



DRAFT WATER MANAGEMENT COMPANION PLAN

Fall 2015



Photo Credit:

Left:

Lake Shasta, California

Date: 19 July 2010

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Right:

Monarch Butterfly

Date: 17 March 2006

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Prepared by Blue Earth Consultants, LLC



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Disclaimer:

While we have made every effort to ensure that the information contained in this report accurately reflects SWAP 2015 companion plan development team discussions shared through web-based platforms, e-mails, and phone calls, Blue Earth Consultants, LLC makes no guarantee of the completeness and accuracy of information provided by all project sources. SWAP 2015 and associated companion plans are non-regulatory documents. The information shared is not legally binding nor does it reflect a change in the laws guiding wildlife and ecosystem conservation in the State. In addition, mention of organizations or entities in this report as potential partners does not indicate a willingness and/or commitment on behalf of these organizations or entities to partner, fund, or provide support for implementation of this plan or SWAP 2015.

The consultant team developed companion plans for multiple audiences, both with and without jurisdictional authority for implementing strategies and conservation activities described in SWAP 2015 and associated companion plans. These audiences include, but are not limited to, California Department of Fish and Wildlife leadership team and staff, California Fish and Game Commission, cooperating State, Federal, and local government agencies and organizations, California Tribes and tribal governments, and partners (such as non-governmental organizations, academic, research institutions, and citizen scientists).



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Acronyms and Abbreviations

AB	Assembly Bill
ACWA	Association of California Water Agencies
AFWA	Association of Fish and Wildlife Agencies
Blue Earth	Blue Earth Consultants, LLC
CalEPA	California Environmental Protection Agency
CASGEM	California Statewide Groundwater Elevation Monitoring
CBC	California Biodiversity Council
CDFA	California Department of Food and Agriculture
CDFW/the Department	California Department of Fish and Wildlife
CEC	California Energy Commission
Ch.	Chapter
CNRA	California Natural Resources Agency
CVP	Central Valley Project
Delta Conservancy	Sacramento-San Joaquin Conservancy
DOGGR	Division of Oil, Gas and Geothermal Resources
DRECP	Desert Renewable Energy Conservation Plan
DWR	California Department of Water Resources
EQIP	Environmental Quality Incentives Program
GAMA	Groundwater Ambient Monitoring and Assessment
HCP	Habitat Conservation Plan
IRWMP	Integrated Regional Water Management Plan
KEA	Key Ecological Attribute
LAFCO	Local Agency Formation Commission for San Bernardino County
LCC	Landscape Conservation Cooperative
MAF	Million Acre-Feet
NCCP	Natural Community Conservation Plan
NGO	Non-Governmental Organization
NRCS	Natural Resources Conservation Service
NOAA	National Oceanic and Atmospheric Administration
RAMP	Regional Advance Mitigation Planning
RCD	Resource Conservation District
RWQCB	Regional Water Quality Control Board
SGC	Strategic Growth Council
SGCN	Species of Greatest Conservation Need
SNC	Sierra Nevada Conservancy
SWAMP	Surface Water Ambient Monitoring Program
SWAP	State Wildlife Action Plan
SWG	State and Tribal Wildlife Grants
SWP	State Water Project
SWRCB	State Water Resources Control Board



TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
USACE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WCB	Wildlife Conservation Board
WIP	Watershed Improvement Program

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1. Introduction

The California State Wildlife Action Plan 2015 Update (SWAP 2015) provides a vision and a framework for conserving California’s diverse natural heritage. SWAP 2015 also recognizes the need and calls for developing a collaborative framework to manage ecosystems sustainably across the State in balance with human uses of the natural resources. To address the need for a collaborative framework, California Department of Fish and Wildlife (CDFW), Blue Earth Consultants, LLC (Blue Earth), and partner agencies and organizations began preparation of sector-specific companion plans. While this document reports on the progress made thus far on collaboration, the intent is to set a stage for achieving the State’s conservation priorities through continued partnership and by mutually managing and conserving the State’s natural and cultural resources. Text box 2 highlights important definitions to SWAP 2015 and the companion plan process (CDFW, 2015; Chapter [Ch.] 1.5.4).

Text Box 1. What is a State Wildlife Action Plan?

In 2000, Congress enacted the State and Tribal Wildlife Grants (SWG) program to support state programs that broadly benefit wildlife and habitats, but particularly “Species of Greatest Conservation Need” (SGCN) defined by the individual states. Congress mandated each state and territory to develop a SWAP that outlined a comprehensive wildlife conservation strategy to receive federal funds through the SWG program. From 2005 through 2014, CDFW received approximately \$37 million through the SWG program in matched with approximately \$19 million in State government support for the wildlife conservation activities. The SWG program requires SWAP updates at least every 10 years. CDFW prepared and submitted SWAP 2015, the first comprehensive update of the California SWAP 2005, to the U.S. Fish and Wildlife Service (USFWS) on 10/1/2015. The update allows CDFW to expand and improve the recommended conservation activities addressed in the original plan by integrating new knowledge acquired since 2005.¹

¹ For more information see: CDFW, “California State Wildlife Action Plan (SWAP),” 2015, 27 Oct. 2015.

