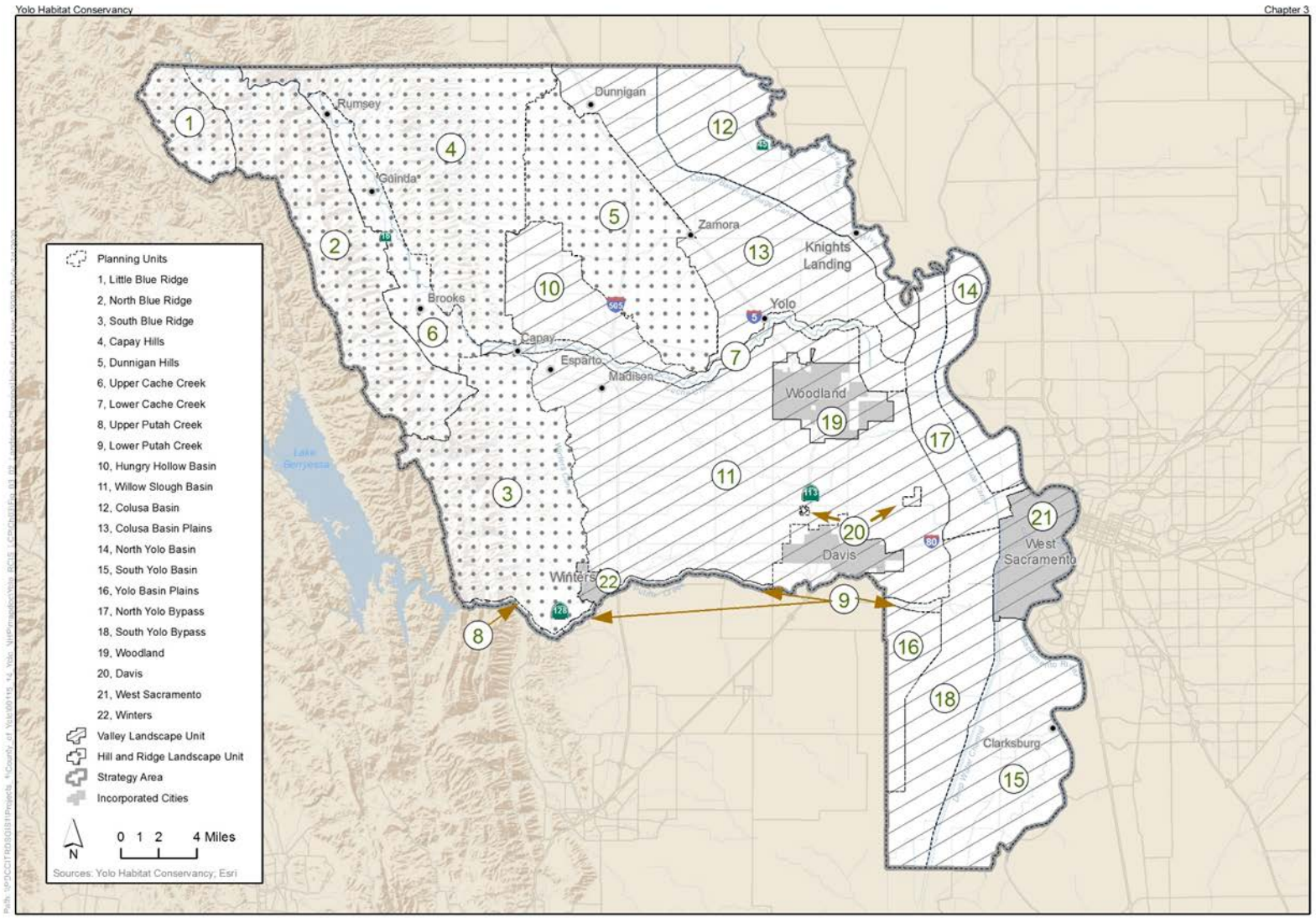


Figure 3-2
Landscape and Planning Units

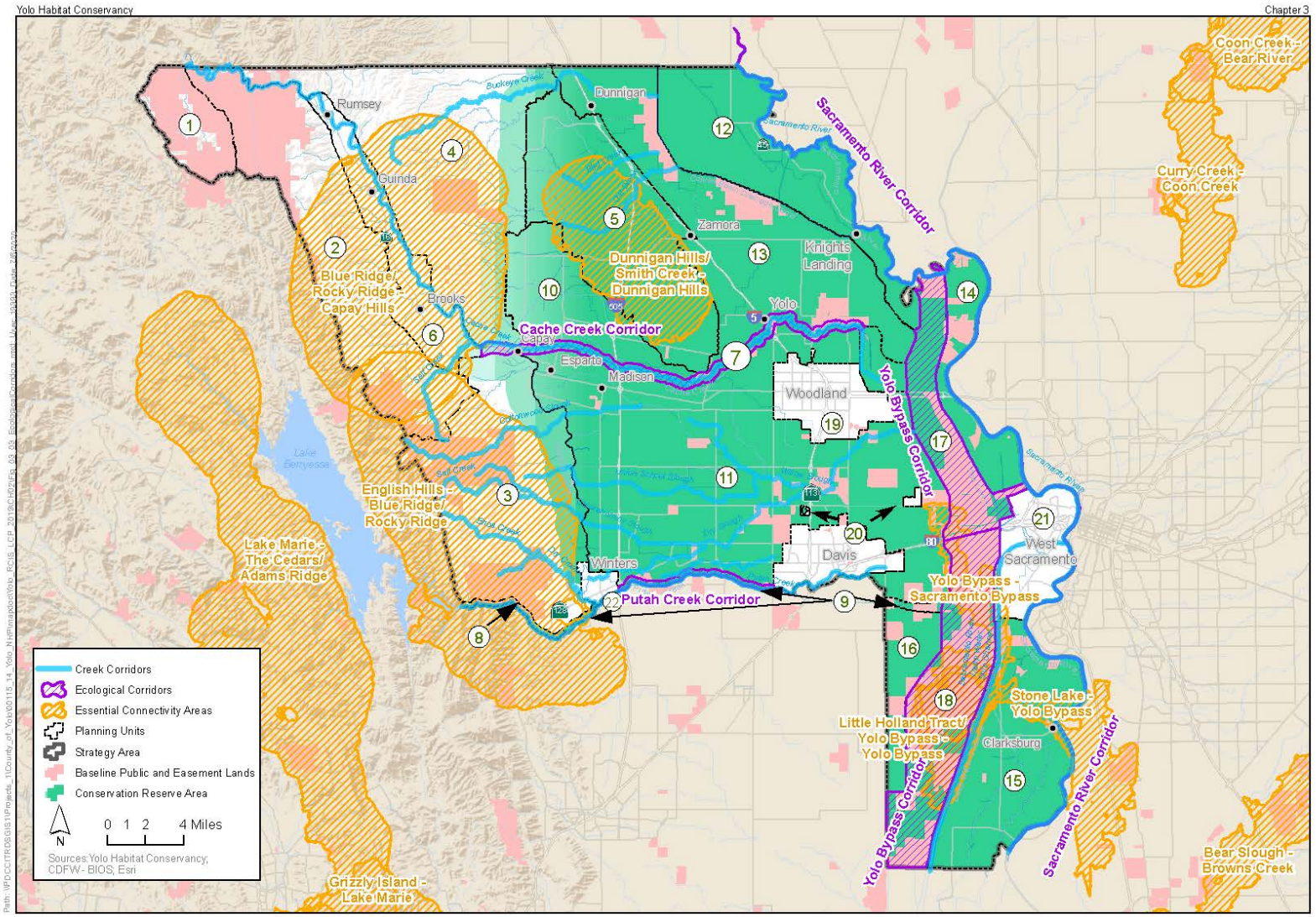


Figure 3-03
Ecological Corridors

3.2.2.2 Valley Landscape Unit—Planning Unit Descriptions

Planning Unit 7—Lower Cache Creek. The 11,361-acre Lower Cache Creek Planning Unit consists of Cache Creek and its adjacent riparian corridor downstream of the town of Capay to its terminus in the Cache Creek Settling Basin (Figure 3-3). The area supports abundant riparian and aquatic habitat and encompasses some adjacent agricultural lands and aggregate mining areas.

Planning Unit 9—Lower Putah Creek. The 2,612-acre Lower Putah Creek Planning Unit includes Putah Creek and its floodplain and adjacent lands in the lower gradient lowland portion of Putah Creek. The western part of this narrow east-west unit is bounded on the north by farmed areas and on the south by the creek, which is the boundary with Solano County. In this unit's eastern part, both sides of the creek are within Yolo County and this planning unit, where they are bordered by agricultural lands. Riparian woodland is a dominant natural community in this planning unit, with most habitat consisting of older mature woodland, but over half of the lands included are adjacent agricultural lands, predominantly in orchards and various field crops.

Planning Unit 10—Hungry Hollow Basin. The Hungry Hollow Basin Planning Unit comprises 21,069 acres of mostly agricultural lands between the Capay Hills and Dunnigan Hills and north of Cache Creek. The south boundary of this planning unit is the Cache Creek corridor, the north boundary follows the South Fork Oak Creek, and the east boundary is the Hungry Hollow Canal. Approximately 93 percent of the lands in the Hungry Hollow Basin Planning Unit are in agricultural use, with pasture and grain comprising over half of agricultural crops.

Planning Unit 11—Willow Slough Basin. The Willow Slough Basin Planning Unit is the largest planning unit, comprising 118,060 acres in the central portion of the county between Cache and Putah Creeks. The planning unit is bounded by the Cache Creek corridor, Cache Creek Settling Basin, and Woodland on the north; the western Yolo Bypass levee on the east; Davis and Putah Creek on the south; and Winters Canal on the west. Agriculture occupies 90 percent (approximately 106,000 acres) of the planning unit, with a wide variety of crop types grown. Urban and California prairie together compose most of the remaining land area, with smaller but important amounts of riparian, alkali sink, wetlands, and open water natural communities.

Planning Unit 12—Colusa Basin. The Colusa Basin Planning Unit encompasses 35,091 acres in the northeast portion of Yolo County. The planning unit boundaries consist of the Colusa County line on the north, the Sacramento River on the northeast, the Yolo Bypass on the southeast, and the Knights Landing Ridge Cut and Colusa Basin Drainage Canal on the southwest. Approximately 92 percent of the lands are used for agriculture and supporting water management, with rice as the predominant crop. Riparian woodland is concentrated along the Sacramento River.

Planning Unit 13—Colusa Basin Plains. The Colusa Basin Plains Planning Unit consists of 56,381 acres dominated by agricultural uses. Knights Landing Ridge Cut and the Colusa Basin Drainage Canal define the boundary on the northeast. Yolo Bypass forms the southeast boundary, the Cache Creek Corridor and Settling Basin define the southern boundary, and Dunnigan Hills and the Union Pacific Railroad define the southwest boundary. Approximately 84 percent of the planning unit is in agricultural uses, with a wide variety of crops grown. The remaining lands consist primarily of managed wetlands, California prairie, and urban areas, and also include significant relict stands of Valley oak woodland.

Planning Unit 14—North Yolo Basin. The North Yolo Basin Planning Unit includes lands between the Sacramento River and the Yolo Bypass along the eastern edge of Yolo County, north of West Sacramento. The planning unit consists of 13,293 acres of land located east of the Yolo Bypass at Fremont Weir, south and west of the Sacramento River, and north of the Sacramento Weir. It includes the Freemont Weir State Wildlife Area. Over 87 percent of lands are in agricultural use, including large areas of field crops, grain and hay crops, orchards, and pasture. The remaining lands consist primarily of California prairie, riparian woodland, and open water, mainly along the Sacramento River.

Planning Unit 15—South Yolo Basin. The South Yolo Basin Planning Unit comprises 38,929 acres. A line from Garcia Bend west to the Sacramento Ship Channel forms the northern boundary of this planning unit. Other boundaries are the Sacramento River on the east, the Solano County line on the south, and the Yolo Bypass on the west. Agriculture is the primary land use (approximately 85 percent), with pasture, vineyard, and field crops the dominant crop types. Other major land cover types include California prairie and urban areas. Substantial riparian and open water habitats occur along the Sacramento River, Elk Slough, and other waterways.

Planning Unit 16—Yolo Basin Plains. The Yolo Basin Plains Planning Unit is relatively small (10,284 acres), bounded by the lower Putah Creek corridor on the north, the Yolo Bypass on the east and south, and the Solano County line on the west. While these lands are subject to flooding from the Yolo Bypass, the planning unit encompasses land above areas that flood frequently. Approximately 83 percent of the land is used for agriculture, primarily pasture, field crops, and grain and hay. Other major habitats include California prairie and managed emergent wetlands. This planning unit supports some of the last remnants of natural vernal pool habitat in Yolo County.

Planning Unit 17—North Yolo Bypass. The 17,776-acre North Yolo Bypass Planning Unit consists of lands within the northern portion of the constructed flood bypass for the Sacramento River. The Sacramento River forms the northern boundary at the Fremont Weir. The southern boundary is Interstate 80. The flood control levees of the bypass form the east and west boundaries. Approximately 64 percent of the lands within the North Yolo Bypass Planning Unit are agricultural, farmed primarily in rice and field crops. Most remaining lands consist of riparian scrub, California prairie, and managed wetlands.

Planning Unit 18—South Yolo Bypass. The South Yolo Bypass Planning Unit consists of 32,301 acres within the southern portion of the Yolo Bypass. Interstate 80 forms the northern boundary. The southern boundary and part of the western boundary consist of the Solano County line. East and west boundaries are the flood control levees of the Yolo Bypass and designated flood areas, as well as county roads and the boundary with Solano County. Managed and natural wetlands, open water, and riparian habitat comprise nearly 40 percent of the lands within the planning unit. Agricultural lands, primarily pasture, field crops, and rice, occupy 33 percent of the lands. California prairie and associated vernal pools and alkali sink habitats make up most of the remainder of the planning unit.

Planning Unit 19—Woodland. The Woodland Planning Unit includes 12,765 acres of land within the City of Woodland's Urban Limit Line as defined in the City's 2002 General Plan as updated in 2006. This planning unit includes the existing urbanized area within the Woodland city limits and lands projected for growth under the City's General Plan. Approximately 66 percent of the planning unit is developed and over 25 percent of the land is currently in various agricultural crops. This planning unit supports important and regionally rare alkali prairie natural community.

Planning Unit 20—Davis. The 10,804-acre Davis Planning Unit includes lands within the City of Davis' sphere of influence as updated in the 2008 Davis General Plan. Urban uses are present on approximately 76 percent of land in this planning unit and agriculture on approximately 19 percent of the planning unit. Natural areas include riparian natural community along the North Fork of Putah Creek and California prairie on the city's outskirts.

Planning Unit 21—West Sacramento. The 14,682-acre West Sacramento Planning Unit includes the city's existing developed areas and lands within its jurisdiction that are projected for urban growth under the West Sacramento General Plan. This planning unit is bounded by the Sacramento Bypass on the north, the Yolo Bypass on the west, the Sacramento River on the east and southeast, and the city limits on the south. Existing urban areas comprise about 73 percent of the planning unit. Other major habitats include California prairie, agriculture, riparian woodland, and open water (mostly within the Sacramento River and Sacramento deepwater ship channel and associated Port of Sacramento).

Planning Unit 22—Winters. The 1,978-acre Winters Planning Unit includes the city's existing developed and undeveloped areas within its urban limit line. Urban uses occur on 39 percent of land and agriculture occupies approximately 32 percent of land in this unit. Natural areas include riparian habitat along Putah Creek and California prairie habitats near the city's northern boundary.

3.2.3 Multi-Benefit Approach

The RCIS/LCP encourages the application of a multi-benefit approach. This includes implementation of multi-benefit projects, defined herein (as set forth in Section 3.1, above) as projects that are designed to achieve a primary public objective (e.g. reducing flood risk) while also creating additional public benefits such as enhancing fish and wildlife habitat, sustaining agricultural production, improving water supply and water quality, increasing groundwater recharge, and providing public recreation and educational opportunities, or any combination thereof.

In Yolo County, the protection of agriculturally productive lands is a widely adopted public goal. The CVFPP Conservation Strategy (DWR 2016) (at p. 6-22) identifies strategies for implementing multi-benefit projects on working agricultural lands to achieve solutions that:

- Keep farmers on the land,
- Maintain agricultural and economic viability in the project area,
- Provide environmental and habitat benefits,
- Are consistent with State, regional, and County policies, and
- Support the stability of local governments and special districts.

These objectives also mirror policies in the 2030 Countywide General Plan for Yolo County. For example, the General Plan includes principles that emphasize protecting "farmland and farming practices through conservation easements, land use controls and regional collaboration," while also promoting "[a] diverse landscape that connects habitat and enhances ecological integrity." (General Plan, Vision & Principles at pp. VI-4 and VI-5.) Numerous General Plan policies also promote a balanced approach to integrating habitat conservation, restoration, and enhancement projects into the predominantly agricultural landscape. For example:

From the Agriculture & Economic Development Element

Policy AG-2.8 Facilitate partnerships between agricultural operations and habitat conservation efforts to create mutually beneficial outcomes.

Policy AG-2.9 Support the use of effective mechanisms to protect farmers potentially impacted by adjoining habitat enhancement programs, such as safe harbor programs and providing buffers within the habitat area.

Policy AG-2.10 Encourage habitat protection and management that does not preclude or unreasonably restrict on-site agricultural production.

Policy AG-2.13 Promote wildlife-friendly farm practices, such as tailwater ponds, native species/grasslands restoration in field margins, hedgerows, ditch management for riparian habitat, restoration of riparian areas in a manner consistent with ongoing water delivery systems, reduction of pesticides, incorporating winter stubble and summer fallow, etc. (*see also Policy CO-2.17*)

From the Conservation and Open Space Element

Policy CO-1.28 Balance the needs of agriculture with recreation, flood management, and habitat within the Yolo Bypass.

Policy CO-2.17 Emphasize and encourage the use of wildlife-friendly farming practices within the County's Agricultural Districts and with private landowners, including:

- Establishing native shrub hedgerows and/or tree rows along field borders.
- Protecting remnant valley oak trees.
- Planting tree rows along roadsides, field borders, and rural driveways.
- Creating and/or maintaining berms.
- Winter flooding of fields.
- Restoring field margins (filter strips), ponds, and woodlands in non-farmed areas.
- Using native species and grassland restoration in marginal areas.
- Managing and maintaining irrigation and drainage canals to provide habitat, support native species, and serve as wildlife movement corridors.
- Managing winter stubble to provide foraging habitat.
- Discouraging the conversion of open ditches to underground pipes, which could adversely affect giant garter snakes and other wildlife that rely on open waters.
- Widening watercourses, including the use of setback levees.

Policy CO-2.5 Protect, restore and enhance habitat for sensitive fish species, so long as it does not result in the large-scale conversion of existing agricultural resources.

Policy CO-2.20 Encourage the use of wildlife-friendly Best Management Practices to minimize unintentional killing of wildlife, such as restricting mowing during nesting season for ground-nesting birds or draining of flooded fields before fledging of wetland species.

Policy CO-2.24 Promote floodplain management techniques that increase the area of naturally inundated floodplains and the frequency of inundated floodplain habitat, restore some natural flooding processes, river meanders, and widen riparian vegetation, where feasible.

Together, the CVFPP Conservation Strategy (DWR 2016) and Yolo County General Plan furnish an appropriate framework for evaluating projects proposed to implement this RCIS/LCP on farmed lands. Some of the conservation opportunities identified in this chapter—in particular, those set forth in Table 3-3, Goals CL1 through CL3 —directly account for the habitat value of cultivated land and promote activities that complement continued farming. In other cases, the conservation opportunities identified in this chapter may include restoration or other activities on farmed lands that could conflict with farming or other existing land uses. These potential conflicts should be given thorough attention during project siting, design, and implementation, and reduced or avoided whenever feasible. Projects proposed to implement this RCIS/LCP should demonstrate careful consideration of potential effects on agriculture and other existing land uses, together with opportunities to provide multiple public benefits, and other aspects of the land use and regulatory setting relevant to this plan.

3.2.4 Structure of the Conservation Strategy

3.2.4.1 Conservation Goals and Objectives

The *conservation goals* of this RCIS/LCP reflect the commitment to achieve broad, desired outcomes for the focal species and other conservation elements in Yolo County. These conservation goals address the unique pressures on focal and conservation species and important conservation elements identified in Chapter 2 and the species accounts (Appendix C). *Conservation objectives* are intended to be concise, measurable statements of the target outcome for each focal species and other conservation elements, to achieve the conservation goals. The conservation objectives focus on conserving landscape elements, protecting or restoring natural communities and focal/conservation species' habitats, managing and enhancing landscape connectivity in the RCIS/LCP strategy area, and managing and enhancing land in Yolo County by a conservation easement or other instrument providing for perpetual protection of land. MCAs may include conservation actions such as management and enhancement on lands that are already protected, as well as lands that the MCA commits to protect. All conservation goals and objectives are intended to be achieved through the implementation of the conservation actions as described in Section 3.2.4.2, *Conservation Actions and Priority Areas*.[13]

The conservation goals and objectives are organized hierarchically on the basis of the following ecological levels of organization:

- **Landscape.** The landscape-level conservation goals and objectives form the overarching framework for the conservation strategy and focus on the extent, distribution, and connectivity among natural communities and improvements to the overall condition of hydrological,

[13] The RCIS Program Guidelines (June 2017 version) recommend that conservation objectives be achievable within the 10-year lifespan of the initial approval of the RCIS. The conservation objectives in this RCIS/LCP, however, do not have a deadline because of the uncertainty in the pace of implementation and the desire to align with the longer timeframe of the overlapping HCP/NCCP (50 years). Instead, RCIS/LCP conservation priorities are designed to be implemented within an approximately 10-year timeframe.

physical, chemical, and biological processes (including connectivity and climate change adaptation) in Yolo County;

- **Natural community.** The natural community conservation goals and objectives focus on maintaining or enhancing ecological functions and values of specific natural communities. Achieving natural community goals and objectives will also provide for the conservation of habitat of associated focal and conservation species and other native species; and
- **Species.** The species-specific conservation goals and objectives address stressors and habitat needs of individual focal species (or, in some cases, groups of species with similar needs) that are not addressed under the landscape and natural community goals and objectives. The conservation strategies for conservation species rely primarily on the landscape-level and natural community-level goals and objectives, and prioritization of conserving lands that support these species.

In addition, the Yolo RCIS/LCP provides rationale for the conservation objectives. For each focal species (Group 1), the Yolo RCIS/LCP lists the landscape-level and natural community-level goals and objectives that would benefit the species, followed by the objectives developed for that species or group of species, and their associated rationale. For the most part, the plan addresses the conservation species (Groups 2 and 3 – LCP only) through goals and objectives at the landscape and natural community levels. Species-specific goals and objectives were developed only when additional factors, such as specific habitat requirements or population factors, needed to be addressed to provide for the conservation of the species in Yolo County.

Most of the conservation goals and objectives are designed to maintain current populations of focal species and retain the other conservation elements. The conservation goals and objectives also provide for the long-term persistence of focal and conservation species and other conservation elements through habitat protection and enhancement. In some cases, populations of focal/conservation species are expected to increase as a result of land preservation, management, habitat enhancement, and habitat restoration. Where there is overlap between the RCIS/LCP and the Yolo HCP/NCCP, the conservation objective includes the required habitat protection, restoration, or enhancement of the HCP/NCCP for context. The conservation provided by the HCP/NCCP is assumed to occur because it is an obligation of the state and federal endangered species permits.

All conservation goals and objectives are given unique codes so that they can be easily identified and tracked by those implementing conservation actions.