Text Box 2. Definitions Important to SWAP 2015

Conservation Target: An element of biodiversity at a project site, which can be a species, habitat/ecological system, or ecological process on which a project has chosen to focus.

Goal: A formal statement detailing a desired outcome of a conservation project, such as a desired future status of a target. The scope of a goal is to improve or maintain *key ecological attributes* (defined below).

Key Ecological Attribute (KEA): Aspects of a target’s biology or ecology that, if present, define a healthy target and, if missing or altered, would lead to the outright loss or extreme degradation of the target over time.

Objective: A formal statement detailing a desired outcome of a conservation project, such as reducing the negative impacts of a critical *pressure* (defined below). The scope of an objective is broader than that of a goal because it may address positive impacts not related to ecological entities (such as getting better ecological data or developing conservation plans) that would be important for the project. The set of objectives developed for a conservation project are intended, as a whole, to lead to the achievement of a goal or goals, that is, improvements of key ecological attributes.

Pressure: An anthropogenic (human-induced) or natural driver that could result in changing the ecological conditions of the target. 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.

Species of Greatest Conservation Need (SGCN): All state and federally listed and candidate species, species for which there is a conservation concern, or species identified as being vulnerable to climate change.

Strategy: A group of actions with a common focus that work together to reduce pressures, capitalize on opportunities, or restore natural systems. A set of strategies identified under a project are intended, as a whole, to achieve goals, objectives, and other key results addressed under the project.

Stress: A degraded ecological condition of a target that resulted directly or indirectly from negative impacts of pressures (e.g., habitat fragmentation).

(CDFW, 2015; Ch. 1.5.4)



1.1 SWAP 2015 Statewide Goals

SWAP 2015 has three statewide conservation goals with 12 sub-goals, under which individual regional goals are organized (CDFW, 2015; Ch. 4.1). These statewide goals set the context for the companion plans and SWAP 2015 implementation.

Goal 1 - Abundance and Richness: Maintain and increase ecosystem and native species distributions in California while sustaining and enhancing species abundance and richness.

Goal 2 - Enhance Ecosystem Conditions: Maintain and improve ecological conditions vital for sustaining ecosystems in California.

Goal 3 - Enhance Ecosystem Functions and Processes: Maintain and improve ecosystem functions and processes vital for sustaining ecosystems in California.

1.2 SWAP 2015 Companion Plans

Need for Partnerships

The state of California supports tremendous biodiversity. However, the State also has a large and growing human population and faces many challenges, such as climate change, which affects biodiversity and natural resources in general. To balance growing human activities with conservation needs for sustaining the State’s ecosystems, collaboratively managing and conserving fragile natural resources is a necessity. As many desirable conservation actions identified under SWAP 2015 are beyond CDFW’s jurisdiction, the Department determined that more detailed coordination plans are needed in line with and beyond the recommendations presented in SWAP 2015. Called “companion plans,” these sector-specific plans (Text Box 3) were created collaboratively with partners and will be instrumental in implementing SWAP 2015 (See Appendix D for a list of partners that informed development of this companion plan).

Text Box 3. Companion Plan Sectors:

- ☞ Agriculture
- ☞ Consumptive and Recreational Uses
- ☞ Energy Development
- ☞ Forests and Rangelands
- ☞ Land Use Planning
- ☞ Marine Resources
- ☞ Transportation Planning
- ☞ Tribal Lands
- ☞ Water Management

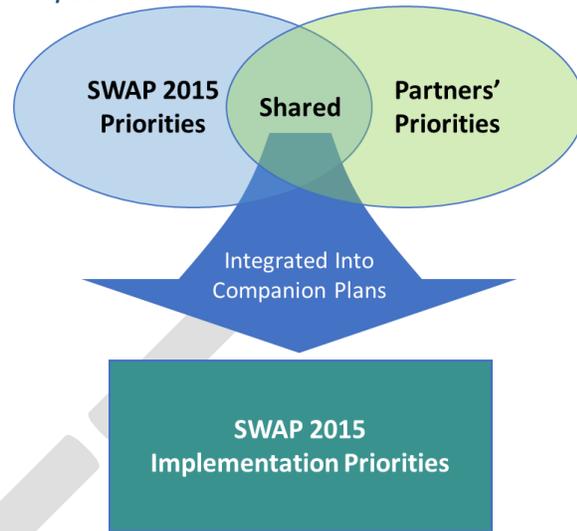
Companion Plan Purpose and Sector Selection

Companion plans present shared priorities identified among SWAP 2015 and partners involved in the companion plan development. Figure 1 illustrates how, through collaboration with partner organizations, priorities for SWAP 2015 have come together in the companion plan and will be elevated as high implementation priorities for SWAP 2015.