3.2.4.2 Conservation Actions and Priority Areas

The *conservation actions* of this RCIS/LCP are intended to be implemented to accomplish the conservation goals and objectives. *Conservation actions* are defined by the RCIS Program Guidelines as actions that permanently protect or restore, and perpetually manage, conservation elements. In contrast, *habitat enhancement actions* are defined as actions that would have long-term durability but would not involve acquiring land or permanently protecting habitat (CDFW 2018). A conservation action is developed to achieve one or more conservation objectives. A conservation action may be implemented through a variety of conservation investments or MCAs. A conservation action that is implemented through an MCA would create conservation credits to be used as compensatory mitigation.

For each conservation objective or set of objectives, the RCIS/LCP lists a number of voluntary conservation actions or habitat enhancement actions that may be implemented to achieve the objective(s). These include actions that directly address the threats and stressors to the focal/conservation species. For example, if habitat loss is a threat, then protection and restoration of habitat would be the action to address that threat. If invasive vegetation is the threat, then managing invasive plants would be the action to address the threat.

CDFW defines a *conservation priority* as a conservation or habitat enhancement action that is identified based on its importance for benefiting and contributing to the conservation of focal species and their habitats, or other conservation elements within an RCIS area (CDFW 2018). The Yolo RCIS/LCP uses *priority areas* for RCIS (Group 1) focal species (Section 3.3.2, *Focal Species*) as a type of conservation priority, to highlight important locations where conservation actions should occur in the next 10 years (Table 3-3). Section 3.4, *Conservation Strategy,* lists conservation priority areas for each RCIS focal species. Section 3.4.3.3, *Unique Areas,* describes *unique areas* the Advisory Committee identified as important for conservation due to unique ecological attributes, for the purpose of the LCP.

The conservation actions and conservation priorities are not limited to those identified in this chapter. Additional conservation actions and new conservation priorities will likely become apparent as additional information becomes available about the changing future environment in Yolo County. Those implementing conservation in Yolo County should consider any opportunity to contribute to the conservation goals and objectives of this RCIS/LCP if the expected outcome will benefit the long-term viability of the native species in Yolo County. MCAs cannot be developed for actions not listed in the RCIS, however, unless the RCIS is amended to include the new actions.

3.2.4.3 Ensuring Consistency with Other Conservation Plans

Fish and Game Code Section 1852(c)(10) requires an RCIS to include provisions ensuring that the strategy is consistent with and complements any administrative draft natural community conservation plan, approved natural community conservation plan, or federal habitat conservation plan that overlaps with Yolo County. Fish and Game Code Section 1852(c)(11) requires an RCIS include an explanation of whether and to what extent the strategy is consistent with any previously approved strategy or amended strategy, state or federal recovery plan, or other state or federal approved conservation strategy that overlaps with Yolo County.

This conservation strategy has been developed to complement the Yolo HCP/NCCP, described in Section 2.12.1.1. The RCIS/LCP Steering Committee designed the conservation goals and objectives for focal species that overlap with Yolo HCP/NCCP covered species, to build off of the HCP/NCCP biological goals and objectives. Appendix F describes how the Yolo RCIS/LCP is consistent with the Yolo HCP/NCCP, and provides a crosswalk between the Yolo RCIS/LCP and HCP/NCCP goals and objectives to demonstrate consistency between the two plans. Appendix F also includes a letter from the Conservancy, the HCP/NCCP implementing entity, certifying the RCIS is consistent with and complements the HCP/NCCP. Appendix F also provides a crosswalk between the RCIS/LCP goals and objectives and other local conservation plans described in Section 2.12.3, *Other Regional Conservation Plans and Initiatives.*

The RCIS/LCP Steering Committee also developed the conservation goals and objectives for federally listed species to be consistent with recovery plans developed for those species. Appendix F, *Conservation Strategy Rationale,* provides the rationale for the goals and objectives related to each

focal species, and for federally listed species with recovery plans, the rationale includes descriptions of how the goals and objectives are consistent with the species recovery plans.

This conservation strategy has also been developed to support and contribute to the CVFPP's conservation objectives for landscape functions and processes, natural communities, and focal species addressed in the CVFPP Conservation Strategy (DWR 2016). The CVFPP Conservation Strategy also informs the implementation of this RCIS/LCP in another way—by contributing a multi-benefit approach to project development and implementation that affords careful attention to existing land uses and related policy and legal issues. This element of the CVFPP Conservation Strategy is particularly relevant to this RCIS/LCP because many of the projects that carry out the actions set forth in this section will occur on or near actively cultivated lands. The Yolo County General Plan describes the preservation of agriculture as "fundamental to the identity of Yolo County." (2030 Countywide General Plan, Goal AG-1.) Preserving compatible agricultural uses on conservation lands is thus a priority, and multi-benefit projects (which will often but not always preserve existing agricultural uses) are also more likely to navigate past traditional feasibility constraints such as available funding, statutory authority, policy constraints, cost-effectiveness, and acceptability. Projects that implement this RCIS/LCP should thus seek to align with this element of the CVFPP Conservation Strategy, as discussed further in Section 3.4, below.

3.2.4.4 Other Conservation Elements

The RCIS guidelines state that an RCIS shall include other *conservation elements* (defined in Section 1.4.7) needing conservation within the RCIS/LCP area, and those whose inclusion would help to achieve a comprehensive, cohesive, and connected regional conservation outcome. Section 1.4.7 of the Yolo RCIS/LCP lists the other conservation elements and describes the rationale for including each one in this plan. Section 2.9, *Other Conservation Elements,* provides a summary about existing conditions for each of the conservation elements. These conservation elements are integrated throughout the conservation strategy. Appendix E, Table E-18 summarizes how the conservation strategy addresses each of the conservation elements.

3.3 Results of Conservation Gaps Analysis

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

Section 3.2.1, *Conservation Gaps Analysis,* describes the purpose and methods for the conservation gap analysis. The sections below provide the results of this analysis. This conservation gaps analysis is limited in that it focuses on natural community and habitat protection through conservation easements, and does not take into account ongoing conservation actions, or gaps in conservation, related to natural community and habitat management and enhancement, particularly on public lands that may not be protected under perpetual conservation easements. County and city parks, local federal and state land managers, and agricultural working lands all contribute to conservation of Yolo County native species and their habitat on areas that are not protected under easements. Furthermore, some lands that are protected under conservation easements may have management or enhancement needs and opportunities that are not factored into this conservation gaps analysis. The Yolo RCIS/LCP allows for providing conservation in the form of enhancement and management on public lands or lands that are already protected under conservation easements, to meet the plan's conservation goals and objectives.

3.3.1 Natural Communities

Table 3-1 presents the results of the conservation gap analyses for natural communities in Yolo County. As described in Chapter 2, Yolo County is dominated by agricultural lands on the valley floor and oak woodlands and other natural lands in the foothills. More than 25 percent of many natural land cover types in Yolo County are already protected because local governments, conservation organizations, and the state and federal government have conserved significant amounts of land in the past, as illustrated by the number of acres already protected. These protected areas can be leveraged (i.e., factored into landscape-based conservation plan approaches) when protecting new areas to gain a larger conservation benefit for natural communities and species.

Natural land cover types with the highest percentage of protection (including acres to be protected under Yolo HCP/NCCP) include serpentine (86 percent), closed-cone pine-cypress (95 percent), vernal pool complex (86 percent), and fresh emergent wetland (85%). While these natural communities are mostly protected, they are considered rare and will be conserved to the maximum extent possible. The natural land cover types with the lowest proportion in open space and the largest conservation gaps overall are non-rice cultivated lands (8 percent), California prairie (13 percent), and lacustrine and riverine (16 percent).

Table 3-1. Natural Community Gap Analysis

Natural Community	Existing Acres in Strategy Area (acre)	Total Protected		Total Unprotected	
		Acres	Percent	Acres	Percent
Cultivated Lands – Rice	35,724	5,466	15%	30,258	85%
Cultivated Lands – Non-Rice	214,939	16,624	8%	198,315	92%
California prairie	80,911	10,248	13%	70,663	87%
Serpentine	2,327	2,004	86%	323	14%
Chamise	30,187	15,622	52%	14,565	48%
Mixed Chaparral	14,518	9,918	68%	4,600	32%
Oak and Foothill Pine	43,772	10,100	23%	33,672	77%
Blue Oak Woodland	35,891	8,390	23%	27,501	77%
Closed-Cone Pine-Cypress	212	201	95%	11	5%
Montane Hardwood	3,087	975	32%	2,112	68%
Valley Oak Woodland	181	36	20%	145	80%
Alkali Prairie	312	89	29%	223	71%
Vernal Pool Complex	299	257	86%	42	14%
Fresh Emergent Wetland	26,309	22,290	85%	4,019	15%
Valley Foothill Riparian	12,565	2,592	21%	9,973	79%
Lacustrine and Riverine	13,493	2,214	16%	11,279	84%
Total Natural Communities	**512,646**	**107,027**	**21%**	**405,619**	**79%**

3.3.2 Focal Species

Table 3-2 presents the results of the conservation gap analyses for the 22 RCIS focal species (i.e., Group 1 species) for which habitat models are available. Data are presented by the type of protection through existing mechanism (pre-RCIS/LCP public and easement lands). These results lay the groundwork for prioritizing RCIS/LCP protection of focal species in Yolo County in addition to the habitat to be protected or restored under the Yolo HCP/NCCP.

The RCIS guidelines identify a conservation priority for "Species of Greatest Conservation Need," based on the 2015 SWAP. The SWAP species of greatest conservation need are identified in Appendix C of the SWAP. Appendix Table C-11 identifies species of greatest conservation need in the Northern California Interior Coast Ranges (USDA) Ecoregion. Appendix Table C-18 identifies species of greatest conservation need in the Great Valley (USDA) Ecoregion. As noted in Chapter 2, nearly all of the species of greatest conservation need identified in these tables are included in the RCIS/LCP either as focal/conservation (Group 1) species in the RCIS or as conservation (Group 2 and Group 3) species in the LCP.

Some focal species have a high percentage (i.e., more than 75 percent) of their habitat protected relative to the total acres of land cover that occurs in Yolo County. These include Baker's navarretia (97 percent), Solano grass (100 percent), Colusa grass (100 percent). These species occur in vernal pool complexes. While these species are already highly protected, they are considered rare and will be conserved to the maximum extent possible. Focal species with the lowest proportion (under 20 percent) of their habitat in open space overall and where the conservation gaps are greatest are western spadefoot (14 percent), tricolored blackbird foraging (16 percent), grasshopper sparrow (15 percent), western burrowing owl (12 percent), and bank swallow (17%).

Table 3-2. Gap Analysis for Focal Species (Excluding Fish)

Species	Modeled Habitat (acres)	Protected Areas	% of Modeled Habitat Within Protected Areas	Total Unprotected (acres)
Alkali milk vetch	576	89	15%	487
Heckard's pepper-grass	576	349	61%	227
Brittlescale	583	350	60%	233
San Joaquin spearscale	583	350	60%	233
Baker's navarretia	301	260	86%	41
Palmate-bracted bird's beak	312	89	29%	223
Solano grass	1.2	1.2	100%	0
Colusa grass	1.2	1.2	100%	0
Conservancy fairy shrimp	576	349	61%	227
California Linderiella	576	349	61%	227
Midvalley fairy shrimp	576	349	61%	227
Vernal pool fairy shrimp	576	349	61%	227
Vernal pool tadpole shrimp	576	349	61%	227
Valley elderberry longhorn beetle (Rip)	9,447	1,909	20%	7,538
Valley elderberry longhorn beetle (Nonrip)	3,923	788	20%	3,135
CA tiger salamander - upland	86,505	9,031	10%	77,474
CA tiger salamander - aquatic	1,004	581	58%	423
Western spadefoot - upland	52,379	5,678	11%	46,701
Western spadefoot – aquatic	847	84	10%	763

Species	Modeled Habitat (acres)	Protected Areas	% of Modeled Habitat Within Protected Areas	Total Unprotected (acres)
Northwestern pond turtle - upland	137,185	45,849	33%	91,336
Northwestern pond turtle - aquatic	53,907	11,110	21%	42,797
Giant garter snake - upland	6,162	2,184	35%	3,978
Giant garter snake - aquatic	6,596	1,579	24%	5,017
Giant garter snake – fresh emergent wetland	25,897	22,242	86%	3,655
Giant garter snake - rice	31,168	3,606	12%	27,562
Tricolored blackbird - nesting	4,680	3,366	72%	1,314
Tricolored blackbird - foraging	261,133	25,948	10%	235,185
Black tern	40,243	8,640	21%	31,603
Loggerhead shrike	214,545	52,998	25%	161,547
Western yellow-billed cuckoo	3,868	1,306	34%	2,562
Greater sandhill crane	9,520	194	2%	9,326
California black rail	49	40	82%	9
Northern harrier	321,824	48,847	15%	272,977
Western burrowing owl	103,853	8,955	9%	94,898
Swainson’s hawk - nesting	15,673	9,421	60%	6,252
Swainson’s hawk - foraging	293,415	38,678	13%	254,737
White-tailed kite - nesting	31,732	5,970	19%	25,762
White-tailed kite - foraging	236,498	29336	12%	207,162
Bank swallow	962	111	12%	851

Species	Modeled Habitat (acres)	Protected Areas	% of Modeled Habitat Within Protected Areas	Total Unprotected (acres)
Yellow-breasted chat	2,925	692	24%	2,233
Least Bell's vireo	4,719	1,442	31%	3,277
Townsend's big-eared bat	284,812	44,125	15%	240,687

3.4 Conservation Strategy

The following conservation goals and objectives provide a voluntary roadmap for conservation organizations and project proponents with mitigation needs to inform future land acquisition and land use decisions that assist in implementing the RCIS/LCP in Yolo County. Section 3.4.1, below, provides specific conservation goals and objectives, conservation actions, and conservation priority areas for the RCIS/LCP. Section 3.4.3 provides supplementary conservation guidelines developed by the Advisory Committee for prioritizing conservation lands. These supplemental conservation guidelines can be used by anyone implementing the LCP, RCIS, or both.

3.4.1 Conservation Goals, Objectives, Actions, and Priority Areas

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

Section 3.2.4, *Structure of the Conservation Strategy,* describes the tiered approach for the conservation goals and objectives (landscape, natural community, and species levels) and how the conservation strategy is composed of goals, objectives, conservation actions, and priority areas. Table 3-3, below, provides the goals, objectives, conservation actions, and priority areas for this RCIS/LCP. Appendix E provides the rationale for the conservation objectives and describes how the tiered approach conserves focal species, natural communities, and other conservation elements at multiple levels (i.e., landscape, natural community, and species-specific levels). The conservation goals, objectives, and actions can be achieved through a combination of permanent protection (i.e., including conservation easements) and restoration and enhancement of resources on public and private lands.

Some of the objectives and priorities for focal fish species are projects agencies are obligated to implement as conditions of existing permits or take authorizations. For example, the DWR and the U.S. Bureau of Reclamation are obligated to implement some fish restoration projects in the Yolo Bypass as part of the 2009 National Marine Fisheries Service Biological Opinion. While these restoration projects should be implemented consistent with the RCIS/LCP for the purpose of integrating with the regional strategy, projects required by existing permits cannot be used to create MCA credits unless (a) the MCA is for additional actions conducted above and beyond the mitigation required under the existing permit, or (b) the MCA credits are to be used explicitly and solely to meet the specific existing permit requirements.

The measurable objectives listed in Table 3-3 are not legally enforceable. The numbers of acres are only provided as a means by which to measure the success of the RCIS/LCP. MCAs may exceed the acreage amount provided in the objectives and still receive mitigation credits provided MCA measures are consistent with the RCIS and benefit the focal species being targeted for the specific MCA. Acres protected or restored through the Yolo HCP/NCCP count toward meeting these measurable objectives.

Measurable objectives in this RCIS include metrics for tracking progress towards achieving the RCIS' goals and objectives. In describing objectives, metrics are provided with the intent of measuring, in a

consistent way, the net change, from habitat restoration actions, on the habitat area and habitat quality. When implementing conservation actions and habitat enhancement actions that include habitat restoration, an MCA Sponsor shall select, and submit for CDFW's approval, an appropriate metric(s) from the metrics indicated in this RCIS to measure the net change in habitat area and habitat quality.

If the MCA Sponsor determines that an alternative metric, not listed in this RCIS, is more fitting for an action or objective, the MCA Sponsor may make a written request to the RCIS Proponent and CDFW to consider approving that alternative metric instead of, or in addition to, one or more metrics in this RCIS. CDFW will consider the proposed alternative metric and the RCIS Proponent's recommendation, if any, when determining whether to approve the alternative metric.

Once a metric(s) is designated and approved, it must be used for both the baseline and subsequent measurements of habitat area and habitat quality. If an approved metric turns out to be faulty or problematic, the MCA Sponsor may make a written request to the RCIS Proponent and CDFW to consider approving a different metric instead of, or in addition to, the approved metric(s), as set forth above. The determination to approve will be based, in part, on whether that new metric can be compared with the original baseline data in a reasonable way to compare the change in habitat area or habitat quality, as applicable.

MCA sponsors will report on relevant RCIS metrics for corresponding conservation actions and habitat enhancement actions implemented through an MCA. MCA sponsors may include additional measures and performance standards for assessing habitat quality in an MCA, consistent with the MCA Guidelines and with approval by CDFW.

The following metrics are acceptable in this RCIS for measuring the net change in habitat area and habitat quality resulting from habitat restoration actions:

- Acreage
- Linear feet
- Percent cover (native vs. nonnative species)
- Native species diversity
- Number of individuals
- Number of populations
- Gene pool / genetic diversity
- Evidence of presence and abundance (presence/absence, # of nests, calls, scat, etc.)
- Habitat structure (number of canopy layers; percent cover; snags, etc.)
- Distribution of key resources (e.g., nesting trees, ponds, host plants) (number per acre)
- Inundation duration (consecutive days)
- Water depth (feet)
- Vigor index (health of plant on a scale of 1-4)
- Stream flow (cubic feet per second)

- Water temperature and chemical composition (dissolved oxygen, etc.)
- Stream substrate composition (percent cover; gravel size; etc.)
- Stream characterization (pool, riffle, run; length and width)

Table 3-3. RCIS/LCP Conservation Goals and Objectives and Applicable Conservation Actions

Biological Goals and Objectives	Applicable Conservation Actions
LANDSCAPE-LEVEL GOALS AND OBJECTIVES	
Goal L1: Large Interconnected Landscapes. Maintain interconnected landscapes in Yolo County with the range of physical and biological attributes (e.g., slope, soils, hydrology, climate, and plant associations) that support the distribution and abundance of focal and conservation species and their habitats, provide for the movement and genetic interchange among populations of focal and conservation species, support adaptive adjustments in species distributions in response to climate change, and sustain native biodiversity.	
Objective L1-1: Landscape Connectivity. Establish landscape connections within and between natural communities where connectivity is currently poorly developed or lacking. Maintain connectivity where it currently exists and/or is well developed and avoid fragmentation.	**L1-1.1.** Evaluate key landscape connections in Yolo County (including Essential Connectivity Areas, creek corridors, and other ecologically important connections based on the best available data), and determine whether they are intact or highly constrained connections. **L1-1.2.** Prioritize protection of intact connections and restoration or enhancement of constrained connections. **L1-1.3.** Prioritize actions that increase habitat connectivity between transitional habitats along the Sacramento River, Putah Creek, and Cache Creek. (Also see Objective L1-5, *Ecotone conservation,* below.) **L1-1.4.** Prioritize actions to increase habitat connectivity among transitional habitats along secondary riparian corridors involving perennial and intermittent streams in Yolo County. These streams with secondary riparian corridors include, but may not be limited to, Tule Canal, Enos Creek/Dry Creek, Dry Slough, Salt Creek/Chickahominy Slough, Cottonwood Creek, Willow Slough, Thompson Canyon/Salt Creek, Oat Creek, Bird Creek, and Buckeye Creek. (Also see RCIS/LCP Objective L1.5, *Ecotone conservation,* below.) **L1-1.5.** Maintain and avoid fragmentation (the opposite of connectivity) of existing landscape connections within Yolo County in seeking to include environmental gradients. (Also see RCIS/LCP Objective L1.3, *Environmental gradients,* below.) **L1-1.6.** Provide connectivity among landscape elements within Yolo County and ecologically significant landscape elements outside Yolo County. **L1-1.7.** Incorporate existing protected areas within the system of conserved lands, and to the extent possible, prioritize additions to the system that maintain connectivity within the protected landscape.
Objective L1-2: Areas to support sustainable populations. Maintain sufficient natural community or habitat areas to support sustainable populations of naturally occurring species in Yolo County.	**L1-2.1.** Prioritize land acquisitions adjacent to protected lands. **L1-2.2**. Prioritize maintenance of habitat connectivity among valley floor habitats, upland habitats, and habitats in higher elevations in the western mountains. **L1-2.3.** Protect habitat for area-limited planning species (species with large home ranges or migratory patterns, such as American badger, black-tailed deer) based on the minimum habitat patch sizes and design guidelines provided in Table 3-3. Protect habitat to facilitate seasonal migration for black-tailed deer.

Biological Goals and Objectives	Applicable Conservation Actions
Objective L1.3: Environmental Gradients. Include a variety of environmental gradients (e.g., hydrology, elevation, soils, slope, and aspect) within and across a diversity of protected and restored natural communities within Yolo County. Provide connectivity across gradients.	**L1-3.1.** Prioritize land acquisitions that add to the range of environmental gradients on protected lands in Yolo County.
Objective L1-4: Natural Community Restoration. Increase the extent of natural communities through restoration, in a manner that maximizes the likelihood of their long-term functioning, taking into consideration both historic conditions and potential future conditions with climate change.	**L1-4.1.** Restore species composition and ecological processes in natural communities in areas with the appropriate soils, hydrology, and other physical conditions that support the community. **L1-4.2.** Implement initial restoration actions according to recommendations in a restoration handbook such as Griggs (2009) that is widely accepted among restoration scientists. **L1-4.3.** Consider the historic conditions of a site when developing restoration plans. A site is typically more likely to support a vegetation community that it supported historically, unless key physical components have been irreversibly altered by factors such as climate change or extreme human disturbance. **L1-4.4.** Consider potential future conditions resulting from climate change when developing restoration plans. **L1-4.5.** Adaptively adjust restoration approaches on the basis of additional knowledge gained from monitoring or observing previously implemented restoration actions. Incorporate knowledge gained from restoration science generally to the extent that it addresses conditions in Yolo County. **L1-4.6.** Use locally native plant material. **L1-4.7.** Use native local soils. **L1-4.8.** Do not import fill. **L1-4.9.** Do not compact soil. **L1-4.10.** Protect restored areas against degradation that may result from undesirable practices in or management of adjoining land uses or other disturbances.
Objective L1-5: Ecotone Conservation. Protect, restore and enhance ecotones between natural communities.[14]	**L1-5.1** Protect transitional areas between riparian and oak woodland or savanna laterally along rivers, streams, sloughs, canals, and drainages. **L1-5.2.** Protect ecotones that provide connectivity between natural communities. **L1-5.3.** Protect ecotones that have high biodiversity as a result of the overlap of two natural community types.

[14] An *ecotone* is a region of transition between two biological communities.

Biological Goals and Objectives	Applicable Conservation Actions
	L1-5.4. Remove invasive species from degraded ecotones, where feasible and where desirable to accomplish ecological goals. **L1-5.5.** Protect or restore natural soil structure within ecotones.
Priority Areas: Prioritize protection and management of lands in key connectivity and linkage areas (Figure 2-16).	
Goal L2: Ecological Processes and Conditions. Maintain or restore ecological processes and conditions in Strategy Area landscapes that sustain natural communities, native species, and landscape connectivity.	
Objective L2-1: Hydrologic and Geomorphic Processes Improve dynamic hydrologic and geomorphic processes[15] in watercourses and floodplains in a way that avoids or minimizes impacts on terrestrial species habitat (including the HCP/NCCP) and agricultural land. Allow floods to promote fluvial processes, such that bare mineral soils are available for natural recolonization of vegetation, desirable natural community vegetation is regenerated, and structural diversity is promoted; or implement management actions that mimic those natural disturbances.	**L2-1.1.** Restore riverine geomorphic process on the Sacramento River, Putah Creek, Cache Creek, Tule Canal, and other watercourses in the strategy area. • Create riparian management corridors that can accommodate natural lateral channel migration. • Relocate levees away from watercourses to reduce the physical forces acting on them, and to allow natural lateral channel migration. • Create or improve secondary channels and overflow swales that add riverine and floodplain habitat values (e.g., resting or rearing areas for fish migrating downstream) and provide escape routes for fish during receding flows. • Minimize new bank protection actions, or remove non-critical bank protection features, to allow channels to meander naturally within the floodplain. **L2-1.2.** Increase access to natural floodplains. • Protect entire floodplains around watercourses where possible. • Set levees back to widen floodplains and expand available in-stream, secondary channel, or floodplain habitat. • Modify floodplain topography to provide sustained inundation for 14 days or longer between late November and late April. **L2-1.3.** Modify the floodplain to improve function and support focal species. • Modify floodplains in locations where higher ground impedes flow connectivity or capacity, to increase the hydrologic connectivity and capacity of the active floodplain, improve fish migration, reduce stranding potential, and allow additional riparian vegetation to establish without significantly impeding flows. • Modify floodplains to provide greater topographic and hydrologic diversity. Eliminate depressional features (such as isolated gravel pits or deep borrow pits) that strand fish when water recedes, but recognize that depressional features such as ponds can be important refugia for species such as northwestern pond turtle and giant garter snake. • Create higher ground in floodplains that can serve as refugia from floodwaters for wildlife species, including giant garter snake and California black rail.

[15] Hydrologic and geomorphic processes are further described in the rationale for this objective, in Appendix E, *Conservation Strategy Rationale.*

Biological Goals and Objectives	Applicable Conservation Actions
	L2-1.4. Manage water on agricultural land in the Yolo Bypass to provide floodplain functions • Sustain inundation for 14 days or longer between late November and early March on appropriate lands in the Yolo Bypass to benefit anadromous fish.
Objective L2-2. Fire. Allow or mimic natural fire regimes in areas where fires naturally occur and are a key component of the ecosystem.	**L2-2.1.** Incorporate prescribed fire and managed wildfire into management programs in areas where fires naturally occur, where feasible.
Priority areas: Priority conservation areas for riverine hydrologic and geomorphic processes include Sacramento River, Putah Creek, Cache Creek, Tule Canal. Yolo Bypass is an additional priority conservation area for floodplain management. Priority areas for fire management are the fire adapted shrub and forest dominated communities in the western portion of Yolo County.	
Goal L3: Landscape-level Stressors. Reduce landscape-level stressors that cause widespread effects on native species and ecosystems and on natural processes.	
Objective L3-1. Invasive Species. Control or eradicate invasive species that may cause reduced habitat quality for desired native species, reductions in biological diversity, or degraded ecosystem processes.	**L3-1.1.** Implement applicable elements of the Invasive Plant Management Plan (Appendix E of the CVFPP Conservation Strategy [DWR 2016]) within the CVFPP CPAs. See Appendix G of this Yolo RCIS/LCP for excerpts. **L3-1.2** Prioritize invasive species for control, based on level of threat to native species, biodiversity, or ecosystem processes. **L3-1.4** Find and eliminate seed/propagule sources of invasive plant species in restoration projects in Yolo County. **L3-1.5.** Identify and implement suitable control programs, including appropriate use of herbicides, grazing, flooding, and fire, as well as other proven methods, for invasive plant species (including, but not limited to, barbed goat grass, yellow starthistle, perennial pepperweed, tamarisk, and giant reed). **L3-1.6.** Identify and implement suitable control programs, including the appropriate use of chemical agents, trapping, and controlled hunting, as well as other proven methods, for invasive animals (e.g., feral or free-roaming dogs, cats, rats, wild pig, invasive fish, European starling, and bullfrog).
Objective L3-2. Pollutants and Toxins. Reduce the effects of known pollutants and toxins that threaten native species.	**L3-2.1.** Identify and implement actions to reduce the effects of known pollutants and toxins, such as mercury toxicity in Cache and Putah Creeks. **L3-2.2**. Incorporate best management practices (BMPs) into riverine, riparian, and wetland restoration projects to minimize mercury methylation, consistent with the Cache Creek Total Maximum Daily Load (TMDL) and the Delta TMDL. **L3-2.3.** Support the use of least-toxic approaches to pest management. **L3-2.4.** Discourage the use of herbicides, fungicides, insecticides, rodenticides, and other chemical poisons near ecologically sensitive areas generally and to the extent practicable in flood control areas in accordance with state and federal operation and maintenance laws and requirements.

Biological Goals and Objectives	Applicable Conservation Actions
	L3-2.5. Establish buffer zones around established habitat reserve areas, in cooperation with farmers, at sufficient distance to avoid or limit over-spray or wind drift from agricultural operations adjacent to or near habitat reserve areas**.**
Objective 3-3. Hazardous Human Land Uses. Reduce impacts from hazardous human land uses, such as roads, that negatively affect the sustainability of natural communities and RCIS/LCP focal and conservation species.	**L3-3.1** Prepare and implement guidance for buffers between natural lands and adjacent human activities. **L3-3.2.** Identify key road conflict areas and implement practices such as "funnel fencing" to reduce road mortality (road kill); design culverts and bridges to allow safe animal passage through or under them. **L3-3.3.** Implement BMPs for operations and maintenance programs and for flood-control activities that minimize adverse effects on natural communities, biological diversity and ecosystem processes, and focal and conservation species to the extent such BMPs do not violate state and federal operation and maintenance laws and requirements for flood control projects.
Priority areas: Prioritize areas with the most severe threats to ecosystems and target or conservation species.	
Goal L4: Biodiversity, Ecosystem Function, and Resilience. Maintain and increase biodiversity, ecosystem function, and resilience across landscapes, including agricultural and grazed lands. Maintain landscape elements and processes that are resilient to climate change which will continue to support a full range of biological diversity in Yolo County.	
Objective L4-1: Heterogeneity within Agricultural Lands. Maintain a heterogeneous landscape of agricultural and natural lands throughout the Valley Landscape Unit, including on- and off-the-protected lands, with large and structurally complex patches of native vegetation connected by corridors and habitat stepping stones, situated within a matrix of agricultural lands that, where possible, provides structural characteristics similar to those of native vegetation.	**L4-1.1.** Protect and maintain “stepping-stone” patches (small areas of natural vegetation distributed throughout the landscape) and corridors (elongated strips of vegetation that link patches of native vegetation) of natural lands within the agricultural matrix. Natural habitat patches should be large, with round or square shapes that protect as much “interior” habitat condition as possible. Landscape linkages should be wide, incorporating as much natural habitat as possible. **L4-1.2.** Restore, enhance, and/or protect existing natural (riparian) habitat values associated with interconnected aquatic areas (including major water-supply and drainage infrastructure elements) throughout the landscape matrix, creating a regional conservation lattice. **L4-1.3.** Incorporate and maintain structural complexity, including trees, snags, and other structural elements in the landscape of agricultural and grazed lands to provide cover, shade, and nesting, perching, and roosting opportunities for native wildlife. **L4-1.4.** Create or maintain buffers around sensitive areas. **L4-1.5.** Maintain buffers along waterways and adjacent to natural vegetation, in cooperation with farmers, to diminish any adverse effects of agricultural practices on those habitats and to provide complementary habitat features (e.g., upland refugia and hibernacula for giant garter snake). (From CVFPP Conservation Strategy [DWR 2016]) **L4-1.5.** Retain selected trees and snags and plant trees to provide habitat features for raptors (including Swainson’s hawk) and other wildlife. (From CVFPP Conservation Strategy [DWR 2016])
RCIS/LCP Objective L4-2: Resilience to Climate Change. Promote the continued capability of the landscape, natural	**L4-2.1.** Initially, identify and map species-rich locations in the RCIS/LCP area without respect to current level of rarity or legal status. Amend the RCIS/LCP over time to incorporate new biologically significant locations not already in the RCIS/LCP’s conservation framework.

Biological Goals and Objectives	Applicable Conservation Actions
community, and species habitat elements in Yolo County to provide conservation benefits under conditions resulting from climate change.	**L4-2.2.** Potential elements in a climate-adaptation strategy may include, but are not limited to, the following: • Gaps in managed lands that block landscape connectivity may be closed; seek collaborative management with landowners or acquire lands to bridge/close gaps. • Restore desired habitat conditions to degraded areas in the landscape. • Develop adaptive elements for RCIS/LCP management that address invasive species control or eradication for invasive species that may become more predominant with climate change. **L4-2.3.** Increase landscape resilience by providing multiple protected areas within the landscape framework. **L4-2.4.** Incorporate resilience into RCIS/LCP management by adapting to landscape changes likely to result from climate change, based on best available science. An adaptive strategy to offset landscape changes resulting from climate effects may include, but is not limited to, the following: • Address the effects of increased temperatures, altered precipitation patterns, and drought on natural communities and habitats in Yolo County where possible, based on the best available scientific and technical information. • Address the effects of increased disturbance (e.g., fire, wind) frequency and severity where possible, based on the best available scientific and technical information. • Identify practices to offset the climate-related changes, possibly including introducing selected plant species not currently present (i.e., identify functional roles and select species to fill them should natural habitat be significantly altered), provided there is a high degree of certainty the ecological benefits will outweigh ecological risks. **L4-2.5.** Incorporate resilience to the effects of climate change into the landscape by actively managing the landscape matrix to increase habitat values within it. With additional habitat functions provided by the matrix, the integrity of the designated preserved land elements will be augmented by a matrix that is permeable (i.e., not hostile) to mobile species, and also provides additional habitat values. The following actions (among others) increase the value of the matrix as habitat: • Restore or establish desired ecological conditions in damaged/degraded/burned areas. • Restore fluvial processes, adequate streamflows and wetland hydrology, and riparian functions to aquatic features, while planning for possible future increases in peak flows and flood events. • Incorporate oaks throughout the matrix, as well as establishing multi-hectare oak woodland habitat areas. (see Section 3.4.2.4 for additional considerations for oak woodland areas). **L4-2.6.** Incorporate principles of Climate Smart Conservation (Stein et al. 2014) into the management of Yolo County, including the following: • Assess climate impacts and vulnerabilities, identifying specific components of vulnerability (exposure, sensitivity, and adaptive capacity) to provide a useful framework for linking actions to impacts.

Biological Goals and Objectives	Applicable Conservation Actions
	• Review/revise conservation goals and objectives, which should incorporate new information as needed and available about climate change and changing conditions. • *Identify possible adaptation options* for reducing key climate-related vulnerabilities or taking advantage of newly emerging opportunities, with particular attention given to crafting possible management actions. • *Evaluate and select adaptation actions* to determine which are likely to be most effective from an ecological perspective, and most feasible from social, technical, and financial viewpoints. • *Implement priority adaptation actions*, engaging diverse partners and emphasizing benefits to multiple sectors of society. • *Track action effectiveness and ecological responses,* using monitoring approaches designed to ensure that they are capable of guiding needed adjustments in strategies and actions, in order to inform adaptive management.
RCIS/LCP Objective L4.3: Natural Community and Habitat Resilience with Climate Change. Promote resilience in natural communities and habitat values (i.e., maintenance of habitat values) under conditions resulting from climate change.	**L4.3-1.** Initially, evaluate baseline distributions and densities of focal species in and adjacent to Yolo County, documenting previously unrecorded occurrences of these species. Validate data on special habitat elements, including serpentinitic substrates, wetlands, and other habitat elements associated with focal species in and near Yolo County, and identify and document previously unrecorded occurrences of these elements. **L4.3-2.** Among focal and conservation species in Yolo County, assess species according to genetic importance for conservation purposes, including degree of relatedness among serpentine taxa, degree of differentiation of range-margin taxa from central populations, unique or very different adaptation complexes (e.g., insect-plant associations that differ from those elsewhere), and other genetically related conservation criteria. **L4.3-3.** Develop a planning/management/monitoring strategy for focal and conservation species under climate change, based on best available science, including elements required by federal or state laws and regulations. **L4.3-4.** Monitor population status of focal and conservation species as they respond to climate change. Species with reduced but stable population sizes may not require direct intervention. For species appearing to be substantially affected by climate change, develop and implement action plans to stabilize or recover populations. Plans could include assisted migration to suitable habitat at other locations if, based on the best available information, such action is determined to be ecologically desirable with little or no risk of unintended detrimental effects that would outweigh the benefits.
Priority areas: Prioritize areas that make the greatest contribution to climate change resilience based on the best available science.	

Biological Goals and Objectives	Applicable Conservation Actions
NATURAL COMMUNITY-LEVEL GOALS AND OBJECTIVES	
Cultivated Lands	
Goal CL1: Cultivated land habitat conservation Conservation of cultivated land habitat values for focal and conservation species and natural communities	
Objective CL1.1: Protect Cultivated Lands with Habitat Values Protect at least 2,872 acres of unprotected non-rice cultivated lands that provide habitat value for focal and other native species.	**CL1.1-1.** Identify and describe the agricultural uses that benefit wildlife and estimate the habitat values of individual crops. This may include incorporation of the habitat valuation system for croplands developed by the Habitat Exchange Program for Swainson's hawk and other species. **CL1.1-2.** Increase the quality of existing cropland as habitat for Swainson's hawk foraging by increasing the extent of alfalfa, irrigated pasture, and low-height row crops, particularly as alternatives to orchards and vineyards. (From CVFPP Conservation Strategy [DWR 2016]) **CL1.1-3.** Cultivate grain crops near greater sandhill crane roosting sites and defer tillage of crops to increase foraging opportunities for cranes. (From CVFPP Conservation Strategy [DWR 2016]) **CL1.1-4.** Assess trends in cropping patterns countywide, so that any desired intervention (such as incentives to grow particular crops types, or purchasing conservation easements) can be based on sound information. **CL1.1-5.** Enter into contracts to pay farmers to grow crop types that benefit covered species. **CL1.1-6.** Purchase easements from willing sellers to prevent conversion to crops that do not provide suitable habitat benefits. **CL1.1-7.** Identify solutions to potential conflicts between conservation efforts and ongoing agricultural operations, including mechanisms (e.g., safe harbor agreements, compensation) to mitigate or avoid conflicts or impacts.
Objective CL1.2: Incorporation of habitat features Encourage farming practices that increase habitat values in areas of contact between working agricultural lands and wildlands throughout Yolo County, including habitat features such as hedgerows and patches of natural habitat (e.g., riparian patches) within the agricultural matrix.	**CL1.2-1.** Add hedgerows to farm edges to provide cover and feeding habitat for focal and conservation species. Work with Yolo RCD, NRCS, and UC Cooperative Extension to provide incentives for wildlife-friendly management practices, such as fencing, hedgerows, tailwater ponds, timing of operations, and weed control. **CL1.2-2.** Flood appropriate harvested fields during fall and winter to provide habitat for wading birds (including greater sandhill crane). (From CVFPP Conservation Strategy [DWR 2016]) **CL1.2-3.** Manage grazing of floodways in a manner that sustains habitat for targeted species (e.g., Swainson's hawk). (From CVFPP Conservation Strategy [DWR 2016]) **CL1.2-4.** Flood appropriate harvested fields during winter and spring to provide rearing habitat for juvenile salmonids. **CL1.2-5.** Restore, enhance, and/or protect habitat values associated with interconnected aquatic areas in the agricultural landscape, including major canals and other water-supply infrastructure elements, throughout the landscape matrix, creating a regional conservation lattice supporting local habitat while also providing corridors for wildlife movement.

Biological Goals and Objectives	Applicable Conservation Actions
	CL1.2-6. Develop and maintain dynamic channel zones for watercourses that allow streamflow access to floodplains and movement of eroded materials through the floodplain area. **CL1.2-7.** Maintain buffers and hedgerows along waterways and adjacent to natural vegetation to diminish the adverse effects of agricultural practices on those habitats and to provide complementary habitat features (e.g., upland refugia and hibernacula for giant garter snake) (From CVFPP Conservation Strategy [DWR 2016]) **CL1.2-8.** Retain selected trees and snags and planting trees to provide habitat features for raptors (including Swainson's hawk). (From CVFPP Conservation Strategy [DWR 2016]) **CL1.2-9.** Maintain water in canals and ditches during the active periods of sensitive species (e.g., giant garter snake). (From CVFPP Conservation Strategy [DWR 2016]) **CL1.2-10.** Manage canal and ditch vegetation to facilitate dispersal and other movements of giant garter snakes. (From CVFPP Conservation Strategy [DWR 2016]) **CL1.2-11.** Acquire easements to widen riparian corridors on and adjacent to agricultural properties. **CL1.2-12.** Enhance riparian areas on agricultural properties.
Objective CL1.3: Cultivated land pollinators Maintain pollinators within the agricultural landscape.	**CL1.3-.**1 Protect existing natural habitat (e.g., prairies, oak woodlands, chaparral, and riparian areas associated with major streams) that occurs in the vicinity of agricultural areas near wildlands. Avoid pesticide drift from agricultural areas into wildland pollinator habitats. **CL1.3-2.** Identify and protect existing pollinator habitat within agricultural landscapes: • Areas of natural or seminatural habitat such as riparian areas, wetlands, species-rich grasslands, and vegetated road verges • Areas supporting flowers, such as buffer areas, forest edges, hedgerows, roadsides, ditchsides, and fallowed fields. • Potential bee nesting sites such as areas of untilled bare soil, snags, and pithy-stemmed shrubs. **CL1.3-3.** Create or restore habitat: • Such habitat can take the form of hedgerows, pollinator meadows ("bee pastures"), orchard understory plantings, riparian and rangeland revegetation, and flowering cover crops. • Have at least three plant species blooming each season (spring, summer, and fall). • Use native plants wherever possible. • Nonnative plants may be suitable on disturbed sites and for specialty uses such as cover cropping. • Include bee nest sites in habitat patches. • Restored patches should be 0.5 acre or more in size (Natural Resource Conservation Service 2018). • If crop pollination is the focus, habitat patches should be no more than 600 meters from the crop (or from each other); shorter distances—250 to 300 meters—would be optimal. • Create linear habitats along roads and tracks, ditches, and field margins to increase connectivity across the landscape.

Biological Goals and Objectives	Applicable Conservation Actions
	CL1.3-4. Minimize pesticide use, especially adjacent to natural areas or known pollinator habitat: • Pesticides should not be applied when bees are actively foraging on flowers. • Integrated Pest Management principles should be followed when planning pest management. • If possible, apply pesticides in fall or winter, or at night. • Select the formulation and application method that will minimize overspray or drift into pollinator habitat. • Reduce spraying near field margins. **CL1.3-5.** Carefully plan grazing, mowing, or the use of fire in any pollinator habitat. **CL1.3-6.** Fit imported bumblebee colonies with queen excluders and use only in glasshouses. **CL1.3-7.** Do not use commercially reared bumblebees for open-field pollination.
Priority areas: Prioritize areas that provide the greatest value for focal and other native species.	
California Prairie	
Goal CP1: Large contiguous areas of California prairie to support native species Maintain or increase the extent of large contiguous areas of California prairie to sustain and enhance the distribution and abundance of associated focal and other native species in Yolo County.	
Objective CP1.1: California prairie protection Protect at least 886 acres of California prairie, prioritizing protection of California prairie where large, contiguous patches are present and where native species are abundant in the Hill and Ridge Landscape Unit and Planning Unit 5.	**CP1.1-1.** Identify priority areas for protection based on patch size and abundance of native species. **CP1.1-2.** Focus protection in priority areas.
Objective CP1.2: Increase and enhance California prairie. Increase the extent (through restoration) and enhance native prairie	**CP1.2-1.** Create California prairie habitat by planting and establishing large areas of native grasses and forbs, or planting native species as components of projects that have temporary ground disturbance or that create features on the landscape (e.g. levees) that require vegetation. **CP1.2-2.** Vegetate flood management features (i.e., levees, seepage berms, O&M areas) with native grasses and forbs. **CP1.2-3.** Adjust grazing regimes to enhance native species. **CP1.2-4.** Avoid disturbing the soil profile. **CP1.2-5.** Enhance habitat for native herbivores like ground squirrels and ungulates.
Objective CP1.3: Burrowing rodents Maintain and enhance the functions of protected California prairie as habitat for	**CP1.3-1.** Identify priority areas with an abundance of burrows. **CP1.3-2.** Identify and implement management practices that promote or maintain burrowing rodents on lands (including ground squirrels) protected for conservation purposes pursuant to a conservation

Biological Goals and Objectives	Applicable Conservation Actions
focal, conservation, and other native species by maintaining areas with burrowing rodents such as ground squirrels and gophers.	easement or similar other instrument providing for perpetual protection of land, except as otherwise prohibited by state and federal laws and regulations related to flood control infrastructure protection.
Objective CP1.4: Grazing regimes. Maintain and enhance the functions of protected California prairie in the reserve system as habitat for focal, conservation, and other native species by implementing appropriate grazing regimes.	**CP1.4-1.** Integrate grazing management into management plans for protected lands. **CP1.4-2.** Apply monitoring and adaptive management to grazing regimes, adjusting grazing as needed to minimize invasive species, maximize native biodiversity, and provide the necessary habitat for focal and conservation species.
Objective CP1.5: California prairie pollinators Maintain pollinators within the California prairie landscape.	**CP1.5-1.** Identify and protect existing pollinator habitat: • Areas of natural California prairie or seminatural grassland that support a diverse native flora. • Potential bee nesting sites such as areas of bare soil, snags, and pithy-stemmed shrubs. **CP1.5-2.** Restore and enhance California prairie to provide native pollinator habitat. • Control and remove invasive weeds. • Use native forbs to enhance diversity of California prairie. **CP1.5-3.** Use grazing, mowing, or fire carefully to avoid harming pollinators. • Treat only part of the area in one year. • Leave areas untreated as refugia for pollinators. • Time grazing to avoid periods of major bloom. • Do not mow while flowers are in bloom, except as required pursuant to flood infrastructure maintenance laws and requirements. . • Use burning to suppress shrubs and trees, where safe and ecologically appropriate, except as required pursuant to flood maintenance laws and requirements. • Allow habitat to recover fully between burns. **CP1.5-4.** Reduce spraying and protect California prairie from drift from adjacent fields.
Priority areas: Prioritize conservation of large, interconnected areas supporting multiple focal and other native species, such as in the Dunnigan Hills area, and sites that support connectivity between smaller habitat patches (including restoration or connectivity).	
Chaparral	
Goal CH1: Chaparral conservation. Maintain conserved chaparral that supports viable populations of native wildlife and plant species, supports connectivity in the landscape, and assists in maintaining diverse pollinator species.	
Objective CH1.1: Protect chamise chaparral for connectivity.	**CH1.1-1.** Protect stands of chamise chaparral that aid in maintaining landscape connectivity within Yolo County.