The companion plans respond to feedback from many sources, including CDFW staff and partners who support natural resources management and conservation. This includes the California Biodiversity Council (CBC), under which a resolution to promote interagency alignment within the State was signed

in 2013. The companion plans also fulfill the strong suggestion from the Association of Fish & Wildlife Agencies (AFWA) and the National Fish, Wildlife, and Plants Climate Adaptation Strategy¹ to incorporate increased partner engagement as a best practice in wildlife conservation planning. This effort also directly helps CDFW comply with recently added provisions to the Fish and Game Code under Assembly Bill (AB) 2402, specifically under Section 703.5(b), which states that CDFW shall “seek to create, foster, and actively participate in effective partnerships and collaborations with other agencies and stakeholders to achieve shared goals and to better integrate fish and wildlife resource conservation and management with the natural resource management responsibilities of other agencies” (California Fish and Game Code, 2015).

Figure 1: Alignment of SWAP 2015 and Partner Priorities in Companion Plans



CDFW selected sector categories based on the needs for the Department as well as the themes and subjects identified in other existing plans including the California Climate Adaptation Strategy,² 2014 update to the Safeguarding California: Reducing Climate Risk,³ The President’s Climate Action Plan,⁴ and the National Fish, Wildlife, and Plants Climate Adaptation Strategy.⁵

Because each companion plan focused on teamwork during its development phase, they inherently help set a stage for implementing SWAP 2015 through future collaborations. Together, SWAP 2015 and associated companion plans describe the context and strategic direction of integrated planning and management efforts that will help sustain California’s ecosystems.

Companion Plan Development

The SWAP 2015 companion plan **management team** (see Appendix C for a list of members), comprised of CDFW staff with support from Blue Earth staff, provided general direction to the **development team** (see Appendix D for a list of members). Blue Earth facilitated sector-specific discussions among the CDFW staff and development team members, who represented a cross section of sector interests and

¹ For more information, see: USFWS and National Oceanic Atmospheric Administration (NOAA), “National Fish, Wildlife, and Plants Adaptation Strategy,” 2012. Web. 27 Oct. 2015. <http://www.wildlifeadaptationstrategy.gov/>.

² For more information, see: California Natural Resources Agency (CNRA), “Climate Adaptation Strategy,” 2009. Web. 27 Oct. 2015. http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf.

³ For more information, see: CNRA, “Safeguarding California: Reducing Climate Risk – Update,” 2014. Web. 27 Oct. 2015. http://resources.ca.gov/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf.

⁴ For more information, see: Executive Office of the President, “The President’s Climate Action Plan,” 2013. Web. 27 Oct. 2015. <https://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>.

⁵ For more information, see: USFWS and NOAA, “National Fish, Wildlife, and Plants Adaptation Strategy,” 2012.



mandates. Team members were selected based on their positive response to outreach efforts by CDFW to seek participation and representation from public and private partners heavily involved in the conservation and management of the State's natural resources.⁶

Beginning in early 2015, a series of four planning and collaboration meetings were held for each sector. The meetings consisted of an initial kickoff session with participation from all sectors followed by three sector-specific meetings. During these meetings, development team participants discussed their ongoing and potential future efforts that would benefit wildlife and habitat conservation in the State. The development teams and CDFW then identified collaboration opportunities and joint priorities or overlaps among SWAP 2015 and partners' strategies and actions. Blue Earth and CDFW organized the feedback from the facilitated development team discussions into nine companion plan documents. In addition, the management team led a review process between CDFW and development team partners, along with a subsequent public review phase for the nine companion plan documents.

Companion Plan Content

Each companion plan addresses:

- SWAP 2015 priorities - statewide goals and strategies;
- companion plan overview - approach, purpose, development process, and content;
- description of the sector;
- common themes across the sectors;
- common priority pressures and strategies across the sectors;
- SWAP 2015 components that best align with the priorities of the participants' organizations under each sector;
- collaboration opportunities identified for joint priorities under each sector – alignment opportunity and potential resources by jurisdiction, locality, and strategy;
- considerations for evaluating future collaboration efforts and desired outcomes/outputs; and
- next steps relevant to the sector.

2. Water Management Sector

2.1 Water Management in California

California covers nearly 156,000 square miles of land, has more than 1,100 miles of coastline, and is home to over 38 million people (U.S. Census Bureau, 2010). California receives 200 million acre-feet of water on average from precipitation and regional imports from Oregon, the Colorado River, and Mexico (California Department of Water Resources [DWR], 2014). Native vegetation, evaporation into the atmosphere, agricultural crops and wetlands, and flows to other states or the ocean use 50-60% of this water (DWR, 2014). The remaining water is dedicated to urban and agricultural uses, environmental

⁶ Disclaimer: Although the management team sought to engage a broad range of partners in the development team process, CDFW recognizes that there are many other partners that will play important roles in implementing SWAP 2015 and companion plan.

restoration, and storage for future use (Text Box 4). Water distribution ranges between 9-13% for urban uses, 31-48% for agricultural uses, and 40-60% for environmental water in wet to dry years (DWR, 2014). In 2010, an “average” year, the water use distribution ranged from 49% for environmental use, 41% for agricultural use, and 10% for urban use. Average total water usage for the 10-year period between 2001-2010 shows environmental water at 46%, agriculture at 43%, and urban use at 11% of the total water use in the State, totaling about 82 million acre-feet (MAF) (DWR, 2014).