Biological Goals and Objectives	Applicable Conservation Actions
Protect chamise chaparral as needed to achieve landscape connectivity.	
Objective CH1.2: Protect mixed chaparral. Protect at least five acres of mixed chaparral, where it supports focal or conservation species or contributes to key connectivity.	**CH1.2-1.** Protect stands of mixed chaparral that aid in maintaining landscape connectivity within Yolo County. **CH1.2-2.** Prioritize protection of mixed chaparral that supports focal species.
Objective CH1.3: Manage chaparral Manage chaparral to promote native plant and wildlife diversity.	**CH1.3-1.** Encourage research by collaborating agencies (e.g., Bureau of Land Management, U.S. Forest Service, the University of California and other academic institutions, and nonprofit conservation organizations) investigating ecological relationships in chaparral in the region, including the roles of fire and other disturbances and the effects of climate change on chaparral in the region. Amend the LCP to reflect the results of this research. **CH1.3-2.** Allow natural post-fire regeneration. **CH1.3-3.** Avoid post-fire seeding with nonnatives. **CH1.3-4.** Minimize soil disturbance, including during firefighting.
Objective CH1.4: Chaparral pollinators Maintain pollinator (especially native bee) populations within chaparral.	**CH1.4-1.** Identify and protect existing pollinator habitat. • Areas of natural or seminatural chaparral that support a diverse native flora. • Potential bee nesting sites such as areas of bare soil, snags, and pithy-stemmed shrubs. **CH1.4-2.** Enhance degraded chaparral. • Control and remove invasive plant species. • Use native shrubs and forbs to enhance diversity of chaparral. **CH1.4-3.** Use grazing, mowing, or fire carefully to avoid harming pollinators. • Treat only part of the area in one year. • Leave areas untreated as refugia for pollinators. • Time grazing and other management actions to avoid periods of major bloom. • Do not mow while flowers are in bloom except as required pursuant to flood infrastructure maintenance laws and requirements. . • Use burning to suppress shrubs and trees, where safe and ecologically appropriate. • Allow habitat to recover fully between burns, except as required pursuant to flood infrastructure maintenance laws and requirements. **CH1.4-4.** Reduce spraying on chaparral and protect chaparral from drift from adjacent fields.
Priority areas: Prioritize chaparral that increases landscape connectivity or supports multiple focal or other native species.	
Woodlands and Forests	

Biological Goals and Objectives	Applicable Conservation Actions
Goal WF1. Valley oak protection and restoration Protect and restore Valley oak woodland, forest, savanna, and individual trees in Yolo County, with an emphasis on restoration over protection.	
RCIS/LCP Objective WF1.1: Increase valley oaks Increase the extent of valley oaks in Yolo County through restoration and enhancement.	**WF1.1-1.** Find patches and stringers (narrow rows of trees) and add to them. Increase size of existing stands. **WF1.1-2.** Limit plantings to local source valley oaks/material (valley oaks in Yolo County are genetically significant, an island of unique genetic make-up). **WF1.1-3.** Prioritize riparian areas for valley oak restoration and enhancement (see Goal WF3 regarding oak woodland in riparian areas). **WF1.1-4.** Plant on sites with suitable soils and hydrology (this is particularly important for valley oaks but is a factor for all restoration). See conservation actions under Objective L1.4 for additional actions related to restoration of natural communities.
Objective WF1.2: Protect valley oaks Protect at least 22 acres of existing stands, individual trees, patches, and stringers of valley oaks.	**WF1.2-1.** Consider the prioritization criteria in Section VI of the Yolo County Oak Woodland Conservation and Enhancement Plan (January 2007), with respect to the following resource values, when prioritizing areas for valley oak protection. • Stand composition, integrity, and functionality • Habitat for plant and wildlife species • Landscape function **WF1.2-2.** Provide landowner incentives for protecting valley oaks on agricultural lands and other private lands. **WF1.2-3.** Reduce or eliminate impacts of cattle grazing and other land uses on protected, enhanced, and restored areas.
Priority areas: Prioritize based on evaluation of stand composition, integrity and functionality; habitat for plant and wildlife species; and landscape functions.	
Goal WF2. Upland oak protection and restoration/enhancement Implement protection and restoration or enhancement of upland oaks in the Hill and Ridge Landscape Unit, with an emphasis on protection over restoration.	
Objective WF2.1: Protect upland oaks Protect upland oaks in the Hill and Ridge Landscape Unit, including contiguous forests, woodland and savannas, and patches and stringers of upland oak woodland, prioritizing protection of oak woodland surrounded by natural lands rather than developed lands, and those on lands contributing to connectivity.	**WF2.1-1.** Consider the prioritization criteria in Section VI of the Yolo County Oak Woodland Conservation and Enhancement Plan (January 2007), with respect to the following resource values, when prioritizing protection of upland oaks in the Hill and Ridge Landscape Unit. • Stand composition, integrity, and functionality • Habitat for plant and wildlife species • Landscape function. **WF2.1-2.** Reduce or eliminate impacts of cattle grazing and other land uses on protected, enhanced, and restored areas.

Biological Goals and Objectives	Applicable Conservation Actions
Objective WF2.2: Increase Upland Oaks. Increase the extent of upland oak woodland, forest, or savanna through restoration, to increase connectivity and stand size (reduce fragmentation).	**WF2.2-1.** Restore areas to include high native plant biodiversity, primarily in the understory. **WF2.2-2.** Restore/protect natural soil structure at restoration sites. Changing soil profiles can render areas less suitable for native plants. See conservation actions under RCIS/LCP Objective L1.4 for additional actions related to restoration of natural communities.
Priority areas: Prioritize based on evaluation of stand composition, integrity and functionality; habitat for plant and wildlife species; and landscape functions. Prioritize upland oak woodland with potential to function as part of a linkage that allows species or communities to adapt to climate change needs.	
Goal WF3. Riparian Oak Protection and Restoration. Protect, restore, or enhance oak woodland and forest in riparian areas, with a focus on the Hill and Ridge Landscape Unit	
Objective WF3.1: Protect Riparian Oaks and Oak Woodlands Protect oak woodland and forest in riparian areas in the Hill and Ridge Landscape Unit.	**WR3.1-1.** Consider the prioritization criteria in Section VI of the Yolo County Oak Woodland Conservation and Enhancement Plan (January 2007), with respect to the following resource values, when prioritizing protection of upland oaks in the Hill and Ridge Landscape Unit. • Stand composition, integrity, and functionality • Habitat for plant and wildlife species • Landscape function **WR3.1-2.** Work with willing landowners to reduce or eliminate impacts of livestock grazing and other land uses on protected, enhanced, and restored areas. It may be particularly important to fence riparian areas, for example to prevent erosion and water quality degradation because of the tendency for cattle to concentrate in riparian areas.
Objective WF3.2: Increase and Enhance Riparian Oaks and Oak Woodlands. Increase the extent of, through restoration, and enhance oak woodland and forest in riparian areas in the Hill and Ridge Landscape Unit.	**WF3.2-1.** Plant in areas with suitable hydrology (or restore/enhance hydrology if not present). **WF3.2-2.** Focus on riparian oak woodland and forest in the Hill and Ridge Landscape Unit. **WF3.2-3.** Increase the widths and habitat quality in existing stringers (narrow strips of trees) to enhance landscape linkage functions (i.e., widen corridors). **WF3.2-4.** Use locally sourced material. **WF3.2-5.** Restore/enhance native biodiversity and remove invasive exotics. **WF3.2-6.** Prioritize valley oaks for riparian restoration and enhancement where ecologically appropriate.
Priority areas: Prioritize areas that serve as elements in connectivity and for climate adaptation purposes.	
Goal WF4. Oak woodland management Manage oak woodland and forest natural communities outside of riparian areas to enhance habitat quality supporting native biodiversity, and to provide enhanced ecosystem functions and services.	

Biological Goals and Objectives	Applicable Conservation Actions
Objective WF4.1. Manage and Enhance Oak Woodlands Manage and enhance oak woodlands to maintain or increase native biodiversity.	**WF4.1-1.** Increase locally native plant biodiversity through plantings, primarily in the understory (taking into account potential species range shifts with climate change, where necessary, when developing plant palettes). **WF4.1-2.** Protect oak woodlands from disturbances that inhibit oak regeneration, such as overgrazing. **WF4.1-3.** Protect the natural soil profile. **WF4.1-4.** Maintain or enhance native biodiversity by controlling/removing invasive exotics.
Objective WF4.2. Oak woodland pollinators Maintain pollinator (especially native bee) populations within oak woodlands and forests.	**WF4.2-1.** Reduce or prevent fragmentation of woodland and forest areas. **WF4.2-2.** Adjust grazing to reduce the impact on flowering plants. • The best time to graze varies by site, but grazing should be limited to periods of low pollinator activity. • Establish exclosures and rotate grazing to allow the vegetation community to recover. **WF4.2-3.** Control invasive species. **WF4.2-4.** Use prescribed fire, where safe and ecologically appropriate except as otherwise required by state or federal law, as a natural disturbance to manage the habitat. • Burn only small areas at one time. • Do not burn the same area more frequently than every 5 years, to the extent practicable. • During burns, skip areas to leave as refugia from which pollinators can recolonize. **WF4.2-5.** If pesticides are required for pest management: • Do not apply to significant patches of foraging flowers. • Do not apply while pollinators are active. • Choose least-toxic options, such as pheromone traps. **WF4.2-6.** Restore habitat with locally native species only (taking into account potential range shifts from climate change when developing plant palettes).
Objective WF4.3: Burrowing rodents. Maintain and enhance the functions of protected oak woodlands as habitat for focal and other native species by maintaining areas with burrowing rodents such as ground squirrels and gophers.	**WF4.3-1.** Identify priority areas with an abundance of burrows. **WF4.3-2.** Focus protection in priority areas. **WF4.3-3.** Identify and implement management practices that promote or maintain burrowing rodents on lands protected by a conservation easement or other instrument providing for perpetual protection of land, such as grazing regimes that promote conditions suitable for burrowing rodents, except where such practices would conflict with state and federal laws and regulations related to protecting flood infrastructure.
Objective WF4-4: Grazing Regimes. Maintain and enhance the functions of protected oak woodland as habitat for focal and other native species by	**WF4.4-1.** Integrate grazing management into management plans for protected lands. **WF4.4-2.** Apply monitoring and adaptive management to grazing regimes, adjusting grazing as needed to minimize invasive species, maximize native biodiversity, and provide the necessary habitat for focal species.

Biological Goals and Objectives	Applicable Conservation Actions
implementing appropriate grazing regimes.	
Priority areas: Prioritize protected areas as prioritized under the woodland protection goals.	
Goal FW1: Fresh Emergent Wetland Conservation. Conserve, restore, and enhance fresh emergent wetlands in Yolo County.	
Objective FW1.1: Protect fresh emergent wetlands. Protect at least 100 acres of fresh emergent wetlands, prioritizing protection of fresh emergent wetlands that support focal or conservation species.	**FW1.1-1.** Identify fresh emergent wetlands supporting focal species. **FW1.1-2.** Prioritize protection in identified areas.
Objective FW1.2: Increase fresh emergent wetland areas. Increase the acres of fresh emergent wetlands in Yolo County for focal species.	**FW1.2-1.** Restore fresh emergent wetlands in areas that are likely to support RCIS/LCP focal species, with restoration design features that contribute to habitat value for focal species. **FW1.2-2.** See conservation actions under Objective L1.4, Natural community restoration, for additional actions related to restoration of natural communities.
Objective FW1.3: Maintain or enhance fresh emergent wetland habitat areas. Maintain or enhance the habitat quality of fresh emergent wetland areas	**FW1.3-1.** Maintain fresh emergent wetlands habitats that support focal species. **FW1.3-2.** Control or eliminate invasive wetland plant species that would otherwise create large monotypic stands lacking in structural diversity.
Priority areas: Prioritize lands with the greatest value for focal and other native species.	
Riparian	
Goal R1: Riparian Conservation Establish, maintain, and protect functional riparian habitat well distributed throughout the Yolo County, including protection of existing, and restoration and enhancement of diminished, riparian habitat values.	
Objective R1.1: Protect riparian areas Protect at least 320 acres of existing riparian areas within Yolo County, prioritizing drainages that provide key landscape linkages associated with watercourses.	**R1.1-1.** Protect existing riparian areas through conservation easements, prioritizing the drainages shown on Figure 2-16, *Habitat Connectivity and Linkages*. **R1.1-2.** Restore, enhance, and protect riparian habitat associated with interconnected aquatic areas in the agricultural landscape, including irrigation canals and other water-supply infrastructure and drainage elements, throughout the landscape matrix, creating a regional conservation lattice supporting local habitat while also providing corridors for wildlife movement. **R1.1-3.** Provide financial incentives to private landowners to maintain existing riparian areas on private lands, or to allow riparian habitat to naturally establish and be retained on sites with suitable soils and hydrology, particularly sites associated with the drainages shown on Figure 2-16, *Habitat Connectivity and Linkages*.

Biological Goals and Objectives	Applicable Conservation Actions
Objective R1.2: Increase Riparian Habitat Areas Increase riparian habitat area and distribution in Yolo County through restoration, prioritizing drainages that provide key linkages, particularly where restoration closes gaps in vegetation along the length of drainages, widens riparian zones or provides wide riparian nodes adjacent to drainages, or provides lateral linkage between drainages and adjacent natural communities.	**R1.2-1.** Restore riparian areas to provide continuous lengths of vegetation along drainages. Riparian areas should be as wide as soil, hydrologic, and other constraints will allow. . **R1.2-2.** If it is infeasible to provide wide areas of riparian habitat along the entire channel, restore areas to provide wide nodes of riparian habitat along the channel. **R1.2-3.** See conservation actions under Objective L1.4 for additional actions related to restoration of natural communities.
Objective R1.3: Maintain or Enhance Riparian Habitat Areas Maintain or enhance the functional habitat value of existing riparian habitat areas by maintaining or increasing the complexity of the riparian vegetation.	**Objective R1.3-1.** Introduce tall, broad-canopied tree species like valley oak and shorter species such as elderberry and California rose, which increase the structural complexity of the riparian habitat and the complexity of food webs in the habitat. **Objective R1.3-2.** Manage existing riparian habitats to maintain key food resources for breeding and wintering birds. Incorporate plant species that provide food resources for summer and winter migratory species into riparian enhancement and restoration plans. **Objective R1.3-3.** Control or eliminate invasive riparian plant species such as arundo that would otherwise create large monotypic stands lacking in structural diversity. **Objective R1.3-4.** Create conditions that provide fluvial processes that periodically disturb riparian areas, thereby promoting various successional stages and increased structural diversity. An example of an action that would provide fluvial processes would be to set back levees to widen the floodplain.
Priority areas: Prioritize lands with the greatest value for focal and other native species.	
Lacustrine	
Goal LR1: Stream conservation. Conserve and enhance at least .25 mile of stream systems in Yolo County.	
Objective LR1.1. Fluvial equilibrium. Maintain and/or restore fluvial equilibrium[16] between erosion and deposition in Strategy Area streams.	**LR1.1-1.** Avoid stream channelization. **LR1.1-2.** Avoid unnecessary vegetation removal. **LR1.1-3**. Minimize erosion in uplands that contributes to excessive sedimentation in Strategy Area streams. Maintain vegetative cover, using native species, to stabilize slopes and reduce effects of precipitation in generating erosion. **LR1.1-4.** Maintain vegetation cover in uplands as an approach to increase infiltration of precipitation and reduce excessive runoff into Strategy Area streams.

[16] Fluvial equilibrium is described further for this objective in Appendix F, *Conservation Strategy Rationale.*

Biological Goals and Objectives	Applicable Conservation Actions
	LR1.1-5. Maintain and/or restore riparian and floodplain vegetation to stabilize and maintain equilibrium between sediment and streamflow in Strategy Area stream channels. **LR1.1-6.** Maintain a sediment supply in channels below dams and other channel obstruction that can contribute sediments to downstream reaches in order to maintain a dynamic equilibrium between channel erosion and aggradation.
Objective LR1.2. American beavers. Protect lacustrine/riverine systems supporting American beavers.	**LR1.2-1.** Target portions of streams that support American beavers for protection. **LR1.2-2.** Incorporate beaver management practices into management plans for lands protected by a conservation easement or other instrument providing for perpetual protection of land supporting or potentially supporting this species (where consistent with existing laws and regulations related to flood easement areas). Such management may include protection of existing beaver dams where possible, and installation of deceiver or bypass devices where necessary, rather than dam removal. Management may also include wrapping trees identified for retention with wire cylinder tree wraps or cages.
Objective LR1.3: Native vegetation. Promote the establishment and maintenance of native vegetation along natural and constructed waterways.	**LR1.3-1.** Encourage ecologically sustainable water management practices, including continuous bank vegetation along ditches and other constructed features. **LR1.3-2.** Establish native plant species demonstrated to provide ecological and water-quality benefits along waterways. **LR1.3-3.** Where possible, conduct ditch/canal maintenance only on one side of each canal or ditch per year. Also see conservation actions for *Riparian*, related to establishing and maintaining riparian areas along waterways.
Objective LR1.4: Stream processes and conditions. Maintain and/or restore and protect stream processes and conditions in Yolo County streams.	**LR1.4-1.** Encourage maintenance of appropriate minimum streamflows throughout the annual cycle to maintain aquatic life in Strategy Area streams. Flows may not be perennial in many streams, although subsurface (hyporheic) flows often continue to maintain riparian processes even when no surface flow occurs. Conservation of stream processes is related to maintaining subsurface flow and groundwater that are hydrologically part of the streamflow in each watershed (Winter et al. 1998). **LR1.4-2.** Maintain or reestablish streamflow dynamics that resemble the natural runoff patterns that sustain in-stream and riparian/floodplain ecosystems in Yolo County, including flow dynamics that support the reproduction of desired native riparian plant species (e.g., Fremont cottonwood). LR1.4-3. Encourage maintenance of habitat conditions that favor native fish species in Strategy Area streams. Where feasible, eliminate invasive nonnative plant, fish, and invertebrate species from Yolo County streams. **LR1.4-4.** Expand and protect riparian vegetation along Strategy Area streams where possible in accordance with flood management and operation laws and requirements. See conservation actions under LCP Objective L1.4 for additional actions related to restoration of natural communities.

Biological Goals and Objectives	Applicable Conservation Actions
Priority areas: Prioritize lands with the greatest value for focal and other native species.	
Alkali Prairie	
Goal AP1: Alkali Prairie Conservation. Conserve alkali prairie in Yolo County.	
Objective AP1.1: Protect Alkali Prairie. Protect 7 acres of alkali prairie natural community.	**AP1.1-1.** Place conservation easements on alkali prairie supporting focal or conservation species.
Priority areas: Prioritize lands with the greatest value for focal and other native species.	
Vernal Pool Complex	
Goal VP1: Vernal Pool Conservation. Conserve vernal pool complexes in Yolo County.	
Objective VP1.1. Vernal pool Pollinators. Maintain pollinator (especially native bee) populations within vernal pools.	**VP1.1-1.** Protect existing vernal pool complexes, including upland areas. **VP1.1-2.** Do not excavate new pools in upland areas within vernal pool complexes. **VP1.1-3.** Carefully manage grazing to help maintain native plant communities and retain longer flooding periods. **VP1.1-4.** Avoid pesticide drift or overspray from adjacent crops. **VP1.1-5.** Protect specialist bees with a buffer of 500 feet around the pools. **VP1.1-6.** Use a wider buffer (1 kilometer) for aerial spraying of insecticides, especially during the active flight period of the specialist bees (which coincides with blooms of the plants).
Objective VP1.2. Enhance Vernal Pools. Enhance 64 acres of vernal pools and surrounding uplands within the vernal pool watershed.	**VP1.2-1.** Enhance vernal pool complex through topographic modification to enhance hydrology, or other enhancements deemed beneficial to the species based on the best available scientific and technical information.
Priority areas: Prioritize lands with the greatest value for focal and other native species.	
SPECIES-LEVEL GOALS AND OBJECTIVES	
Focal Plant Species	
Goal PLANT1: Conserve plant populations. Conserve focal and conservation plant species populations in Yolo County.	
Objective PLANT1.1: Protect focal plant species habitat and occurrences. Protect currently known but unprotected or newly discovered unprotected habitat for focal plant species, prioritizing occupied habitat.	**PLANT1.1-1.** Place conservation easements on existing Category 2[a] and 3[b] protected lands, prioritizing lands that support occurrences of the focal plant species. **PLANT1.1-2.** Place conservation easements on any newly discovered areas supporting the focal plant species.

Biological Goals and Objectives	Applicable Conservation Actions
Objective PLANT1.2. Maintain or increase focal plant species abundance. Maintain or increase the mean annual abundance of focal plant species in protected habitat within Yolo County.	**Plant1.2-1.** Monitor and adaptively manage focal plant species populations in Yolo County, using the best available information to adjust management and enhancement actions as necessary to maintain or increase populations relative to the baseline range of abundance (see Appendix C, Covered Species Accounts).
Objective PLANT1.3. Protect focal plant species habitat. Protect 7 acres of modeled alkali milk-vetch, brittlescale, Heckard's pepper-grass, palmate bracted birds-beak, and San Joaquin spearscale habitat.	**PLANT1.3-1.** Place conservation easements on alkali prairie supporting modeled habitat for alkali milk-vetch, brittlescale, Heckard's peppergrass, palmate bracted bird's-beak, and San Joaquin spearscale.
Objective PLANT1.4. Enhance focal plant species habitat. Enhance 64 acres consisting of modeled Baker's navarretia, Colusa grass, and Solano grass habitat and surrounding uplands within the vernal pool watershed.	**PLANT1.4-1.** Enhance modeled vernal pool habitat for Baker's navarretia, Colusa grass, and Solano grass by removing invasive plant species, topographic modification to enhance hydrology, or other enhancements deemed beneficial to the species based on the best available scientific and technical information.
Focal Plant Species Priority Areas: Prioritize conservation actions in occupied habitat in planning units 13 and 16.	
Vernal Pool Invertebrates	
Goal VPI1: Vernal Pool Invertebrate Conservation. Conserve vernal pool invertebrates in protected habitat in Yolo County.	
Objective VPI1.1: Enhance vernal pool invertebrate habitat. Enhance 64 acres consisting of both modeled vernal pool fairy shrimp, vernal pool tadpole shrimp, California linderiella, Conservancy fairy shrimp, and Midvalley fairy shrimp habitat and surrounding uplands within the vernal pool watershed.	**VPI1.1-1.** Enhance modeled vernal pool habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, midvalley fairy shrimp, California linderiella, and vernal pool tadpole shrimp through topographic modification to enhance hydrology, or other enhancements deemed beneficial to the species based on the best available scientific and technical information.
Vernal Pool Invertebrate Priority Areas: Prioritize conservation actions in vernal pools occupied by the focal vernal pool invertebrate species in planning units 13 and 16, and any newly discovered occupied habitat.	
Goal VELB1. Maintenance of valley elderberry longhorn beetle populations. Maintenance of the distribution and abundance of valley elderberry longhorn beetle in Yolo County.	

Biological Goals and Objectives	Applicable Conservation Actions
Objective VELB1.1: Protect and manage valley elderberry longhorn beetle populations Increase protection and management of valley elderberry longhorn beetle colonies in Yolo County.	**VELB1.1-1.** Protect known valley elderberry longhorn beetle colonies (from CVFPP Conservation Strategy [DWR 2016]). **VELB1.1-2.** Find and protect currently unknown valley elderberry longhorn beetle colonies (from CVFPP Conservation Strategy [DWR 2016]). **VELB1.1-3** Monitor and adaptively manage protected colonies based on the best available science to maintain or increase colony size (from CVFPP Conservation Strategy [DWR 2016]).
Objective VELB1.2: Valley elderberry longhorn beetle habitat amount, connectivity, and quality. Protect 10 elderberry shrubs and successfully establish 30 elderberry shrubs in at least 1.2 acres of protected riparian areas.	**VELB1.2-1.** Protect areas supporting, or capable of supporting, elderberry shrubs within the species' current and historic range (from CVFPP Conservation Strategy [DWR 2016]). **VELB1.2-2.** Restore habitat in areas that connect existing colonies to each other, and to unoccupied habitat (from CVFPP Conservation Strategy [DWR 2016]). **VELB1.2-3.** Monitor and adaptively manage protected habitat based on the best available science to maintain or increase habitat quality (from CVFPP Conservation Strategy [DWR 2016]). **VELB1.2-4.** Incorporate elderberry shrubs into habitat restored in riparian areas, especially within 12 miles of habitat occupied by valley elderberry longhorn beetle (from CVFPP Conservation Strategy [DWR 2016]).
VELB Priority Areas. Prioritize conservation actions in or adjacent to occupied habitat in areas that also contribute to meeting the landscape and natural community-level objectives.	
Focal Fish Species	
Goal FISH1: Protected and enhanced focal fish species habitat. Protect and enhance focal fish species spawning, rearing, and migration habitat in Yolo County.	
Objective FISH1.1: Shaded riverine aquatic habitat. Increase the area of shaded riverine aquatic habitat in Yolo County that supports focal fish species.	**FISH1.1-1.** Maintain, restore, or enhance shade that moderates water temperatures and reduces visibility to predators. **FISH 1.1-2.** Maintain, restore, or enhance in-stream and overhanging vegetation cover that reduces visibility to predators and provides shade and in-stream cover for fish. **FISH 1.1-3.** Enhance the biomass of overhanging or fallen branches and in-stream plant material to support the aquatic food web, including terrestrial and aquatic invertebrates that provide food for fish, and to provide habitat complexity that supports a high diversity and abundance of fish species.
Objective FISH1.2: In-stream marsh habitat. Increase the area of in-stream marsh habitat in Yolo County that supports the focal fish species.	**FISH1.2-1.** Prioritize fresh emergent wetland restoration in areas that support focal fish species such as areas near northern Liberty Island and Prospect Island, Elk Slough and Duck Slough. For example, the Lower Yolo Ranch project at the northern end of Liberty Island is expected to provide habitat and food production for Delta Smelt and other native species.
Objective FISH1.3: Passage Barriers. Remove or modify passage barriers that prevent access of focal fish species to spawning and rearing habitat, and build or	**FISH1.3-1.** Conservation actions that would contribute to this objective include, but are not limited to, remediating the following priority structures that obstruct fish passage in the Yolo Bypass, identified by the CVFPP Conservation Strategy (DWR 2016):

Biological Goals and Objectives	Applicable Conservation Actions
modify barriers to prevent passage into detrimental locations.	• Sacramento Weir • Fremont Weir • Lisbon Weir • Tule Canal crossings (five)
Objective FISH1.4: Large Woody Material. Increase large woody material in focal fish species habitat to provide complexity and predator refuges for focal fish species in streams in Yolo County.	**FISH1.4-1.** Restore vegetation along streambanks, to increase input of large woody material to streams **FISH1.4-2.** Install large woody material directly into streams and along stream banks as a component of restoration or enhancement projects.
RCIS/LCP Objective FISH1.5: Yolo Bypass inundation. Increase inundation in the Yolo Bypass so that it reaches an optimized magnitude, frequency, and duration that will benefit native fish while using an Integrated Water Management (IWM) approach. An IWM approach utilizes a system-wide perspective and considers all aspects of water management, including public safety and emergency management, environmental sustainability, and the economic stability of agricultural and recreational uses of the Bypass.	**FISH1.5-1.** Provide access to additional spawning habitat for Sacramento splittail (Sommer et al. 2001a, 2002, 2007a, 2008; Moyle 2002; Feyrer et al. 2006). Because splittail are primarily floodplain spawners, successful spawning is predicted to increase with increased floodplain inundation. **FISH1.5-2.** Provide additional juvenile rearing habitat for Chinook salmon, Sacramento splittail, and possibly steelhead (Sommer et al. 2001a, 2001b, 2002, 2007a, 2008; Moyle 2002; Feyrer et al. 2006). Growth and survival of larval and juvenile fish can be higher within the inundated floodplain compared to those rearing in the mainstem Sacramento River (Sommer et al. 2001b). **FISH1.5-3.** Improve downstream juvenile passage conditions for Chinook salmon, Sacramento splittail, river lamprey, and possibly steelhead and Pacific lamprey. An inundated Yolo Bypass is used as an alternative to the mainstem Sacramento River for downstream migration of juvenile salmonids, Sacramento splittail, river lamprey, and sturgeon; rearing conditions and protection from predators are believed to be better in this area. Sommer et al. (2003, 2004) found that, other than steelhead and Pacific lamprey, juveniles from all of these species inhabit the Yolo Bypass during periods of inundation. The expected increased habitat and productivity resulting from increased inundation of Yolo Bypass are likely to also provide some benefits to covered species, including steelhead and lamprey. **FISH1.5-4.** Improve adult upstream passage conditions of migrating fish using the bypass, such as Chinook salmon, steelhead, sturgeon, and lamprey. An inundated Yolo Bypass is used as an alternative route by upstream migrating adults of these species when Fremont Weir is spilling. Increasing the frequency and duration of inundations will provide these improved conditions for more covered species over longer portions of their migrations. However, the increased use of the bypass could put more fish at risk, if stranding conditions occur when flows are reduced. The overall benefits of providing additional flow in the bypass will be assessed through adaptive management (Section 3.5, Adaptive Management and Monitoring Program). Monitoring for fish stranding will also be implemented, and fish salvage and rescue operations will be carried out, as necessary, to avoid stranding and migration delays for covered fish species. **FISH1.5-5.** Increase food for rearing salmonids, Sacramento splittail, and other covered species on the floodplain (Sommer et al. 2001a, 2001b, 2002, 2004, 2007a, 2008; Moyle 2002; Feyrer et al. 2006).

Biological Goals and Objectives	Applicable Conservation Actions
	During periods when the bypass is flooded, a relatively high production of zooplankton and macroinvertebrates serves, in part, as the forage base for many of the covered fish species (Benigno and Sommer 2008). **FISH1.5-6.** Increase the availability and production of food in the Delta, Suisun Marsh, and bays downstream of the bypass, including restored habitat in Cache Slough, for delta smelt, longfin smelt, and other covered species, by exporting organic material and phytoplankton, zooplankton, and other organisms from the inundated floodplain into the Delta (Schemel et al. 1996; Jassby and Cloern 2000; Lehman et al. 2008). **FISH1.5-7.** Increase the extent and frequency of floodplain inundation and the amount of associated rearing and migration habitat by diverting more Sacramento River water through a notch in Fremont Weir . **FISH1.5-8.** Reduce losses of adult Chinook salmon, sturgeon, and other fish species to stranding and illegal harvest by improving upstream passage at the Fremont Weir and monitoring for fish stranding below Fremont Weir as flow into Yolo Bypass from the Sacramento River recedes. As necessary, implement fish salvage and rescue operations to avoid stranding and migration delays for covered fish species. **FISH1.5-9.** Reduce the exposure and risk of juvenile fish migrating from the Sacramento River into the interior Delta through the Delta Cross Channel and Georgiana Slough, by decreasing the number of fish passing through these areas (Brandes and McLain 2001). **FISH1.5-10.** Reduce the exposure of outmigrating juvenile fish to entrainment or other adverse effects associated with the proposed north Delta intakes and the proposed Barker Slough Pumping Plant facilities by passing juvenile fish into and through the Yolo Bypass upstream of the proposed intakes. **FISH1.5-11.** Improve fish passage, and possibly increase and improve seasonal floodplain habitat availability, by retrofitting Los Rios Check Dam with a fish ladder, or creating another fish-passable route by which water from Putah Creek can reach the Toe Drain. **FISH1.5-12.** Modify the Tule Canal to accommodate additional flows resulting from modifications to the Fremont Weir. Modifications will be done to facilitate upstream fish passage and promote inundation out of the Tule Canal during periods when inundation is desired. **FISH1.5-13.** Modify Fremont Weir to allow for sustained inundation of the Bypass for 14 days or longer between late December and March 15 to benefit anadromous fish.

Biological Goals and Objectives	Applicable Conservation Actions
	• Improve agricultural crossings in the Tule Canal to improve fish passage and water movement. • Improve the Sacramento Weir • Improve Lisbon Weir • Retrofit the Los Rios Check Dam with a fish ladder • Realign Lower Putah Creek in the Yolo Bypass for fish benefits. • Restore in-stream focal fish habitat in Putah Creek. • When developing habitat projects, consider the 2020 update to the Yolo Bypass Drainage and Water Infrastructure Improvement Study and incorporate an integrated water management approach to help address drainage and water supply issues for wetlands managers and farmers resulting from increased inundation.
Objective FISH1.6: Restore Putah Creek Fish Habitat. Support and partner with existing efforts to restore Putah Creek habitat in Yolo County to enhance spawning, rearing, and migration of focal fish species.	**FISH1.6-1.** Restore in-stream spawning, rearing, and migration habitat for focal fish species in Putah Creek. **FISH1.6-2.** Restore shaded riverine aquatic habitat along Putah Creek. **FISH1.6-3.** Restore geomorphic and fluvial properties along Putah Creek. **FISH1.6-4.** Remove invasive species. **FISH1.6-5.** Bank stabilization. **FISH1.6-6.** Trash clean-up.
Objective FISH1.7: Nonnative predators. Reduce nonnative predator habitat by restoring more natural hydrologic and geomorphologic processes in streams.	**FISH1.7-1.** Restore and enhance natural habitats, as described under *Objective FISH1.2: In-stream Marsh Habitat* and *Objective FISH1.6: Restore Putah Creek Fish Habitat*
Objective FISH1.8: Research. Support short-term research projects to gain an understanding of multiple benefits of seasonal inundation on agricultural lands, including providing focal fish species spawning and rearing habitat.	**FISH1.8-1.** Fund short-term research projects to better understand multiple benefits of seasonal inundation on agricultural lands in Yolo County.

Biological Goals and Objectives	Applicable Conservation Actions
Objective FISH1.9: Restore focal fish species fresh emergent wetland habitat. Restore 50 acres of fresh emergent wetland to benefit Delta smelt, white sturgeon, Central Valley steelhead, Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley fall/late fall-run Chinook salmon**.**	**FISH1.9-1.** Restore fresh emergent wetland in areas such as the Yolo Bypass where the focal fish species occur.
Objective FISH1.10: Restore and manage focal fish species riparian habitat. Restore and manage at least five acres of valley foothill riparian natural community along Tule canal to benefit green sturgeon, Central Valley steelhead, Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley fall/late fall-run Chinook salmon**.**	**FISH1.10-1.** Restore and manage riparian habitat along drainages where the focal fish species may occur, such as Tule Canal.
Fish Priority Areas: Prioritize conservation actions in the Sacramento River, Yolo Bypass, and Putah Creek for the focal fish species.	
California tiger salamander	
Goal CTS1: California tiger salamander conservation. Conserve California tiger salamander in Yolo County.	
Objective CTS1.1: Protect Upland Habitat. Protect at least 400 acres of modeled upland habitat within 1.3 miles of aquatic habitat for California tiger salamander..	**CTS1.1-1.** Establish perpetual conservation easements on California tiger salamander upland habitat in areas consistent with Objective CTS1.1.
Objective CTS1.2: Protect Aquatic Habitat. Within the protected lacustrine and riverine natural community, protect at least 7 acres of California tiger salamander aquatic habitat.	**CTS1.2-1.** Establish perpetual conservation easements on suitable California tiger salamander aquatic habitat in the Dunnigan Hills Planning Unit, prioritizing occupied habitat.
Objective CTS1.3: Restore and Enhance Habitat. Increase the acreage and value of	**CTS1.3-1.** Restore or create ponds suitable for supporting California tiger salamander, within the species' range in Yolo County, in the Dunnigan Hills Planning Unit. **CTS1.3-2.** Invasive species control.

Biological Goals and Objectives	Applicable Conservation Actions
California tiger salamander habitat through restoration and enhancement.	
California Tiger Salamander Priority Areas: Prioritize conservation actions in designated critical habitat and recovery units for California tiger salamander, in the Dunnigan Hills Planning Unit.	
Western spadefoot	
Goal WS1: Maintenance or Increase of Western Spadefoot Distribution and Abundance. Maintain or increase the distribution and abundance of western spadefoot within its range in Yolo County.	
Objective WS1.1: Upland Habitat Protection. Protect at least 400 acres of modeled upland habitat within 1.3 miles of aquatic habitat for western spadefoot..	**WS1.1-1.** Place perpetual conservation easements over western spadefoot habitat, prioritizing occupied areas. **WS1.1-2.** Conduct surveys in suitable habitat that have not previously been surveyed.
Objective WS1.2: Aquatic Habitat Protection. Protect at least 7 acres of western spadefoot aquatic habitat.	**WS1.2-1.** Place perpetual conservation easements over western spadefoot habitat, prioritizing occupied areas. **WS1.2-2.** Conduct surveys in suitable habitat that have not previously been surveyed.
Western Spadefoot Priority Areas: Prioritize occupied areas for placement of conservation easements.	
Northwestern pond turtle	
Goal WPT1: Maintenance or Increase of Northwestern Pond Turtle Distribution and Abundance. Maintain or increase the distribution and abundance of northwestern pond turtle within its range in Yolo County.	
Objective WPT1.1: Protect and manage habitat. Protect at least 480 acres of modeled western pond turtle aquatic habitat and sufficient adjacent uplands to sustain protected turtles occupying the protected aquatic habitat..	**WPT1.1-1.** Place perpetual conservation easements over northwestern pond turtle habitat, prioritizing occupied areas. **WPT1.1-2.** Add rocks and logs to aquatic habitat to provide basking sites and cover, as needed.
Objective WPT1.5: Protect breeding occurrence. Protect at least one breeding occurrence of western pond turtle.	
Northwestern Pond Turtle Priority Areas: Prioritize conservation actions in occupied habitat in planning units 1-16 and 18.	
Giant garter snake	
Goal GGS1: Giant Garter Snake Conservation. Conserve giant garter snake in Yolo County, including the Willow Slough/Yolo Bypass subpopulation and a segment of the Colusa Basin subpopulation, and connectivity between the two subpopulations.	
Objective GGS1.1: Protect Giant Garter Snake Habitat. Protect and manage at	**GGS1.1-1.** Actions that protect and restore habitat include but are not limited to: • Land acquisition in fee title or conservation easement

Biological Goals and Objectives	Applicable Conservation Actions
least 280 acres of protected rice land, 232 acres of upland natural communities, 100 acres of fresh emergent wetland and 84 acres of lacustrine/riverine land cover in modeled giant garter snake habitat. Suitable emergent marsh can be substituted for rice land.	• Establish mitigation banks for giant garter snake • Marsh restoration
Objective GGS1.2: Manage and Enhance Giant Garter Snake Habitat. Manage and enhance giant garter snake habitat to maintain and enhance habitat value for giant garter snake.	**GGS1.2-1.** Minimize or removes barrier to connectivity by removing roads or creating undercrossings such as appropriately designed culverts that facilitate the movement and dispersal of snakes. (CVFPP Conservation Strategy [DWR 2016]) **GGS1.2-2.** Management agreements with landowners to manage rice land and marshes to maintain or enhance habitat for giant garter snake (e.g., NRCS WRP, Central Valley Habitat Exchange) **GGS1.2-3.** Maintain water levels in canals and ditches during the snake's active season (particularly during years when rice is fallowed). (CVFPP Conservation Strategy 2016 [DWR 2016]) **GGS1.2-4.** Fallow rice fields for short periods to flush contaminants and promote prey production (CVFPP Conservation Strategy 2016 [DWR 2016]) **GGS1.2-5.** Manage rice lands to minimize ground disturbance in uplands adjacent to canals and ditches during the snake's overwintering period. (CVFPP Conservation Strategy 2016 [DWR 2016]) **GGS1.2-6.** Enhance habitat including creating refugia and basking sites in marshes, elevate areas in the Yolo Bypass to provide refugia from floodwaters. (CVFPP Conservation Strategy 2016 [DWR 2016]) **GGS1.2-7.** Strategically lower floodway elevations in the Yolo Bypass to form marshes and modify the floodway to achieve greater topographic and hydrologic diversity, to create habitat conditions that support giant garter snakes. Supporting a mosaic of marsh habitat and high-water refugia could create movement corridors, basking sites, and burrowing opportunities in close proximity to foraging sites. **GGS1.2-8.** Improve habitat in or adjacent to the Yolo Bypass, such as by incorporating perennial wetlands that support a suitable prey base, vegetation for cover from predators, and upland refugia, to provide expansive suitable habitat that mimics historical conditions while also decreasing the giant garter snake's reliance on rice fields and canals. (CVFPP Conservation Strategy 2016 [DWR 2016]). **GGS1.2-9.** Incorporate habitat that straddles the bypass levees, coupled with habitat enhancement on those levees, to provide upland refugia during high-water events. (CVFPP Conservation Strategy 2016 [DWR 2016]) **GGS1.2-10.** Maintain lowflow channels in Yolo Bypass to minimize invasive plants, to provide suitable habitat and movement corridors for giant garter snake. **GGS1.2-11.** Control invasive species that adversely affect giant garter snake populations.

Biological Goals and Objectives	Applicable Conservation Actions
Giant Garter Snake Priority Areas. Prioritize conservation actions in planning units 11–13 and 18, in areas that do not experience winter floods, or if flooding occurs, upland refugia are available or can be created.	
Tricolored blackbird	
Goal TRBL1: Tricolored Blackbird Conservation. Conserve tricolored blackbird populations in Yolo County.	
Objective TRBL1.1: Protect Nesting Habitat. Within the protected fresh emergent wetland natural community, site at least 40 acres in modeled tricolored blackbird nesting habitat..	**TRBL1.1-1.** Establish conservation easements on tricolored blackbird habitat. **TRBL1.1-2.** Prioritize protection within 5 miles of occupied or recently occupied (within the last 15 years) nesting tricolored blackbird habitat, with preference given to previously occupied sites.
Objective TRBL1.2: Manage and enhance habitat. Manage and enhance protected tricolored blackbird habitat to maintain habitat value for this species.	**TRBL1.2-1.** Nesting habitat. Management and enhancement of tricolored blackbird nesting habitat should be consistent with the recommendations provided by Kyle (2011). The following criteria will guide management of emergent wetland habitat to benefit tricolored blackbird. • Burn, mow, or disc bulrush/cattail vegetation every 2 to 5 years as needed to remove dead growth and encourage the development of new vegetative structure. • Maintain large continuous stands of bulrush/cattail that are at least 30 to 45 feet wide to provide adequate space for breeding as well as protection from predators. • Provide a 50:50 to 60:40 ratio of bulrush/cattail marsh to open water in areas intended to support tricolored blackbird nesting **TRBL1.2-2.** Foraging habitat. Plant agricultural areas with cover strips and hedgerows to provide habitat to increase prey (insect) abundance for tricolored blackbird. Where possible, plant in high and very high value crop types, as defined below. Crop types have foraging habitat values for tricolored blackbird as follows (natural lands are not listed below) (Meese, pers. comm. 2013): • Very high value: Native pasture. • High value: Rice, sunflower, alfalfa, mixed pasture. • Medium value: Fallow lands cropped within three years, new lands prepped for crop production. • Low value: Mixed grain any hay crops. • Marginal value: Rice.
Tricolored Blackbird Priority Areas: Prioritize conservation actions in and near occupied habitat in planning units 2–6, 11–16, and 18.	
Grasshopper sparrow	
Goal GS1: Grasshopper sparrow conservation. Conserve grasshopper sparrows in Yolo County.	
Objective GS1.1: Protect Habitat. Protect at least 400 acres of modeled grasshopper sparrow habitat.	**GS1.1-1.** Through perpetual conservation easement acquisition, prioritizing occupied habitat, prioritize grasshopper sparrow habitat that overlaps with western burrowing owl and CTS habitat in Dunnigan Hills and other areas. 2,000 acres of grassland in Dunnigan Hills required under HCP/NCCP.

Biological Goals and Objectives	Applicable Conservation Actions
Objective GRSP1.2: Maintain and enhance habitat. Maintain and enhance the habitat functions of protected grasshopper sparrow habitat.	**GRSP1.2-1.** Reduce areal extent and biomass of nonnative plant species that degrade habitat. **GRSP1.2-2.** Manage livestock grazing to maintain cover conditions that support grasshopper sparrow nesting.
Grasshopper Sparrow Conservation Priority Areas: Prioritize conservation actions in and near occupied habitat in planning units 2–7 and 9–16, in areas that also contribute to the landscape-level goals and objectives.	
Western burrowing owl	
Goal WBO1: Western burrowing owl conservation. Conserve western burrowing owls in Yolo County.	
Objective WBO1.1: Protect Habitat. Protect at least 600 acres of modeled western burrowing owl habitat.	**WBO1.1-1.** Place conservation easements on habitat lands (prioritizing occupied habitat) **WBO1.1-2**. Protect sufficient habitat surrounding occupied burrows to sustain the breeding pairs, consistent with Staff Report on Burrowing Owl Mitigation (CDFG 2012). The 2012 CDFG report recommends determining the acreage needed around burrowing owl burrows to sustain breeding pairs based on site specific conditions and information on the species' natural history. Gervais et al. (2003) suggests that burrowing owls concentrate foraging efforts within 600 meters of a nest burrow. Based on this information, protected burrowing owl occurrences should include 600 meters of foraging habitat surrounding the nesting burrows. A different configuration may be protected, however, if based on site-specific information and the best available scientific information on the species, sufficient habitat is protected surrounding the burrows to sustain the breeding pairs of western burrowing owl. Land that is disked for fire control or other purposes should not count toward the acreage commitments for western burrowing owl.
Objective WBO1.2: Manage and Enhance Habitat. Implement management and enhancement practices to encourage burrowing owl occupancy on protected lands.	**WBO1.2-1.** Maintain appropriate vegetation height. **WBO1.2-2.** Prohibit rodenticides on protected habitat. **WBO1.2-3.** Minimize the spread of invasive weed species. **WBO1.2-4.** Encourage the presence of ground squirrels. **WBO1.2-5.** Install artificial burrows to augment natural burrows where they are lacking. **WBO1.2-6.** Create berms as future burrowing sites. **WBO1.2-7.** Create debris piles to enhance prey populations.
Western Burrowing Owl Conservation Priority Areas. • First priority for protection: Occupied western burrowing owl habitat. Assign the highest priority to occupied habitats where established western burrowing owl colonies are present. • Second priority for protection: Lands that support suitable habitat and are adjacent to occupied habitat, • Third priority for protection: Other lands that support suitable habitat and are appropriate for management and enhancement actions.	
Swainson's hawk	
Goal 1: Swainson's Hawk Conservation. Conserve Swainson's hawks in Yolo County.	

Biological Goals and Objectives	Applicable Conservation Actions
Objective SWHA1.1: Protect at least 2,872 acres of unprotected Swainson's hawk habitat.	**SWHA1.1-1.** Place conservation easements on habitat lands (prioritizing occupied habitat)
Objective SWHA1.2: Maintain Agricultural Habitat. Within the protected non-rice cultivated land natural community, maintain crop types that support Swainson's hawk foraging habitat .	**SWHA1.2-1.** Consider the distribution of protected habitat in Yolo County to ensure that protected habitat meets the needs of the Swainson's hawk, which is wide ranging across Yolo County landscape and not highly dependent on habitat connectivity. Consistent with *A Proposed Conservation Strategy for the Swainson's Hawk in Yolo County* (Estep 2015), strategically acquire conservation easements to maintain blocks of contiguous Swainson's hawk foraging habitat throughout the planning units that support the bulk of the nesting population. Newly protected habitat can be consolidated and form larger contiguous blocks or can be a series of separate, smaller blocks scattered throughout each planning unit. Acquisition of newly protected lands for the Swainson's hawk should focus on planning units 5, 10, 11, 13, 15, and 16, but can include others as determined by the Conservancy's Scientific and Technical Advisory Committee (STAC). Since the majority of the nesting population and available nesting habitat occurs within planning units 10, 11, 13, 15, and 16, protecting habitat here will maintain habitats nearest the majority of nesting habitats. Protecting grassland habitat in planning unit 5 will benefit Swainson's hawk by providing natural habitat for this grassland species (Dechant et al. 2000). Historically, Swainson's hawk occupied large grassland and shrubstep habitats in California (Woodbridge 1998); protecting this natural habitat will provide Swainson's hawk foraging habitat in Yolo County that is not subject to variation as a result of changing agricultural crop patterns. **SWHA1.2-2**. Prioritize protection of active nest trees (a nest site is considered to be active if it was used at least once during the past 5 years (California Department of Fish and Game 2010)). Also see conservation actions under Objectives AG1.1 and AG1.2 for actions to benefit Swainson's hawk on cultivated lands.
Objective SWHA1.3: Maintain or Enhance Nest Tree Density. Maintain or enhance the density of Swainson's hawk nest trees on cultivated land foraging habitat to provide a minimum density of one tree suitable for Swainson's hawk nesting (native trees at least 20 feet in height, particularly valley oaks, cottonwoods, and other faster growing tree species if conditions are suitable) per 10 acres of cultivated lands in the reserve system. Where existing protected trees do not meet that minimum requirement, plant suitable nest trees	**SWHA1.3-1.** Plant and maintain suitable nest trees (when planting, it should be native trees that grow to over twenty feet in height, however maintaining suitable trees should include any suitable tree, including exotic tree species) on foraging habitat. Also see conservation actions under Objectives AG1.1 and AG1.2 for actions to benefit Swainson's hawk on cultivated lands.