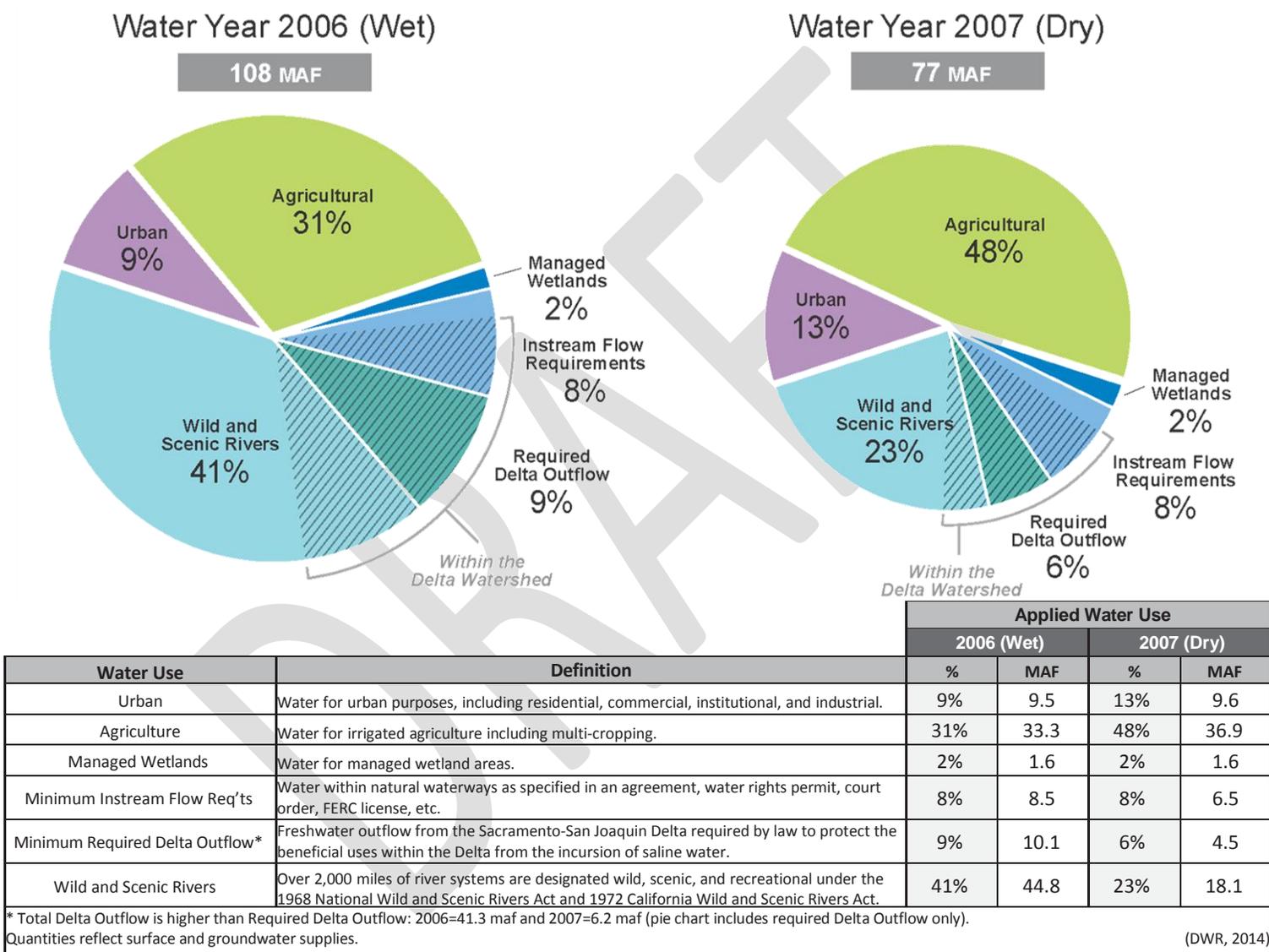
Figure 2 shows comparative water usage between different sectors under specific water years, with amounts for each use (in MAF) provided in the embedded table (DWR, 2014). Water year 2006 was a wet year where environmental water accounted for 60% of the total 108 MAF of the applied water use in the State. In contrast, environmental use decreased to 39% of the total water distribution in 2007, a dry year. The table shows that urban and managed wetlands use changed minimally, and agricultural and instream flow requirements fluctuated by 4 MAF and 2 MAF respectively, from wet to dry years. However, amounts for minimum Delta outflow requirements fluctuated by nearly 6 MAF and wild and scenic rivers by about 25 MAF from wet to dry years. Although the percentages from wet to dry years may indicate a shift in water allocated to each use (i.e. agricultural), actual use in MAF did not change more than 25% (urban and agricultural use not more than 10%) with the exception of minimum requirements for Delta outflow and wild and scenic rivers (DWR, 2014). See Appendix F for fact sheets on agricultural, environmental, and urban water use.

Text Box 4. Where does California’s Water Go?¹

- California’s water supports three main sectors: cities and communities, agriculture, and environment.
- On average, the proportion of water used by each sector is 10% cities and communities, 40% agriculture, and 50% environment.
- This statewide ratio varies widely depending upon whether a year is wet or dry. In wet years, the proportion that serves environmental purposes can be 60% or more, while in dry years that proportion drops to roughly one-third.
- Water often serves double duty: Water allocated for one purpose is often reused for other purposes downstream. Water flowing into the Delta to repel saltwater intrusion often serves a dual purpose by also helping native fish.

¹For more information about water use in California, see the factsheets provided in Appendix F. (DWR, 2015b)

Figure 2. How Water is Used in California





Several ongoing and planned efforts seek to address California’s current and future water demands. For example, the State Water Resources Control Board (SWRCB) Division of Water Rights places an increasing emphasis on protecting fish, wildlife, and recreation enjoyment through integrating both public trust and appropriative right systems for surface water allocations (SWRCB, 2015a). The California State Water Project’s (SWP) unique delivery system, constructed and operated by DWR, provides water for 25 million residents and 750,000 acres of irrigated agricultural land (DWR, 2008). The main purpose of the SWP is to store water and distribute it to 29 urban and agricultural water suppliers in California, where 70% goes to urban users and 30% goes to agricultural users (DWR, 2008). Also confronting California’s water demands and spanning approximately 400 miles from Redding to Bakersfield, the U.S. Bureau of Reclamation’s Central Valley Project (CVP) is one of the world’s largest water storage and transport systems (Bureau of Reclamation, 2013). The CVP consists of 20 dams and reservoirs, 11 power plants, and several hundred miles of major canals (Bureau of Reclamation, 2013). The CVP dedicates 800,000 acre-feet per year to fish, wildlife, and habitat enhancement and over 400,000 acre-feet to State and Federal wildlife refuges and wetlands (Bureau of Reclamation, 2013).

In addition, there are 515 groundwater basins that the California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization Program has categorized and prioritized to help identify, evaluate, and determine the need for additional groundwater level monitoring (DWR, 2015a). These basins contributed to an estimated 38% of California’s 2005-2010 average annual total water supply and contribute to as much as 45% during dry years (DWR, 2014-2015c). The SWRCB Groundwater Ambient Monitoring and Assessment (GAMA) program was established in 2000 (expanded by AB 599 – the Groundwater Quality Monitoring Act of 2001) with the goals to improve statewide groundwater monitoring and increase availability of groundwater quality information to the public (SWRCB, 2015b).

In addition to the SWP and CASGEM, the State-Federal flood management system reduces impacts of potential flooding, mainly through a network of nearly 1,600 miles of levees that protect the Central Valley from catastrophic floods (Central Valley Flood Protection Board, 2011).

2.2 *Current Water Management and Conservation in California*

Many State water management partners have incorporated strategies to conserve California’s natural and wildlife resources in their programs and plans. For example, the Governor’s Water Action Plan was released in 2014 and developed to meet three objectives: reliable water supplies, the restoration of important species and habitat, and increased resiliency and sustainability of water resources. The Water Action Plan addresses pressing water issues through prioritized actions, including protection and restoration of important ecosystems. Examples include prioritizing key mountain meadow habitats, managing headwaters for multiple benefits, as well as refuges like the Pacific Flyway for migratory birds (California Natural Resources Agency [CNRA], California Department of Food and Agriculture [CDFA], and California Environmental Protection Agency [CalEPA], 2014). The Water Action Plan highlights 10 essential actions to accomplish these goals:



- Make conservation a California way of life;
- Increase regional self-reliance and integrated water management across all levels of government;
- Achieve the co-equal goals for the Delta of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem;
- Protect and restore important ecosystems;
- Manage and prepare for dry periods;
- Expand water storage capacity and improve groundwater management;
- Provide safe water for all communities;
- Increase flood protection;
- Increase operational and regulatory efficiency; and
- Identify sustainable and integrated financing opportunities.