Biological Goals and Objectives	Applicable Conservation Actions
(valley oaks, cottonwoods, and other fast growing tree species that would be suitable nesting habitat) to meet this density requirement.	
Swainson's Hawk Conservation Priority Areas: Prioritize conservation actions in and near occupied habitat in planning units 5, 10, 11, 13, 15, and 16.	
Greater Sandhill Crane	
Goal GSHC1: Protection and expansion of greater sandhill crane. Protect and expand the greater sandhill crane winter range in Yolo County.	
Objective GSHC1.1: Protect Foraging Habitat. Increase protection of high- to very high-value foraging habitat for greater sandhill crane by a least 160 acres, with at least 80 percent maintained in very high-value types in any given year. Protected habitat should be in planning unit 15, within 2 miles of known roosting sites, and should consider sea level rise and local seasonal flood events. Patch size of protected cultivated lands should be at least 160 acres (Littlefield and Ivey 2000).	**GSHC1.1-1.** Establish conservation easements on greater sandhill crane foraging habitat. **GSHC1.1-2.** Maintain appropriate crops on protected habitat to provide the needed habitat values for greater sandhill crane (Table 3-5).
Objective GSHC1.2: Create high-value foraging habitat. Increase the acres of high-value greater sandhill crane winter foraging habitat by protecting low-value habitat or nonhabitat areas and converting it to high- or very high-value habitat. Created habitat should be in Planning Unit 15, within 2 miles of known roosting sites, and should consider sea level rise and local seasonal flood events.	**GSHC1.2-1.** Establish conservation easements or purchase in fee-title on lands where high value foraging habitat can be created. **GSHC1.2-2.** Convert low-value habitat or non-habitat areas on cultivated lands to high-value habitat by switching to high value crop types**.**
Objective GSHC1.3: Create managed wetland roosting habitat. Increase the acres of managed wetlands consisting of greater sandhill crane roosting habitat in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use	**GSHC1.3-1.** Establish conservation easements on greater sandhill crane roosting habitat. **GSHC1.3-2.** Create managed wetlands that provide roosting habitat as follows (Gary Ivey, pers. comm. 2014). • Develop roost sites as a series of shallow, open ponds separated by a system of checks and levees. Small upland islands can also be created within the ponds. Cranes often congregate to roost or loaf

Biological Goals and Objectives	Applicable Conservation Actions
Area in Planning Unit 15, with consideration of sea level rise and local seasonal flood events. The wetlands should be located within 2 miles of existing permanent roost sites and protected in association with other protected natural community types at a ratio of 2:1 upland to wetland to provide buffers around the wetlands.	on the checks and other areas of higher ground and forage in the shallow water contained within the ponds. • Design checks, levees, and other upland sites with sloping banks, which allow cranes to walk from the flooded pond to the adjacent uplands. • In addition to the presence of water, food availability, and loafing opportunities, selection of roosting sites by greater sandhill cranes is based in part on predator avoidance. Therefore, the development of the ponds and checks should consider the ability of predators to access roosting cranes along checks and levees. • Selected roost sites will have direct access to sufficient irrigation water to maintain required water depths. **GSHC1.3-3.** Manage or enhance managed wetland roost sites as follows (Ivey et al. 2014)). • Place gravel or grit on the upland islands or on portions of the levees between the roosts and contiguous upland buffers. • Mow or burn sloped banks prior to flooding to increase crane access and predator sightings. • Maintain water depth throughout the winter season at an average depth of 10 centimeters, but should range across the roost site between 5 and 20 centimeters. • Begin flood-up of roosts by September 1. For roosts in close proximity, flood some in early September, additional roosts by early October, and other roosts at later dates to optimize foraging use during flood-up. Begin drawdown no earlier than March 15. • Manage vegetation at roosting sites to ensure no more than 10 percent cover of tall emergent plants, such as tules (*Schoenoplectus* spp.), cattails (*Typha* spp.), trees, and large shrubs. Site the 10 percent cover within the wetland basin as cranes can and do use this emergent cover for thermal cover during adverse weather conditions. • To enhance food value, employ moist soil management techniques to achieve and maintain substantial stands of high-value plants such as native smartweed (*Polygonum* spp.), yellow nut sedge (*Cyperus esculentus*), and swamp timothy (*Crypsis schoenoides*). A variety of other plant species may also be used, including grasses and clovers. Moist soil management may also require occasional irrigation during the dry spring and summer months as well as periodic summertime discing. • Burn, mow, or disc bulrush/cattail vegetation as needed to maintain as < 10 percent of the composition and every 2 to 5 years to remove dead growth and encourage the development of new vegetative structure.
Objective GSHC1.4: Create flooded cornfield roosting and foraging habitat. Increase the acres of roosting habitat within 2 miles of existing permanent roost	**GSHC1.4-1.** Establish conservation easements on lands within the greater sandhill crane Winter Use Area that can support cornfields for flooding. **GSHC1.4-2.** Create flooded cornfields that provide roosting and foraging habitat. **GSHC1.4-3.** Manage or enhance flooded fields as follows (Ivey pers. comm. 2014).

Biological Goals and Objectives	Applicable Conservation Actions
sites, consisting of active cornfields that are flooded following harvest to support roosting cranes and that provide highest-value foraging habitat. Individual fields should be at least 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area (see species account, Figure A).	• Deferring the tilling of corn and grain fields until after December 21, to increase the amount and availability of forage for greater sandhill crane. • Where feasible, a portion of corn or grain fields may be left unharvested to increase the quantity of forage available to greater sandhill cranes. Forage gradually becomes available as senescent plant stalks fall over as a result of weathering. If using a corn seed variety designed for increased standability (in which case the plants may not fall over as a result of weathering), plant in lower densities or employ techniques such as alternating strips of standing corn and low growing vegetation and/or fallow land between the strips of standing corn to provide greater access by greater sandhill cranes. • To increase the foraging and roosting value of cultivated lands for greater sandhill cranes, shallowly flooded some corn, grain, and irrigated pasture during fall and winter. Cultivated land roosting habitat should consist of blocks of at least 180 acres that will be sequentially flooded to maintain a minimum of 40 acres of roosting habitat at any given time during the winter when cranes are present. This is intended to minimize disturbance and provide not only the roost water, but also new foraging opportunities throughout the season in close proximity to the roosting habitat. For example, if the field block is divided into two 90-acre parcels (180 acres total), half of one field may be flooded early in the fall and half of the other field may be flooded and maintained from mid-winter until the end of the season, while the first is drained or left to evaporate. Birds will benefit from having new foraging area close to the roost while it is being converted.
Greater Sandhill Crane Conservation Priority Areas: Prioritize conservation in areas within the greater sandhill crane Winter Use Area that are not subject to the effects of sea level of rise.	
Norther harrier	
Goal NH1: Northern harrier habitat. Sufficient protected habitat to support the population of northern harrier in Yolo County.	
Objective NH1.1. Protect at least 3,000 acres of modeled northern harrier habitat..	**NH1.1-1.** Place perpetual conservation easements over modeled northern harrier habitat.
Northern Harrier Conservation Priority Areas: Prioritize habitat protection in and near occupied habitat in planning units 2-1, 9-16, and 18, in areas that also contribute to the landscape-level and natural community-level goals and objectives.	
Bank Swallow	
Goal BS1. Bank Swallow Conservation. Conserve bank swallow in Yolo County.	
Objective BS1.1: Protect Habitat. Protect at least 10 acres of unprotected bank swallow habitat..	**BS1.1-1.** Protect channel banks from anthropogenic alterations (predominantly bank stabilization and rip-rapping)
Objective BS1.2: Manage and enhance habitat	**BS1.2-1.** Avoid degrading bank swallow habitat when vegetating banks to restore riparian and provide shaded riverine aquatic habitat for fish.

Biological Goals and Objectives	Applicable Conservation Actions
Manage and enhance bank swallow habitat to improve bank swallow foraging habitat values.	**BS1.2-2.** Promote scouring and flooding to create banks that provide suitable nesting habitat (consistent with Objective L2.1, Fluvial processes) **BS1.2-3.** Promote open grass and forb vegetation along floodplains for bank swallow foraging habitat. **BS1.2-4.** Control invasive plant species (consistent with RCIS/LCP Objective L3.1, Invasive species). **BS1.2-5.** Remove unnecessary rip-rap on the banks of the Sacramento River.
Bank swallow priority areas: Prioritize conservation of colonies along the Sacramento River and Cache and Putah Creeks.	
Black tern	
Goal BT1: Black Tern Habitat. Sustain sufficient habitat area to support black terns that migrate through Yolo County and to support future reestablishment of a nesting population in Yolo County.	
Objective BT1.1: Protect or Restore Black Tern Habitat. – Protect or restore at least 72 acres of suitable habitat for black tern.	**BT1.1-1.** Establish conservation easements on black tern habitat, prioritizing occupied areas.
Black Tern Conservation Priority Areas: Prioritize conservation actions in and near occupied habitat in planning units –11-13 and 17-18, in areas that also contribute to the landscape-level and natural community-level goals and objectives.	
Western yellow-billed cuckoo	
Goal WYBC1: Western Yellow-billed Cuckoo Habitat. Sufficient western yellow-billed cuckoo habitat in Yolo County to provide opportunities for migration and breeding.	
Objective WYBC1.1: Restore Western Yellow-billed Cuckoo Habitat. Design at least 12 acres of the restored valley foothill riparian to provide suitable habitat for western yellow-billed cuckoo.).	**WYBC1.2-1.** Restore western yellow-billed cuckoo habitat. **WYBC1.2-2.** Consider habitat needs for western yellow-billed cuckoo when designing riparian restoration projects to maintain mature riparian forest intermixed with early- to midsuccessional riparian vegetation**.** **WYBC1.2-3.** Restore patches of riparian habitat greater than 100 acres in size and 660 feet in width to provide high-quality habitat for western yellow-billed cuckoo, where there is potential for occupancy (from CVFPP Conservation Strategy [DWR 2016]). **WYBC1.2-4.** To meet habitat needs for this species, design restoration projects to include cottonwoods, willows, and other riparian plant species to provide greater than 40 percent canopy closure, with a mean canopy height of approximately 7 to 10 meters (Laymon et al. 1997).
Western Yellow-billed Cuckoo Priority Areas: Prioritize conservation actions in and near occupied habitat, if any, where there is potential to maintain or restore fluvial processes that contribute to the creation or maintenance of large patches of suitable western yellow-billed cuckoo habitat.	
Least Bell's vireo	
Goal LBV1: Least Bell's Vireo Habitat. Sufficient habitat in Yolo County to support least Bell's vireos that migrate through, and to support potential future reestablishment of a nesting population.	

Biological Goals and Objectives	Applicable Conservation Actions
Objective LBV1.1: Manage Least Bell's Vireo Habitat. Manage least Bell's vireo habitat to support the species.	**LBV1.1-1.** Control cowbirds (consistent with RCIS/LCP Objective L3.1, Invasive species). Least Bell's vireo is particularly vulnerable to nest parasitism by brown-headed cowbirds (Sharp and Kus 2006). Cowbird control may be an important aspect of managing least Bell's vireo habitat in Yolo County. This species was previously thought to be extirpated from Yolo County, but has recently been discovered in and near Yolo County (Appendix C, Covered Species Accounts), and a population may become reestablished as a result of habitat restoration and management. Cowbird trapping. Cowbird trapping is an effective short-term management tool in recovery of endangered riparian birds (Kus and Whitfield 2005). Cowbird trapping has proven successful in reversing downward population trends for least Bell's vireo. Annual trapping in southern California eliminated or reduced cowbird parasitism relative to pretrapping rates and thereby enhanced productivity of nesting pairs, resulting in an eightfold increase in vireo numbers between 1986 and 2005 (Kus and Whitfield 2005). For cowbird trapping to be effective, it must be implemented on an annual basis for a sustained period. When cowbird trapping is not necessary to improve native bird populations or has minimal benefits, the funds and resources used for trapping could be used for other, more beneficial conservation efforts (U.S. Fish and Wildlife Service 2002a). Furthermore, sustained cowbird trapping might result in cowbirds developing either learned or genetic resistance to trapping, and in the capture of some nontarget species (U.S. Fish and Wildlife Service 2002a). For these reasons, cowbird trapping should only be implemented under limited circumstances, as described below; alternative methods to reduce cowbird nest parasitism may also be implemented to benefit least Bell's vireo. Landscape-level management. Cowbirds typically feed in areas with short grass and in the presence of ungulates such as domesticated livestock. They also feed in areas associated with anthropogenic influences such as golf courses and suburban lawns with bird feeders. Cowbirds commute on a daily basis from these feeding areas to riparian areas where they parasitize native birds (U.S. Fish and Wildlife Service 2002a). Therefore, proximity to potential cowbird feeding areas should be a consideration in siting riparian restoration projects. Protected lands may also be managed to discourage grazing and other activities that could attract cowbirds near riparian areas that support nesting least Bell's vireos or yellow-breasted chats. Natural community-level management. Parasitism rates and cowbird densities usually decline with increases in the density of vegetation; therefore, cowbird parasitism might be reduced by measures that result in denser vegetation, such as supplemental plantings of vegetation that tends to grow in dense patches (U.S. Fish and Wildlife Service 2002a; Sharp and Kus 2006). Species-level management. Because only a small number of least Bell's vireos, if any, are expected to nest in Yolo County in the near term, nest monitoring and removal or addling of cowbird eggs, if present, are likely to be the most cost-effective method for reducing cowbird parasitism on the species. This method has the added benefit of providing information on the extent to which parasitism threatens nesting vireos in Yolo County. Addling is preferred over egg removal, because the host might abandon a nest if the

Biological Goals and Objectives	Applicable Conservation Actions
	combined volume of eggs is reduced below a certain value by removal of cowbird eggs (U.S. Fish and Wildlife Service 2002a). Cowbird trapping may be necessary, if the least Bell's vireo population in Yolo County has grown to a level at which cowbird egg addling or removal is no longer cost-effective, but monitoring determines that parasitism is threatening the population (at least 25 percent parasitism rate, or based on the best available information and consultation with species experts). Cowbird trapping should not be implemented unless pretrapping data indicate that cowbird parasitism may be threatening the least Bell's vireo population and cowbird egg removal or addling is determined to be less cost-effective. Prior to initiating cowbird trapping, a trapping plan should be developed that includes clear goals for the program, criteria for determining when trapping will be discontinued, and a siting strategy for placement of traps in locations expected to result in the greatest success in reducing parasitism on least Bell's vireo (U.S. Fish and Wildlife Service 2002a). The number of cowbirds or eggs removed, parasitism rate, and vireo nesting success should be documented to determine whether the program goals have been met.
Objective LBV1.2: Restore Least Bell's Vireo Habitat. Design at least 120 acres of restored valley foothill riparian to provide suitable habitat for this least Bell's vireo.	**LBV1.2-1.** Restore patches of riparian habitat greater than 10 acres in size to provide habitat for least Bell's vireo, where potential for occupancy is high (from CVFPP Conservation Strategy [DWR 2016]).
Least Bell's Vireo Conservation Priority Areas: Prioritize conservation actions in and near occupied or previously occupied areas, such as in the Yolo Bypass.	
White-tailed kite	
Goal WTK1: White-tailed Kite Habitat. Sufficient protected habitat to support the population of white-tailed kites in Yolo County.	
Objective WTKI1.1: Protect at least 2,000 acres of unprotected white-tailed kite foraging and nesting habitat.	**WTKI1.1-1.** Place conservation easements on habitat lands (prioritizing occupied habitat)
White-tailed Kite Conservation Priority Areas: Prioritize conservation actions in and near occupied habitat in planning units 3-7, 9, and 11-14, in areas that also contribute to the landscape-level and natural community-level objectives.	
California black rail	
Goal CBR1: California Black Rail Habitat. Provide suitable habitat conditions for California black rail in Yolo County.	
Objective CBR1.1: Protect California Black Rail Habitat. Protect at least 50 acres of fresh emergent wetland natural community providing suitable habitat for California black rail. Increase the protection of California black rail habitat in Yolo County, including patches of marsh	**CBR1.1-1.** Establish conservation easements on California black rail habitat, prioritizing occupied areas.

Biological Goals and Objectives	Applicable Conservation Actions
greater than 20 acres in size, with land cover types and in locations that comprise the species' modeled habitat, prioritizing protection of occupied habitat or habitat where potential for occupancy is high (species account, Appendix C).	
Objective CBR1.2: Restore California Black Rail Habitat. Increase the acres of California black rail habitat in Yolo County, with the land cover types and in locations that comprise the species' modeled habitat (species account, Appendix C).	**CBR1.2-1.** Restore marsh habitat for California black rail, consisting of shallowly inundated emergent vegetation at the upper edge of the marsh (within 50 meters of upland refugia habitat) with adjacent riparian or other shrubs that will provide upland refugia, and other moist soil perennial vegetation.
Objective CBR1.3: Enhance Black Rail Habitat. Enhance California black rail habitat by increasing its ability to support the species.	**CBR1.3-1.** Increase amount and quality of emergent wetlands (patches greater than 20 acres). **CBR1.3-2.** Increase amount and quality of high-water refugia. **CBR1.3-3.** Minimize stressors (e.g., habitat degradation, noise, vibrations, and human disturbance from operations and maintenance activities; predation; flooding; or sea level rise).
California Black Rail Conservation Priority Areas: • Prioritize conservation actions in or near occupied or previously occupied habitat, in areas that do not experience winter floods, or if flooding occurs, upland refugia are available or can be created. • Prioritize conservation actions in areas that would not be adversely affected by sea level rise**.**	
Loggerhead Shrike	
Goal LHSH1: Maintenance of Loggerhead Shrike Distribution and Abundance. Maintain the distribution and abundance of loggerhead shrikes within Yolo County.	
Objective LHSH1.1: Protect Habitat. Protect at least 700 acres of loggerhead shrike habitat.	**LHSH1.1-1.** Perpetual conservation easement acquisition, prioritizing occupied habitat.
Objective LHSH1.2: Enhance loggerhead habitat. Enhance loggerhead shrike habitat by increasing its ability to support the species.	**LHSH1.2-1.** Establish suitable nesting/perching trees and shrubs in regions of the county that support high quality foraging habitat but lack woody vegetation.
Loggerhead Shrike Priority Areas: Prioritize conservation actions in or near occupied or previously occupied habitat.	

Biological Goals and Objectives	Applicable Conservation Actions
Yellow-Breasted Chat	
Goal YBCH1: Maintenance of Yellow-Breasted Chat Distribution and Abundance. Maintain the distribution and abundance of yellow-breasted chats within Yolo County.	
Objective YBCH1.1: Protect Habitat. Protect and manage 120 acres of yellow-breasted chat habitat.	**YBCH1.1-1.** Perpetual conservation easement acquisition, prioritizing occupied habitat.
Yellow-Breasted Chat Priority Areas: Prioritize conservation actions in or near occupied habitat.	
Townsend's Big-Eared Bat	
Goal TBEB1: Maintenance of Townsend's Big-Eared Bat Distribution and Abundance. Maintain the distribution and abundance of Townsend's big-eared bats within Yolo County.	
Objective TBEB1.1: Protect and Manage Habitat Protect and manage 1,200 acres of Townsend's big-eared foraging and roosting bat habitat.	**TBEB1.1-1.** Perpetual conservation easement acquisition, prioritizing occupied habitat.
Townsend's Big-Eared Bat Priority Areas: • Prioritize conservation of occupied mining sites in the Little Blue Ridge planning unit.	

[a] Category 2 lands are defined in the Yolo HCP/NCCP as lands without an irrevocable conservation mandate but with a management goal and/or acquisition purpose related to ecological protection. The land is predominantly natural habitat or in a use that supports covered species habitat. This category includes public lands held in fee title and private lands in cases where a conservation entity (e.g., land trust) holds fee title, without permanent easements in place.

[b] Category 3 lands are defined in the Yolo HCP/NCCP as lands that consists of public open space, but its primary management goal is not related to ecological protection, and it has no irrevocable conservation mandate. Such land includes natural habitat or a use that supports covered species habitat. This category includes public lands without a conservation mandate or private lands held in fee title by a conservation organization (i.e., agricultural land trust), without permanent conservation easements in place

Table 3-4. Patch Size, Configuration, and Habitat Connectivity Considerations for Planning Species

Planning Species	Natural Communities	Minimum Size/Configuration Considerations	Habitat Connectivity Considerations
American badger	California prairie in the Hill and Ridge Landscape Unit.	Variable home range of between 395 and 2,100 acres (Messick and Hornocker 1981) Minimum patch size is 400 acres, to correspond with the lower home range estimate (Messick and Hornocker 1981).	Connectivity is essential for home range and dispersal movements, and to facilitate protection of badger populations. Set connectivity goals to create multiple intact contiguous reserves of 1,200 acres to meet the average home range estimate (Messick and Hornocker 1981).
Black-tailed deer (migratory herds – mid-elevation foothills and higher elevations)	Woodlands and forest, shrublands, and scrub	Since black-tailed deer migrate through Yolo County, large patch size would be required to manage habitat for it. Black-tailed deer home ranges are relatively large and variable in size (168 to 1,581 acres, with a mean home range size of 370 acres [McCoy and Gallie 2005]). Minimum patch size for purposes of managing this landscape should be correspondingly large and generally correspond to the mean home range size. Preserved patches should be at least 300 acres and contiguous with other protected habitat areas to allow for unobstructed movement though Yolo County. The location and configuration should be based on proximity to high resident-deer use areas or known migratory routes.	Connectivity of suitable deer habitat through Yolo County is essential for migratory herds. Prioritize preservation of habitat areas that provide connectivity with other habitat areas to provide movement corridors for resident and migratory herds.

Table 3-5. Assigned Greater Sandhill Crane Foraging Habitat Value Classes for Agricultural Crop Types

Foraging Habitat Value Class	Agricultural Crop Type
Very high	Corn, rice
High	Alfalfa, irrigated pasture, wheat
Medium	Other grain crops (barley, oats, sorghum)
Low	Other irrigated field and truck crops
None	Orchards, vineyards

Table 3-5, above, provides the foraging habitat values for various crop types found within the strategy area in order to meet Objective GSHC1.1: Protect Foraging Habitat in Table 3-3, Conservation Goals and Objectives and Applicable Conservation Measures.

3.4.2 RCIS Conservation Prioritization Guidelines

This section is applicable to the RCIS only and is subject to CDFW review and approval.