To help implement the Water Action Plan, the California Water Plan Update 2013 includes a roadmap with a suite of related actions/objectives and resource management strategies that advance the 10 essential actions in the Water Action Plan. For example, for the essential action of “protect and restore important ecosystems,” the California Water Plan’s supporting strategies include agricultural lands stewardship, forest management, land use planning and management, ecosystem restoration, watershed management, and many other strategies that support ecosystem restoration (DWR, 2014). Furthermore, the Sacramento-San Joaquin Delta Conservancy (Delta Conservancy) contributes to the conservation of California’s natural and wildlife resources through their mission of working collaboratively and in coordination with local communities.” In doing so, the Conservancy will lead efforts to “protect, enhance, and restore the Delta’s economy, agriculture and working landscapes and environment for the benefit of the Delta region and its local communities, and the citizens of California” (Delta Conservancy, 2012). The Delta Conservancy’s goals also include leading efforts to protect, enhance, and restore ecosystems in partnership with other entities and stakeholders (Delta Conservancy, 2012). Another example conservation effort is the Central Valley Flood Management Planning Program’s System Conservation Strategy goal to promote ecosystem function, recovery and stability of native species populations, and overall community diversity (DWR, 2015a). These are just a few examples of efforts in the water management sector supporting conservation and restoration of California’s natural and wildlife resources.

The \$7.545 billion Proposition 1 water bond approved overwhelmingly by California voters in 2014 will provide a significant source of funding for water projects and programs at a crucial time for California and its water use. Key funding areas include regional water reliability, public benefit of water storage capacity (e.g., agriculture and urban users, water quality objectives for wildlife), water recycling, groundwater sustainability, safe drinking water, and watersheds and flood management (Association of California Water Agencies [ACWA], 2014). In addition, CDFW received funding from the USFWS SWG in 2004 for the “California Coastal Watershed Planning and Assessment,” which supported multi-disciplinary, large-scale watershed assessments along the length of California’s coast to help improve freshwater habitat and support increased salmonid populations (CDFW, 2014). In addition, SWAP 2015 includes a chapter on anadromous fish and highlights core principles including water conservation to



identify and implement water management strategies designed to provide sufficient flow quality and quantity to meet fish and habitat needs (CDFW, 2015; Ch. 6). By continuing to enhance water management, CDFW and other partners can work together to meet California’s current and future water needs, while also protecting and conserving the State’s natural and wildlife resources.

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Text Box 5. Collaborative Conservation Effort Examples in the Water Management Sector

There are numerous collaborative conservation and management efforts taking place in California. Below we share three examples related to water management in the State. These examples demonstrate existing conservation efforts that aligned with SWAP 2015. The partners addressed in each description are indicated in **bold**.

- *Maintaining Migratory Bird Habitat*: In 2014, the **California Rice Commission** and **The Nature Conservancy (TNC)** partnered on the BirdReturns pilot program, which provided farmers in the Sacramento Valley with incentives for maintaining flooded fields as habitat for migrating shorebirds. **TNC** initiated the program to ensure that birds migrating through the Central Valley would have sufficient wetland habitat for wintering. Through collaboration with **eBird**, a citizen science project that collects data on bird sightings, **TNC** identified rice farms in bird migration paths, and worked with the **California Rice Commission** to provide rice farmers with incentives (compensation for irrigation costs) to maintain flooding in their fields during migration season (Robbins, 2014). The flooded fields created “pop-up habitats” for migrating birds. During February and March 2014, over 40 rice farms participated in the pilot and provided nearly 10,000 acres of habitat for shorebirds (TNC California, 2014).
- *Restoring the Sierra Nevada Watershed*: In March, 2015 the **Sierra Nevada Conservancy (SNC)** partnered with U.S. Forest Service (**USFS**) to launch the Sierra Nevada Watershed Improvement Program (WIP), a collaborative effort to restore and improve ecosystem health of the Sierra Nevada Watershed through a suite of restoration and conservation activities. The WIP will work to restore streams and meadows, preserve working landscapes, restore forest health, and improve socio-economic conditions in the region (USFS, 2015). The program will begin by focusing on forest restoration activities to increase the resilience of forests to catastrophic wildfires. **SNC** and **USFS** are working with **State, Federal, Tribal, and local agencies**, as well as other **interested stakeholders**, to implement activities that will occur under the WIP.
- *Collaborating to Restore the Delta*: The **CNRA** is partnering with the **Delta Conservancy** on California EcoRestore, a new initiative to create a coordinated approach to conservation and restoration of the San Joaquin Delta ecosystem (CNRA, 2015). California EcoRestore will include a variety of projects designed to increase resilience of Delta ecosystems to climate change, improve habitat for threatened species, and protect and restore ecosystems, with the goal of restoring 30,000 acres of Delta habitat. The **Delta Conservancy**, in collaboration with **local governments**, will lead regional and local planning processes to identify priority restoration projects. EcoRestore will also work to engage Non-governmental Organization (**NGOs**), **academia**, and other **interested stakeholders** to address stressors (e.g., invasive species, climate change) threatening Delta ecosystems (CNRA, 2015).

3. Common Themes across Nine Sectors

Equally important to discussion topics unique to each sector is the common themes considered across all sectors. This section shares overarching themes identified through the development of the nine companion plans within the scope of SWAP 2015. As described below, the top two most commonly discussed topics were: 1) climate change and 2) integrated regional planning.