Table 3-6, below, provides guidelines to assist in prioritizing the multiple conservation actions identified in this plan. In recognition of the need to adjust priorities over time to address changing conditions such as climate change, the primary intent of Table 3-6 is to provide guidance for prioritizing actions during the ten-year term of the RCIS. These guidelines therefore pertain primarily to the RCIS component of the plan rather than the LCP component. For guidelines focused on longer-term conservation for the LCP (i.e., more than ten years), see Section 3.4.3, *Additional LCP Guidelines.*

The RCIS guidelines identify preferred characteristics of conservation sites. Not all of the 12 parameters may apply or may be useful in prioritizing among conservation choices. Moreover, these parameters and preferred characteristics may be adjusted as conservation in the strategy area progresses. These guidelines are intended to be re-evaluated at the end of the ten-year term of the RCIS, if the RCIS is updated at that time.

Table 3-6. RCIS Prioritization Guidelines

Parameters (RCIS Section)	Preferred Characteristics
Conservation goals and objectives (Section 3.4.1, Table 3-3)	Contributes to three or more conservation goals and objectives in RCIS/LCP
RCIS/LCP Priority Area (Table 3-3)	Within a Priority Area identified in Table 3-3
Size of site (acres) (Section 3.4, Goal L1)	Large site (> 160 acres)
Site configuration (i.e., shape) and adjacent land uses (Section 3.4, Goal L1)	Sites with compatible adjacent land uses or with incompatible land uses adjacent[1] and with low ratio of edge:area
Focal or conservation species (Table 1-2)	Site supports occupied habitat for one or more focal or conservation species
Patch size for focal and conservation species where sufficient data was available to define or recommend minimum patch sizes (Section 3.4.1, Table 3-3)	Suitable habitat on site above minimum patch size identified in Table 3-3 for target focal species
Site connectivity to protected area (Section 3.4, Goal L1)	Within or adjacent to existing protected area(s) that are managed for ecological purposes
Regional connectivity (Section 2.9)	Site partially or entirely within Essential Habitat Connectivity Area, Ecological Corridors, or Creek Corridor identified for RCIS/LCP area (Figure 2-16)
Rare natural communities (Section 3.3.1)	Site supports rare natural communities as described in Section 3.3.1 (i.e., the least abundant natural communities in Yolo County).
Long-term management commitments (Section 3.4.1, Table 3-3)	Site includes commitments to ensure long-term sustainability of target biological values[2]
Restoration potential (Objective L1-4)	Site has potential for restoration in terms of area and ability to support one or more focal or conservation species
Threats to site (Section 3.2.4.2)	Site has threat of land use conversion or other degradation
Multiple benefits (Section 3.2.3)	For working lands and flood control areas, the project supports the multi-benefit approach described in Section 3.2.3.[a]

[a] Prioritization for the multi-benefit approach only applies to projects in working lands (e.g., cultivated lands, grazed lands) and flood control areas. This prioritization criterion does not apply when meeting goals and objectives that require protection or restoration of natural communities or habitats incompatible with other uses.

3.4.3 Additional LCP Conservation Guidelines

This section is applicable to the LCP only and is not subject to CDFW review or approval.

The following additional conservation guidelines apply to the LCP. Conservation guidelines are described below as general guidelines, guidelines for natural communities, guidelines for conservation species, and guidelines for unique areas.

3.4.3.1 General Guidelines

- The highest priority for the RCIS/LCP is to implement the landscape framework described in the landscape-level goals and objectives in Table 3-3, to support and enable conservation of native species, natural habitats, and ecological processes at county-wide and regional scales. Landscape connectivity allows species to adapt to changing conditions and increased environmental stressors, restore genetic diversity among local populations, and increase local population abundances that reduce extirpation likelihoods. This is particularly important as climate change, increased human populations, and altered land use patterns affect natural landscapes (Keeley et al. 2018).

  This guideline recognizes that landscape-scale conservation planning assigns higher value to habitat areas that consolidate "core" habitat areas and habitat that enables and supports landscape linkages than to equivalent habitat areas that do not achieve those results. As described elsewhere in this RCIS/LCP, general conservation guidance for landscape-scale conservation emphasizes protected areas that are as large as can be achieved, with minimized perimeter/area ratios, as this achieves increased protection for "core" habitat and increases the likelihood of occurrence of area-sensitive wildlife species (Cushman and Landguth 2012). In addition, landscape linkages among habitat areas function best when they are sufficiently large to provide "core" habitat conditions within the linkages (Rudnick et al. 2012).

- A second priority for this RCIS/LCP is the conservation of communities that support multiple RCIS/LCP focal and conservation species over communities that support fewer species. This guideline recognizes the long-established conservation principle that protecting habitat areas supporting greater richness of sensitive species ("hotspots") in the short term in order to maintain their populations is an essential element in developing landscape-scale conservation plans that protect those species in the long-term (Myers et al. 2000). If resources to achieve conservation objectives are limited, the RCIS/LCP places higher value on areas that currently support higher numbers of sensitive (i.e., focal and conservation) species.

- The conservation of areas in the county with high degrees of threat to loss before areas of lower-degree threat constitutes a third guideline for this RCIS/LCP, assuming that resources for acquisitions, restorations, and other conservation actions are limited and prioritization is required. This guideline reflects a widely adopted practical goal in conservation planning (Carwardine et al. 2018). Natural community gap analysis can be an important tool for providing guidance to accomplish this guideline.

- This RCIS/LCP adopts as a fourth guideline the conservation of habitat areas within landscapes having fewer major stressors (e.g., major or high-volume roads or high-impact land uses such as development are absent near potential conservation areas) over areas having high intensities of factors that adversely affect the conservation values of conserved lands. Roads are a major source of mortality for wildlife, conduits for the introduction of exotic species into the landscape, and a source of vehicle-derived pollutants in their vicinities (Boston 2016). Development is directly associated with habitat loss, fragmentation, and the loss of landscape connectivity; typically results in the introduction of nonnative predators (e.g., free-ranging cats) as well as abundant nonnative vegetation; is often associated with alterations in hydrology and drainage patterns that affect areas outside the developed area; and is generally accompanied by an increased use of pesticides and herbicides that may affect adjacent undeveloped areas (Brain and Anderson 2019). If alternative candidate habitat areas have similar values otherwise, this

RCIS/LCP places higher value on areas that are less subject to major stress or degradation from adjacent land uses.

- A fifth guideline for the RCIS/LCP is the conservation of existing high-quality species' habitats before creating new habitat areas except in planning units that lack high quality habitat areas, and for natural communities that are limited in extent such as Valley oak woodland. Existing high-quality habitat areas already provide the conditions that support many ecological functions and high species richness, conditions that are frequently difficult to establish/reestablish in areas that have been altered or that are naturally less ecologically complex (Possingham et al. 2015), and the RCIS/LCP emphasizes the importance of protecting such high-quality areas. However, when a planning area currently lacks high-quality habitat areas the RCIS/LCP recognizes that a better conservation outcome may sometimes result through the intentional creation or restoration of desired natural communities in areas where they are currently absent or poorly developed.
- The RCIS/LCP adopts as a sixth guideline the restoration/enhancement of areas within the county lacking sufficient representation of native prairie, fresh emergent wetlands, and particularly complex areas of forest, woodland, and chaparral communities, where such communities are ecologically likely to occur. In restoring/enhancing these community types, attention to factors known to be associated with desired ecological functions and habitat values should be emphasized. For example, sometimes the species richness of the vegetation is itself a positive element in maintaining high ecological function and habitat values (Possingham et al. 2015).

3.4.3.2 Conservation Species Guidelines

The RCIS/LCP prioritizes lands supporting conservation species as follows:

- The LCP assigns higher conservation priority to the rarest and most threatened conservation species than more widespread species or species facing a lower degree of threat. Rarity and degree of threat is based on state and federal status; California Native Plant Society status; status identified in regional, statewide, or national conservation plans (e.g., Partners in Flight's 2016 "Landbird Conservation Plan"); and the best available information on the species.
- Additional conservation priority is allocated in the RCIS/LCP to species identified in Appendix C of the 2015 SWAP as "Species of Greatest Conservation Need." SWAP Appendix Table C-11 identifies species of greatest conservation need in the Northern California Interior Coast Ranges (USDA) Ecoregion. Appendix Table C-18 identifies species of greatest conservation need in the Great Valley (USDA) Ecoregion. As noted in Chapter 2, nearly all of the species of greatest conservation need identified in these tables are included in the RCIS/LCP either as focal species in the RCIS or as conservation species in the LCP.
- Lands with important populations of conservation species (e.g., particularly large populations, core (source) populations, or genetically unique populations) have higher conservation priority than otherwise equivalent lands with less significant populations.
- Lands with multiple conservation species have higher conservation priority than otherwise equivalent lands with few to no conservation species.

3.4.3.3 Unique Areas

The Advisory Committee identified the following natural resources in Yolo County with unique plant assemblages or microclimate. The LCP prioritizes these unique areas for conservation.

Coastally Influenced Areas in the South Blue Ridge Planning Unit

The South Blue Ridge Planning Unit (Planning Unit 3) includes a unique assemblage of plants for Yolo County, resulting from marine-influenced atmospheric conditions (both winter storms and especially cooler and moister air masses intruding from the southwest during other seasons) entering through the gap in the Coast Range created by the San Francisco Bay Estuary from coastal areas, providing a moister local climate (Gilliam 2002). This area includes Ireland Ranch and parts of Bobcat Ranch. This area supports plant species that are more typical of coastal plant alliances such as ocean spray (*Holodiscus discolor*) and osoberry (*Oemleria cerasiformis*). It is uncertain how far northward along the Rocky/Blue Ridge line this influence extends (some have suggested Cottonwood Canyon/Creek). Vegetation around Crooker Spring on the Ireland Ranch, in a north-flowing tributary of Salt Creek, includes black oak as a co-dominant riparian species and a number of other species that reflect a coastal influence.

Buckeye Creek and Associated Drainages in the Capay Hills Planning Unit

Buckeye Creek basin, Oat Creek, and Bird Creek originate in a relatively geologically young landform and flow eastward into the Sacramento Valley. Oat Creek and Bird Creek flow through the upper end of Hungry Hollow, then cut through the higher elevations of the Dunnigan Hills to flow east rather than south to Cache Creek. The fluvial characteristics of Buckeye Creek are still relatively intact, and the basin is erosional, reflecting the recent uplift of the Dunnigan Hills in combination with the conversion of the landscape to agricultural uses (there are numerous orchards, and the woodlands appear to be more intensively grazed than the prairies farther south). The remnant riparian areas (including the physical and hydrological influences as well as the vegetation) of Buckeye Creek appear to reflect fluvial processes dominated by flashy hydrology.

3.5 Monitoring and Adaptive Management Framework

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval

This section provides an overview of monitoring and adaptive management and the framework that should be used when developing monitoring and adaptive management plans for each MCA located in Yolo County. Monitoring and adaptive management plans will only be required by CDFW for implementation of conservation actions or habitat enhancement actions under MCAs. Monitoring and adaptive management plans are recommended (but not required) for all other conservation actions associated with the RCIS (i.e., those unrelated to an MCA) or LCP.

This section outlines and describes the key elements of the framework. The level of detail and application of the framework will vary depending on the size and complexity of the MCA site or sites, the resources being monitored, and the nature of the conservation or enhancement actions being executed. Unless otherwise determined by CDFW or other participating regulatory agencies, the MCA proponent will need to address the monitoring and adaptive management elements in the

framework described in this section as part of their monitoring and adaptive management plan for an individual site.

A monitoring and adaptive management framework is not required for the LCP, which is a voluntary commitment by citizens and local agencies in Yolo County to develop and implement a conservation plan that goes beyond the required conservation for 12 covered species in the Yolo HCP/NCCP.

A monitoring and adaptive management plan could be developed for any voluntary conservation action in Yolo County (i.e., unrelated to an MCA), but it is not required. Such a monitoring and adaptive management plan consistent with the framework described in this section would provide the same benefits as those described for mitigation actions.

The Conservancy will ensure that monitoring and adaptive management plans or strategies approved under the Yolo RCIS/LCP are compatible with and, to the extent possible, complement the Yolo HCP/NCCP adaptive management program.

3.5.1 Objectives

The overarching objective of monitoring and adaptive management is to ensure conservation actions are being implemented in ways that benefit focal species and other resources credited under the MCA, and contribute to the achievement of conservation goals and objectives stated in the RCIS/LCP. This section presents a framework that should be referenced when developing site-specific monitoring and adaptive management plans for each MCA site(s). Additional objectives of monitoring and adaptive management include the following.

- Create a structured decision-making framework that can be used as the basis for collecting information, verifying hypotheses, and designing and changing management practices.
- Develop and implement effective and efficient monitoring protocols to ensure data collected will inform adaptive management.
- Document the baseline condition of biological resources on mitigation lands and other key habitat outside of mitigation parcels using existing data, modeling, and the results of ongoing field surveys.
- Provide an organizational framework and decision-making process for evaluating monitoring and other data to determine whether and how to adjust management actions.

3.5.2 Phases of Monitoring and Adaptive Management

The monitoring and adaptive management program for any conservation site, once established, should consist of three phases: baseline inventory, management planning, and long-term monitoring and adaptive management.

This section describes key tasks expected in each phase. In general, activities in the baseline inventory phase will occur during the first 1 to 2 years following the commitment to conduct conservation and enhancement actions. The baseline inventory phase will begin as soon as possible after sites for conservation actions are identified and secured (e.g., land acquisition, conservation easement, management agreement with landowner, or other mechanism). In some cases, baseline information may have been collected during the site assessment process. The long-term monitoring

phase will begin on each site after the baseline inventory phase is complete and any near-term restoration or enhancement actions have been largely completed.

3.5.2.1 Baseline Inventory Phase

The baseline inventory phase will occur on new mitigation sites prior to or when they are secured. Baseline information collected during this phase will be used to assess changes in biological resources once conservation actions are applied and will lay the foundation for future monitoring and adaptive management. Inventories may need to occur over multiple seasons to ensure that all focal species present are identified, or to accommodate any climatic variation between years (e.g., below-average rainfall).

The MCA proponent will inventory and assess populations or status (e.g., presence/absence) of focal species, as appropriate, on mitigation properties. At a minimum, baseline data must be designed and collected so that MCA proponents can do the following.

- Measure their contribution to the relevant conservation goals and objectives in this Yolo County RCIS.
- Measure the net ecological gain in the area and quality of habitat or other natural resource values.
- Measure progress towards performance-based milestones and achievement of ecological performance standards to determine when and how many mitigation credits are released.

During the baseline inventory phase, the MCA proponent may also develop and test hypotheses about key relationships between species, habitats, and processes; the identification and assessment of threats and stressors to natural communities and species; the prioritization of conservation actions on the mitigation site; and the selection of biotic and abiotic indicators for evaluating habitat condition over time.

Baseline conditions on the mitigation site need to be documented to enable management planning and to serve as a comparison point for all future monitoring. Accordingly, resources of interest that occur on a site need to be assessed, documented, and mapped. Documenting baseline conditions will consist of historical data and trends, as available and appropriate, and surveys focused on presence/absence of focal species, for which mitigation credit is being sought, and condition of habitats that support those species. If mitigation credit is being sought for other conservation elements (e.g., wildlife linkage implementation, aquatic resources, rare or unique land cover types) those resources should be assessed as well. Baseline assessments of resources that are regulated by other federal, state, or local agencies, or are subject to other permits within CDFW (i.e., LSAA) should be consistent with standards and protocols recognized by those agencies where possible, to create future monitoring efficiency.

3.5.2.2 Planning Phase for Management and Monitoring

Once the baseline condition of the mitigation site is understood, MCA preparers develop the required monitoring and long-term adaptive management plan. The monitoring and long-term adaptive management plan will memorialize the desired outcomes and success criteria for the mitigation site, as described in the MCA. Management and monitoring planning will generally consist of the following tasks.

- Describe management actions that will be used to improve habitat for focal species or conditions for other conservation elements.
- Describe desired outcomes of management actions, including species population response, habitat condition, or change in other conservation element.
- Prioritize implementation of conservation actions to best achieve mitigation objectives.
- Describe monitoring protocols (i.e., methods and equipment used, monitoring frequency, monitoring timing) and identify sampling design.
- Develop criteria for measuring success of any enhancement or restoration efforts.
- Describe condition of infrastructure and necessary infrastructure improvements needed to execute the management program.
- Develop an adaptive management strategy to adjust the monitoring protocols.
- Create and maintain a data repository that includes monitoring and survey results used for tracking progress toward achieving the RCIS/LCP conservation goals and objectives.

As much as possible the management plan should be a practical guide to management and monitoring actions that will occur on the mitigation site over time, written with the land manager and monitors in mind. The RCIS proponent may seek assistance from potential collaborating groups in voluntarily conducting monitoring tasks and carrying out research which may inform adaptations in the understanding on the ecology of the focal species, conservation species, and the conservation principles on which the LCP is based. Examples of potential collaborating groups include county, state, and federal agencies, Resource Conservation Districts, nonprofit conservation organizations, UC Davis, and other academic institutions.

3.5.2.3 Long-Term Monitoring Phase

The planning phase will be followed by long-term monitoring to determine the status and trends of focal species and habitats and the effectiveness of the management of the MCA mitigation site.

The long-term monitoring phase includes the following tasks.

- Monitor species response to any enhancement, restoration, or habitat creation described in the MCA and management plan.
- Monitor restoration sites for success; remediate sites if initial success criteria are not being met. The management plan will identify triggers for remediation, if necessary.
- Assess status and trends of focal species by monitoring species populations, habitat, and other indicators over time.

In many cases, as sites approach and ultimately meet their performance-based metrics, monitoring frequency and intensity can be reduced. Similar to management actions, the monitoring program can change over time in response to the information collected and the trends observed. This adaptive approach to the monitoring program will ensure that enough data is being collected by MCA sponsors to determine whether the mitigation site is performing as expected, while also avoiding unnecessary monitoring costs. The CDFW will verify all determinations of performance made by MCA sponsors.

3.5.2.4 Adaptive Management

Adaptive Management is a decision-making process promoting flexible management such that actions can be adjusted as uncertainties become better understood or as conditions change. Monitoring the outcomes of management is the foundation of an adaptive approach, and thoughtful monitoring can both advance scientific understanding and modify management actions iteratively (Williams et al. 2007).

Adaptive management is necessary because of the degree of uncertainty and natural variability associated with ecosystems and their responses to management. It is possible that additional and different conservation actions not described in the RCIS or MCA will be identified in the future and proven to be more effective. Results of monitoring may also indicate that some management measures are less effective than anticipated. To address these uncertainties, an adaptive approach will be used to inform management on land subject to MCAs.

The cornerstone of a monitoring and adaptive management program is an approach in which monitoring will yield scientifically valid results that inform management decisions. Information collected through monitoring and other experiments will be used to manage mitigation lands and help determine progress towards conservation objectives. The adaptive management process will be administered by the MCA holder in coordination with CDFW.

Adaptive management tasks include the following.

- Evaluate efficacy of monitoring protocols.
- Incorporate best available scientific information into management.
- Review any unexpected or unfavorable results and test hypotheses to achieve desired outcome.
- Adjust management actions and continue to monitor.
- Adjust success criteria and conservation actions, if necessary.

3.5.3 Types of Monitoring

Each MCA sponsor must develop a monitoring plan, which must be approved by CDFW as part of the MCA approval process. The monitoring plan will comprise the two types of monitoring described in this section, routine monitoring and effectiveness monitoring. The monitoring will include protocols, indicators, monitoring schedule, and success criteria based on the guidance offered in this section.

3.5.3.1 Routine Monitoring

Routine monitoring (also known as easement monitoring) tracks the status of mitigation site and documents that the requirements of the conservation easement or other management agreements are being met. Routine monitoring verifies that the MCA holder and landowner (if these are different parties) are carrying out the terms of the MCA and the easement. All MCA sponsors will be required to conduct routine monitoring that will, at a minimum, track the components listed below.

- Maintaining the property in a condition consistent with the easement.
- Maintaining infrastructure and access as stated in the easement.
- Implementing enhancement and restoration actions as described in the MCA.

- Implementing management actions as described in the MCA.
- Reporting of monitoring activities conducted.

3.5.3.2 Effectiveness Monitoring

Effectiveness monitoring assesses the biological success or failure of conservation actions or enhancement actions and is only required on actions that have been approved for mitigation credit under an MCA. Effects monitoring may also be used on voluntary conservation investments in order to determine if management actions are achieving the desired outcomes, but they are not required. Specific detail regarding what needs to be included in a monitoring plan for a mitigation credit agreement is expected to be provided in the forthcoming Program Guidelines for MCAs.

Effectiveness monitoring is focused on the status of focal species or other conservation elements within Yolo County for which mitigation credit has been assigned under the MCA. Understanding the effects of management actions is a critical component of the monitoring and adaptive management program. The purpose of effects monitoring is to ascertain the success of management in achieving desired outcomes, to provide information and mechanisms for altering management if necessary, and to evaluate whether the mitigation credit agreement was successful. Monitoring results may also be used to determine when mitigation credits can be released and when they are available for use or sale. Further, results from effectiveness monitoring can be used to establish how implementation of the MCA or voluntary conservation investment contributes to the achievement of conservation goals and objectives.

Effectiveness monitoring will include the development and assessment of success criteria (i.e., performance-based milestones) for conservation and enhancement actions. The conservation goals and objectives will determine the nature of the success criteria. In other words, success criteria should be structured in a way that allows the MCA proponent, CDFW, or other interested agencies to determine whether implementation of the conservation or enhancement action achieves, or partially achieves, one or more conservation objectives.

3.5.3.3 Key Elements of Monitoring Program

In addition to the guidelines described previously, the following steps are recommended for MCA sponsors and others who implement conservation actions when designing their monitoring program. Utilizing this monitoring design process will help managers to determine necessary changes in management.

- **Determine what to measure.** Establish the attributes or variables that the monitoring will measure to answer the question defined above. This step includes the development of measurable success criteria for evaluating management actions.
    - **Species status.** Monitoring whether species are present and comparing species status (e.g., species health, life history stages, population size) across years can determine whether and how well management actions are working.
    - **Habitat quality**. Monitoring the function and health of certain habitat types can allow for conclusions about several species at one time, without surveying for each species. This includes assessing how species respond to restoration or enhancement actions on mitigation lands.

- **Develop monitoring protocols.** Questions to be answered by the monitoring program will be at the species or habitat level. Monitoring protocols will vary depending on the species or habitat type being monitoring. In some cases, standardized or CDFW-approved protocols exist.[17] When appropriate, those protocols should be used, although sometimes variations in those protocols may be warranted.
- **Ensure monitoring frequency matches need.** Monitoring frequency should be tied directly to the needs of the MCA and the cycles of the focal species and other natural resources. In some cases, especially early in implementation, monitoring may need to occur frequently to ensure conservation and enhancement actions make progress towards performance-based milestones (and, ultimately, credit release). In other cases, monitoring may need to occur more infrequently. Ensure that the frequency of monitoring efforts matches the question being asked. Factors that may influence the frequency or type of monitoring include, but are not limited to, the following.
    - Natural history of the species being monitored.
    - Habitat variability between years due to uncontrollable factors (e.g., rainfall).
    - Variability in species population levels between years due to uncontrollable factors.
    - Variability in habitat quality between potential sampling locations.

Use indicator species, if appropriate. In some cases, groups of species or indicator species will streamline monitoring. Indicators are selected because they are easy to survey and provide usable information on the species, habitat, or ecosystem in question.

[17] However, many CDFW-approved protocols are designed to detect species presence on proposed development sites and may not be suitable for long-term monitoring to detect species trends or responses to management actions.

Chapter 4
Implementation

4.1 Overview

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

Following approval by CDFW, conservation organizations, local and state agencies, landowners, or other private entities can immediately use the RCIS/LCP. These entities can use the RCIS/LCP to inform decisions related to land acquisition, restoration, enhancement, and management actions for focal species, other species, and other conservation elements addressed by the RCIS/LCP. Examples of how these entities may use the RCIS/LCP voluntarily include the following.

- Inform conservation investments made by conservation organizations in the strategy area.
- Inform grant or permit application evaluations made by state or federal agencies for local conservation or research projects.
- Assist with guiding how project proponents site and design proposed compensatory mitigation projects and implement project-level permitting required pursuant to (a) a California Endangered Species Act permit, (b) a lake or streambed alteration agreement under CFGC 1600, (c) a California Environmental Quality Act (CEQA) document, or possibly other state or federal regulatory permits, such as pursuant to the federal Endangered Species Act or Clean Water Act Sections 404 and 401.
- Assist with guiding the establishment of mitigation banks, conservation banks, or development of MCAs by landowners, public agencies, private entities, or other interested entities to facilitate compensatory mitigation.

Once approved, the RCIS component of this RCIS/LCP will be valid for a period of 10 years, or to 2030. CDFW may extend the duration of the RCIS for additional periods of up to 10 years each after the RCIS is updated with new scientific information and if CDFW finds that the RCIS continues to meet the requirements of CFGC 1852 (see Section 4.3.1, *Updating this Strategy*). The LCP component of this RCIS/LCP will not expire. The Conservancy may update the LCP from time to time, based upon responses to climate change or other factors affecting conservation needs in the county.

This chapter describes the RCIS implementation process and provides an overview of the new tool enabled by the RCIS, an MCA. This chapter also identifies RCIS/LCP implementation tasks required by the CFGC and the RCIS Program Guidelines (California Department of Fish and Wildlife 2017) and suggests optional tasks that exceed those requirements. For the purposes of this RCIS/LCP, the *RCIS proponent* is the entity or entities responsible for conducting the two tasks required by the CFGC and the RCIS Program Guidelines and described in Section 4.3, *Required RCIS Implementation.* The Conservancy was the public agency RCIS proponent to prepare this RCIS/LCP and submit it for CDFW's approval of the RCIS component of the document. The Conservancy and DWR are the RCIS coproponents of the Yolo RCIS/LCP.

Items that are suggestions and not requirements are denoted as those tasks the implementation coproponents *may* do, as opposed to required elements that they *will* do or *shall* do. Section 4.4, *Optional RCIS and LCP Implementation Activities*, describes tasks that are not required, but are

recommended and may prove helpful. Anyone may perform or support the optional tasks. Voluntary users of the RCIS/LCP conservation actions will collectively implement the RCIS/LCP. These users could include any or all of the entities listed above.

4.2 Goals of Implementation

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The RCIS/LCP provides information to facilitate conservation actions or habitat enhancement actions in the strategy area, preferably through multi-benefit projects, where feasible. These actions may include those driven by regulatory needs (primarily in the form of mitigation), as well as voluntary conservation actions. State and local agencies developed this RCIS/LCP to guide investments in conservation, infrastructure, and compensatory mitigation; promote a balanced approach to conservation compatible with existing land uses, such as agriculture; and help ensure conservation actions in the strategy area achieve a high degree of conservation benefit at a regional scale.

4.3 Required RCIS Implementation

This section is applicable to the RCIS only and is subject to CDFW review and approval.

The RCIS component of this RCIS/LCP may be used by anyone or any agency to develop an MCA. For an RCIS to support an MCA, CFGC 1856(b) lists three elements that an RCIS must include.

(1) An adaptive management and monitoring strategy for conserved habitat and other conserved natural resources.

(2) A process for updating the scientific information used in the strategy, and for tracking the progress of, and evaluating the effectiveness of, conservation actions and habitat enhancement actions identified in the strategy, in offsetting identified threats to focal species and in achieving the strategy's biological goals and objectives, at least once every 10 years, until all mitigation credits are used.

(3) Identification of a public or private entity that will be responsible for the updates and evaluation required pursuant to paragraph (2).

This RCIS has been written so that it can support MCAs. The adaptive management and monitoring framework is described in Section 3.5, *Monitoring and Adaptive Management Framework*. The responsibilities of the RCIS coproponents and their partners to update the RCIS and track its progress are described in the following subsections.

4.3.1 Updating this Strategy

In compliance with CFGC 1856(b), the Conservancy and DWR will at least once every 10 years conduct a review to update and refine, if necessary, the strategy based on current scientific information. The RCIS coproponents may use various data sources to inform the update, including, but not limited to, recent scientific literature, technical reports or studies, and guidance from regulatory agencies. The review may reconsider the assumptions on which the strategy was built, particularly related to focal species and conservation priorities. The RCIS coproponents may present the results of this either as part of a progress report (Section 4.4.1, *Progress Report*) or as a stand-

alone document. If the results of this review reveal that fundamental aspects of this RCIS are no longer valid, the RCIS coproponents may elect to amend this RCIS to address the changes, as outlined in Section 4.7, *Amending the RCIS*.

4.3.2 Assessing Progress

To comply with CFGC 1856(b) for the RCIS, the RCIS coproponents will, in coordination with CDFW, conduct the following tasks at least once every 10 years or until all mitigation credits created by MCAs in the Strategy Area are used.

- Track whether conservation actions and habitat enhancement actions identified in Chapter 3, *Conservation Strategy*, have been implemented.
- Evaluate the effectiveness of conservation actions and habitat enhancement actions identified in Chapter 3, *Conservation Strategy*, in
    - offsetting identified threats to focal species, and
    - achieving the conservation goals and objectives of the RCIS.

Sponsors of MCAs are required to track the same information for their MCA and report it annually to CDFW and the public (see Section 4.6.1, *Mitigation Credit Agreements*). Therefore, to track the progress of all MCAs in the strategy area, the RCIS coproponents will simply compile the information provided by MCA sponsors to date. If the RCIS is used by other parties, such as state or local agencies (e.g., to inform or evaluate grant applications) or conservation organizations, the RCIS coproponents should contact those parties to determine how the RCIS was used, and the conservation outcomes of that use (if known or monitored). To aid in the data collection, the RCIS coproponents mays develop a template questionnaire or data form.

There are no requirements for how the progress assessment should be provided to CDFW. The RCIS coproponents will work with CDFW to determine an acceptable format for the progress assessment.

4.3.3 Funding for Required RCIS Implementation Tasks

The amount of effort required for the RCIS coproponents to conduct the two implementation tasks described above will depend on how much the RCIS/LCP is used voluntarily. For example, if there are multiple MCAs developed, each with several species covered, there could be considerable work needed to assess implementation progress cumulatively across these MCAs. Similarly, if the RCIS is used by numerous local conservation organizations and local and state agencies, then it may take substantial work to obtain this information and compile it to assess RCIS progress. In contrast, if there are no MCAs and little use of the RCIS by others, the implementation tasks will be relatively simple.

Currently, there is no funding source(s) identified for the RCIS coproponents to conduct the required implementation tasks. The RCIS coproponents would need to secure funding for these tasks during implementation or partner with other agencies or organizations to conduct the tasks on its behalf. As of the date of preparation of the RCIS/LCP, DWR and the Yolo Habitat Conservancy have agreed in an MOU to share implementation responsibility and DWR will pay for the cost of the Conservancy's involvement.

This strategy assumes that entities pursuing MCAs under the RCIS would fully fund their involvement in, and development of, those MCAs, including the required annual reporting to CDFW and the public. Therefore, the RCIS coproponents would bear no financial responsibility for development or monitoring of MCAs (unless the RCIS coproponents developed its own MCA), with the exception of receiving information from MCA proponents and compiling information as discussed above.

4.4 Optional RCIS and LCP Implementation Activities

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The following subsections describe optional tasks that the RCIS coproponents may consider to further support the RCIS and LCP.

4.4.1 Progress Report

The RCIS coproponents may prepare an RCIS/LCP implementation progress report. Progress reports may prove useful in communicating the progress made toward achieving the conservation goals and objectives in the RCIS. If prepared, the progress report could include the following.

- An overview of the conservation actions the RCIS coproponents and implementation committee is aware of, and only those specifically implemented under this RCIS/LCP.
- An assessment of progress in offsetting identified threats to focal species and other conservation elements and in achieving this RCIS/LCP's conservation goals and objectives.
- An evaluation of the effectiveness of conservation actions and habitat enhancement actions in offsetting identified threats to focal species and in achieving the strategy's conservation goals and objectives.

MCA proponents must conduct monitoring of their conservation actions to determine whether they have met performance-based milestones that allow release of mitigation credits. MCA proponents provide these reports to CDFW, who must post them online. The implementation committee, if created, can use these public reports, and other data, to assess the progress and effectiveness of conservation actions in the strategy area to contribute to the RCIS/LCP conservation goals and objectives.

4.4.2 Implementation Committee

The RCIS coproponents may choose to team with other public agencies, organizations, or collaborators to form an RCIS implementation committee to help guide implementation and updates of the RCIS/LCP, particularly in instances where implementation of this RCIS/LCP would support the missions of these other organizations. Potential implementation committee members may include representatives from the following organizations.

- Yolo County
- The Conservancy
- City of Davis

- City of Woodland
- City of West Sacramento
- City of Winters
- UC Davis
- Non-profit organizations based in the strategy area or that conducts a substantial amount of conservation work within the strategy area
- Other interested jurisdictions or parties

The role of the implementation committee would be to periodically assist the RCIS proproponent on all aspects of implementation. The implementation committee may also choose to serve as a group to help inform and educate potential RCIS/LCP users of how it can be used and the benefits it provides. The implementation committee will not arbitrate or negotiate mitigation on behalf of project proponents. Such responsibility will remain with the entity pursuing the mitigation and the regulatory agencies.

In summary, the following are potential roles for the implementation committee (this list is not exhaustive).

- Publicize the RCIS/LCP and its successful implementation to participating agencies and other entities that may use it to inform conservation actions and habitat enhancement actions in the strategy area.
- Answer questions from users and potential users of the RCIS/LCP.
- Develop guidance, as needed, to clarify and refine components of the RCIS/LCP.
- Assist with preparation of the progress report, or other documents for CDFW, as needed, documenting the implementation of the RCIS and MCAs, as appropriate.
- Support the RCIS coproponents in undertaking periodic updates of the RCIS (at least every 10 years) based on significant new information on the focal species and their conservation.

If established, the implementation committee should meet periodically (e.g., annually) to review how the RCIS/LCP is being utilized and to assess whether information updates or an amendment is needed.

4.4.3 Public Meeting

The RCIS coproponents or one of their partners may host periodic public meetings to update the general public on the progress and challenges with RCIS and LCP implementation. The meeting is an opportunity to update the public on any changes the RCIS coproponents have made to the RCIS/LCP, including the addition of any new information. The RCIS coproponents may organize this meeting to coincide with the release of any progress reports. The RCIS coproponents would develop the agenda for the meeting in cooperation with the advisory committee (Section 4.4.4., *Public Advisory Committee*) to ensure the general public an opportunity to discuss key issues related to implementation.

4.4.4 Public Advisory Committee

The implementation committee may form a public advisory committee to discuss technical issues, and lessons learned, as well as make recommendations to the implementation committee or RCIS coproponents for improvements to the process. The committee could include conservation scientists, species experts with knowledge of the strategy area, and other interested parties, and stakeholders, such as climate scientists, representatives from the environmental community, development community, agricultural community, private landowner community, mitigation banking community, or other specialists who can knowledgably inform the implementation of the RCIS/LCP. Resource agencies and local jurisdictions may send representatives to advisory committee meetings who have appropriate technical expertise. At a minimum, the committee would meet once a year. Additional meetings would be scheduled if needed. The responsibilities of the committee could include the following.

- Review any new information and progress in implementation.
- Monitor progress toward achieving the conservation goals and objectives.
- Evaluate and make recommendations to the implementation committee concerning the effectiveness of the RCIS/LCP and its implementation.
- Recommend key issues to discuss during the public meeting.

The public advisory committee may be the same as the Implementation Advisory Committee for the Yolo HCP/NCCP.

4.5 Other Optional LCP Implementation Activities

This section is applicable to the LCP only, and is not subject to CDFW review or approval.

There is no requirement to update the LCP. However, the RCIS coproponents and their partners may choose to update the LCP components of this RCIS/LCP at the same time as the RCIS component is updated, or at other times during the life of the LCP as warranted by conditions in Yolo County, such as climate change. If the RCIS is not updated, the Conservancy should update the LCP every 15 years as funding is available.

4.6 Regulatory Uses of the RCIS

This section is applicable to the RCIS only and is subject to CDFW review and approval.

4.6.1 Mitigation Credit Agreements

The following generally describes the process for developing MCAs. See the CDFW website for the latest MCA guidelines (https://www.wildlife.ca.gov/Conservation/Planning/Regional-Conservation).

An important benefit of the RCIS component of the RCIS/LCP is that once it is approved by CDFW, it allows anyone to create an MCA within the strategy area. A landowner, private entity, nonprofit organization, or state or local public agency may apply to CDFW for an MCA to create mitigation

credits for use or sale, consistent with the conservation goals and objectives of this RCIS/LCP. An MCA identifies the type and number of credits a person or entity proposes to create by implementing one or more conservation actions or habitat enhancement actions, as well as the terms and conditions under which project proponents may use those credits. Typically, project proponents use credits to meet compensatory mitigation obligations for impacts on focal species, habitat for focal species, and other conservation elements (FGC 1856(a)). Applicants for an MCA are called an *MCA sponsor.*[18] The MCA sponsor must prepare MCAs according to the requirements of CFGC 1856 and any mandated elements of the MCA Guidelines.

An MCA helps establish advance mitigation and can provide a number of significant benefits, particularly for agencies or entities with predictable long-term mitigation needs. As summarized below, once mitigation credits are established, project proponents with compensatory mitigation needs may purchase these credits from the MCA sponsor. Alternatively, the MCA sponsor may use the credits for their own compensatory mitigation needs.

An MCA is designed primarily to address the mitigation needs of project proponents under California laws such as CESA, Native Plant Protection Act, California Environmental Quality Act, or Fish and Game Code section 1600 et seq., Lake and Streambed Alteration Program. However, MCA sponsors may design and create mitigation credits to meet the mitigation requirements associated with federal environmental laws and regulations with the approval of applicable federal regulatory agencies.

4.6.1.1 Developing Mitigation Credit Agreements

MCAs identify the types and amounts of mitigation credits that implementation of conservation actions will create and provide a schedule for their release based on relevant implementation milestones (e.g., land protection, restoration goal achievement). The MCA sponsor establishes these implementation milestones, subject to CDFW approval. MCA sponsors can propose mitigation credits for any conservation action that contributes to the achievement of conservation goals and objectives outlined in this RCIS/LCP. CDFW can approve the release of all credits after the MCA sponsor meets performance-based milestones established by the MCA.

Typically, applicants will establish mitigation credits by undertaking the following types of conservation actions and habitat enhancement actions.

- Permanent acquisition of land development rights and protection of land in perpetuity.
- Restoration of resources that create new or increased existing habitat function for a focal species, or other conservation elements.
- Enhancement of habitat for focal species, including habitat connectivity.

An MCA developed under the RCIS/LCP must also be consistent with any previously approved or amended RCIS, the Yolo HCP/NCCP, a state or federal recovery plan, or other state or federal approved conservation strategy that overlaps with the strategy area (Section 2.12, *Regional Conservation Planning Environment*). The Conservancy will determine whether an MCA is consistent with the Yolo HCP/NCCP. An MCA must also take into account any approved mitigation bank and

[18] The *MCA sponsor* is the entity who will design and implement the proposed conservation actions or enhancement actions that generate the mitigation credits. The MCA sponsor can be the landowner on which those actions will occur, a third party, or both.

available mitigation credits at these banks in the strategy area (Section 2.12.6, *Mitigation and Conservation Banks*).

4.6.1.2 Mitigation Credit Agreements and the Yolo HCP/NCCP

MCA sponsors who wish to create mitigation credits are required by CFGC 1856(j) to avoid duplicating or replacing the mitigation requirements in any approved NCCP in the RCIS strategy area. To ensure this, MCA sponsors seeking to create mitigation credits must coordinate with the NCCP's implementing entity (the HCP/NCCP implementing entity is the Conservancy) to determine consistency with the Yolo HCP/NCCP prior to approval of those credits by CDFW

The Yolo HCP/NCCP requires all projects and activities covered by the plan to pay fees or provide other types of equivalent mitigation. To ensure the financial integrity of NCCPs, CFGC 1856(j) also requires that mitigation credits created by an MCA can only be used for covered activities under the approved NCCP only in accordance with the requirements of that NCCP. Also as required by CFGC 1856(j), a project proponent that is eligible for coverage under the Yolo HCP/NCCP as a special participating entity[19] may use mitigation credits created through an MCA under the RCIS/LCP only if the Conservancy declines to extend coverage under the HCP/NCCP to the project proposed by that eligible individual or entity.

4.6.2 Conservation or Mitigation Banks

An important potential use of this RCIS/LCP is by conservation or mitigation bankers who wish to establish a bank in the strategy area. A conservation or mitigation bank is privately or publicly owned land that is managed for its natural resource values, with an emphasis on a target resource such as a listed species or important natural community. Conservation banks may include restoration projects, but they focus more heavily on the protection and management of occupied habitats of the target species. In exchange for permanently protecting and managing the land—and in the case of mitigation banks, restoring or creating natural resources—the bank operator is allowed to sell credits to project proponents who need to satisfy legal requirements for compensating environmental impacts of development projects.

The goals of private mitigation banks are often compatible with and support regional conservation strategies such as the Yolo RCIS/LCP. (See Section 2.12.6 for information on the conservation and mitigation banks with available credits whose service area overlaps the strategy area.) Therefore, individuals interested in establishing conservation or mitigation banks in the strategy area are encouraged to review the conservation goals and objectives and priority conservation actions described in Chapter 3, *Conservation Strategy*. This information is intended to provide guidance for future mitigation and conservation banks in Yolo County.

Private parties wishing to develop and establish a new mitigation or conservation bank in the strategy area should also consult guidance and instructions provided by CDFW and USFWS.[20]

[19] See Yolo HCP/NCCP Chapter 7 for description of special participating entities, which are the same as "participating species entities" in CFGC 1856(j).

[20] For additional information on banking, see the following websites: <https://www.wildlife.ca.gov/Conservation/Planning/Banking> and <www.fws.gov/sacramento/es/cons_bank.htm>.

4.6.3 In-Lieu Fee Programs

In-lieu fee programs are identified by 33 CFR Part 332, Compensatory Mitigation for Losses of Aquatic Resources (also known as the Mitigation Rule), as a preferred approach to meeting compensatory mitigation needs for adverse effects on waters of the United States, second to mitigation banks. As defined in 33 CFR 332.2, an in-lieu fee program involves:

> . . . the restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for DA [Department of the Army] permits. Similar to a mitigation bank, an in-lieu fee program sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the in-lieu program sponsor. However, the rules governing the operation and use of in-lieu fee programs are somewhat different from the rules governing operation and use of mitigation banks. The operation and use of an in-lieu fee program are governed by an in-lieu fee program instrument.

The National Fish and Wildlife Foundation's (NFWF) Sacramento District operates an in-lieu fee program that provides mitigation credits for impacts on aquatic species and habitats covered under the Clean Water Act, Rivers and Harbor Act, Porter-Cologne Water Quality Control Act, and ESA. The operational area for the in-lieu fee program mirrors the USACE Sacramento District's jurisdictional boundary in California, covering the Central Valley, the Sierra Nevada, and the northeastern corner of the state. NFWF offers two categories of mitigation credits: (1) vernal pool credits for impacts on vernal pool wetlands in 12 vernal pool service areas, and (2) aquatic resource credits for impacts to wetlands, other waters of the United States, waters of the state, and aquatic species. Watershed boundaries divide the aquatic resource areas to capture the headwaters and floodplains associated with the major river systems in the Central Valley. The Cache/Putah aquatic resource service area entirely overlaps Yolo County. The Solano-Colusa vernal pool service area overlaps the central portion of Yolo County, excluding both the eastern and western edges. The NFWF in-lieu fee program is approved for use by the regulatory agencies that govern the environmental acts described above (National Fish and Wildlife Foundation 2017).

This RCIS can assist in informing the siting, design, and management of wetland mitigation projects under in-lieu fee programs.

4.7 Extending and Amending the RCIS

This section is applicable to the RCIS only and is subject to CDFW review and approval.

Under current state law, CDFW may extend the duration of an approved or amended RCIS for additional periods of up to 10 years upon finding that the RCIS/LCP is updated with new scientific information and that the RCIS continues to meet the requirements of CFGC 1852.

Additionally, CDFW may review and approve an amended RCIS through the amendment process described in CFGC 1854 (a), which states, "For purposes of this section, an amended strategy means a complete regional conservation investment strategy prepared by a public agency to amend substantially and to replace an approved strategy submitted by the public agency."

The process and timelines for amending an existing RCIS are the same as for developing a new RCIS, including requirements for public outreach and CDFW review and approval. An RCIS may be amended for a variety of reasons, which may include one or more of the following.

- Changing the strategy area.
- Adding or removing focal species.
- Substantially changing the conservation goals and objectives of focal species or other conservation elements.
- Substantial advancement in the best available science on which the conservation goals and objectives are based (e.g., climate change projections).

4.8 Conservation Partners

This section is applicable to both the RCIS and the LCP and is subject to CDFW review and approval.

The Yolo RCIS/LCP provides a framework for identifying regional conservation priorities and actions for focal species and other conservation elements within the strategy area. The conservation goals and objectives are designed to be broad-based yet comprehensive in identifying those actions necessary to ensure the long-term conservation of the focal species and conservation species addressed by this RCIS/LCP. While centered on focal species, this RCIS also addresses other key conservation elements, including habitat connectivity and wildlife linkages, working landscapes, natural communities, and conservation species in the strategy area. As such, a combination of conservation investments, conservation actions, and compensatory mitigation completed outside of an MCA will likely be needed to achieve this RCIS/LCP's conservation goals and objectives. The RCIS/LCP also anticipates that success in meeting the conservation goals and objectives will require flexibility, creativity, and establishment of partnerships in conservation.

To that end, the Yolo RCIS/LCP encourages agencies and organizations that choose to use the RCIS/LCP to guide their conservation investments to consider partnerships. The needs and goals of other agency or organization partners operating in the strategy area may help support more robust and more effective implementation of conservation priorities. The following entities, among others, are currently engaged in conservation activities in the strategy area.

- American Rivers
- Audubon California
- BLM
- Cache Creek Conservancy
- CDFW
- DWR
- California Invasive Plant Council
- California Native Plant Society
- California Waterfowl Association
- Center for Land Based Learning
- City of Davis
- City of Woodland

- City of West Sacramento
- City of Winters
- Delta Conservancy
- Lower Putah Creek Coordinating Committee
- NMFS
- Natural Resources Conservation Service, Wetlands Reserve Program
- Putah Creek Council
- Sierra Club
- The Nature Conservancy
- Tuleyome
- UC Davis
- USFWS
- Yolo Basin Foundation
- Yolo County
- Yolo County Resource Conservation District
- The Yolo Habitat Conservancy

The implementation committee, when and where appropriate, will look for innovative ways to support others taking the lead in making conservation investments and developing MCAs provided that they are consistent with this RCIS/LCP and would help to achieve its goals and objectives.

Chapter 5
Preparers and Reviewers

5.1 Yolo RCIS/LCP Steering Committee

Yolo RCIS/LCP Steering Committee members are listed below, in alphabetical order of last name.

Chris Alford	Yolo Habitat Conservancy
Ellen Berryman	ICF
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John Cain	American Rivers
Graham Chisolm	Conservation Strategy Group
Laura Hollender	California Department of Water Resources
Dan Kaiser	Environmental Defense Fund
Petrea Marchand	Yolo Habitat Conservancy
Philip Pogledich	Yolo County
Chad Roberts	Representative of Advisory Committee (see below)
Kris Tjernell	Formerly California Natural Resources Agency, now DWR
Sam Uden	Conservation Strategy Group
Cynthia Vitale	Conservation Strategy Group
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[21] Prior to 2012, referred to as the "Steering Advisory Committee."

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Chapter 6
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