3.1 *Climate Change Related Issues*

All sectors highlighted the potential far-reaching effects on California's natural resources induced or exacerbated by climate change as a major issue. The negative impacts to the State's ecosystems described in SWAP 2015 may increase in their magnitude and severity by the compounding effects of climate change (CDFW, 2015; Ch. 2.5.3). The implications of climate change are likely to be profound and influence many facets of the State's natural resources. Therefore, development teams considered collaboration across sectors related to natural resource management and conservation essential to assist ecosystem adaptation effectively and minimize negative effects from the shifting climate.

The suggested collaborative activities under various sector discussions that relate to climate change include a comprehensive assessment of the State's climate change vulnerability and implementation of appropriate adaptation actions (CDFW, 2015; Ch. 2.5.3). Detailed activities addressed during the discussions include, but are not limited to: establishing a sustainable habitat reserve system to reduce other habitat threats and increase habitat resilience to climate change; incorporating climate change impacts (e.g., habitat shifts and sea level rise) into the management of watersheds, habitats, and vulnerable species; improving regulation of greenhouse gas emissions; developing comprehensive research guidelines to evaluate climate change effects; and engaging in education and outreach activities to raise awareness of climate change.

3.2 *Integrated Regional Planning*

California hosts a landscape that is ecologically, socio-economically, and politically intricate. The current status of the State's ecosystems reflects the synergistic interactions among ecological conditions and processes, as well as diverse human activities and conflicting needs and the regulations imposed on those activities.

The concept of integrated regional planning arises from the recognition that addressing only one aspect of such a multi-faceted, dynamic human and natural system would not be sustainable. Integrated regional planning in the context of SWAP 2015, paraphrased from the definition in the California Water Plan, is an approach to prepare for effective management, including conservation activities, while concurrently achieving social, environmental, and economic objectives to deliver multiple benefits across the region and jurisdictional boundaries (DWR, 2014). The expected outcomes of adopting an integrated regional planning approach are to 1) maximize limited resources to provide for increased public well-being, and 2) receive broader support for natural resource conservation beyond the conservation community while systematically improving ecosystem conditions that sustain the ecological integrity of the region.



Integrated regional planning begins with the acceptance of diverse natural resource management priorities associated with the region and the accompanying activities necessary to pursue those interests. Based on this understanding and philosophy, attempts by natural resource management agencies to integrate activities often include negotiations during regional planning processes. Expected efforts under integrated regional planning processes include: planning to reduce conflicts among priorities and activities; minimizing overlapping efforts by aligning similar activities; streamlining and integrating needed processes across the priorities; and collaborating to complement efforts and pursue mutual priorities and interests. As an example, integrated planning could occur by zoning larger planning regions, coordinating multiple needs for the region, and limiting activities within each zone to avoid incompatible activities, or at least reduce unintended negative consequences of isolated but interactive activities. In sum, integrated regional planning requires open-mindedness, transparency, patience, and comprehensive and strategic planning between natural resource management priorities and regional and/or local jurisdictions through coordination.

In developing the companion plans, all sectors considered an integrated regional planning framework as one of the State's top priorities. The needs and tasks related to integrated regional planning and expressed through the discussion among the sector groups were: preparing, approving, and implementing regional- and landscape-level conservation plans; pursuing necessary resources systematically for conservation strategy implementation; coordinating effective partnerships; adapting to emerging issues; and reviewing and revising the plans. Existing efforts recognized for supporting integrated regional planning include Natural Community Conservation Plans (NCCPs), Habitat Conservation Plans (HCPs), Habitat Connectivity Planning for Fish and Wildlife,⁷ the Master Plan for Marine Protected Areas, and individual species management plans. SWAP 2015 also addresses those activities and plans.

In addition, SWAP 2015 highlights where partners can potentially integrate SWAP with other agency conservation programs, including the efforts by California Wildlife Conservation Board (WCB), identified and discussed among the companion plan development teams.

4. Commonly Prioritized Pressures and Strategy Categories across Sectors

Below is an overview of pressures and strategy categories considered important across the nine sector teams. SWAP 2015 adopted the Open Standards for the Practice of Conservation⁸ process and applied it to each targeted ecosystem to identify strategies that could influence key ecosystem pressures (CDFW, 2015; Ch. 1.5.4). During development team meetings, CDFW shared lists of those identified pressures and strategy categories that are considered relevant to each sector. Through voting, each development team prioritized the pressures and strategy categories by the importance to the sector. The commonly prioritized pressure and strategy categories described below were identified by synthesizing overarching

⁷ For more information, see: CDFW, "Habitat Connectivity Planning for Fish and Wildlife," 2015. Web. 27 Oct. 2015. www.wildlife.ca.gov/Conservation/Planning/Connectivity.

⁸ For more information on the Open Standards for the Practice of Conservation, see: Conservation Measure Partnership, "The Open Standards," 2015. Web. 28 Oct. 2015. <http://www.conservationmeasures.org/>.

discussion themes (for pressures) and by counting the frequency of the prioritization (for strategy categories) across the sectors.

4.1 Pressures across Sectors

A pressure, as defined in SWAP 2015, is “an anthropogenic (human-induced) or natural driver that could result in impacts to the target (i.e., ecosystem) by changing the ecological conditions” (CDFW, 2015; Ch. 1.5.4, 26). Pressures can have either positive or negative effects depending on their intensity, timing, and duration, but they are all recognized to have strong influences on the well-being of ecosystems (CDFW, 2015; Ch. 1.5.4). Table 1 lists the 29 standard pressures addressed under SWAP 2015 (CDFW, 2015; Ch. 1.5.4).

Table 1. SWAP 2015 Pressures

<ul style="list-style-type: none"> • Agricultural and forestry effluents • Air-borne pollutants • Annual and perennial non-timber crops • Catastrophic geological events • Climate change • Commercial and industrial areas² • Dams and water management/use • Fire and fire suppression • Fishing and harvesting aquatic resources • Garbage and solid waste • Household sewage and urban waste water^{3,4} • Housing and urban areas² • Industrial and military effluents^{4,5} • Introduced genetic material • Invasive plants/animals 	<ul style="list-style-type: none"> • Livestock, farming, and ranching • Logging and wood harvesting • Marine and freshwater aquaculture • Military activities • Mining and quarrying • Other ecosystem modifications⁶ • Parasites/pathogens/diseases • Recreational activities • Renewable energy • Roads and railroads • Shipping lanes⁷ • Tourism and recreation areas • Utility and service lines • Wood and pulp plantations
<p>Pressures include the following:</p> <ul style="list-style-type: none"> ¹ Volcano eruption, earthquake, tsunami, avalanche, landslide, and subsidence ² Shoreline development ³ Urban runoff (e.g., landscape watering) ⁴ Point discharges ⁵ Hazardous spills ⁶ Modification of mouth/channels; ocean/estuary water diversion/control; and artificial structures ⁷ Ballast water 	

(CDFW, 2015; Ch. 1.5.4)

As described under Section 3.1, the climate change pressure was one of the common themes discussed across the sectors. There were no other standardized pressures listed under Table 1 that were commonly prioritized across all sectors. For more information on pressures prioritized for the water management sector, please refer to Section 5.1 below.



4.2 Strategy Categories across Sectors

SWAP 2015 outlines 11 categories of statewide conservation strategies under which regional strategies are organized, similar to the manner in which the regional goals are tiered under the statewide conservation goals (CDFW, 2015; Ch. 4.2). The statewide and regional strategies are meant to work synergistically to achieve the statewide goals and priorities. Table 2 lists the 11 standardized statewide strategy categories addressed under SWAP 2015 (CDFW, 2015; Ch. 4.2).

Table 2. SWAP 2015 Conservation Strategy Categories

<ul style="list-style-type: none"> • Data Collection and Analysis • Direct Management • Economic Incentives • Environmental Review • Land Acquisition, Easement, and Lease • Land Use Planning 	<ul style="list-style-type: none"> • Law and Policy • Management Planning • Partner Engagement • Outreach and Education • Training and Technical Assistance
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(CDFW, 2015; Ch. 4.2)

Of these 11 strategies, the three most commonly prioritized strategy categories across the nine sectors were: **Data Collection and Analysis** (78% or 7 sectors prioritized this strategy), **Management Planning** (78% or 7 sectors), and **Partner Engagement** (56% or 5 sectors). The strategy categories identified as most relevant to the water management sector are described in Section 5.2 below.

5. Water Management Priority Pressures and Strategy Categories

Managing California’s water resources comes with many challenges, especially in the face of extreme events such as drought and flooding. Uncertain water supplies, water scarcity, groundwater depletion, poor water quality, native fish species decline, land development, population growth, and climate change are just a few examples of potential impacts on natural and wildlife resources in the water management sector (CNRA, CDFA, and CalEPA, 2014). A pressure⁹ such as dams and water management/use can also affect the water management sector (CDFW, 2015; Ch. 2.5.2). Likewise, stresses, such as change in snowpack, change in average annual temperature, change in water levels, sea level rise, hydro periods, and habitat fragmentation, can drive the need for conservation activities within this sector. Although key challenges exist, each can be seen as future opportunities and recommendations to support, improve, and enhance the implementation of SWAP 2015. Activities and strategies to address these pressures and stresses may include natural flow restoration, water rights acquisition, partnership establishment, and effective law enforcement.

During companion plan development meetings held in early 2015, the top pressures and strategies (described below in Section 5.1) were prioritized through ranking and voting by the development teams. The list drew upon efforts undertaken between 2013 and 2014 to identify province- and state-scale pressures and strategies for SWAP 2015 (CDFW, 2015; Ch. 1.5). Through facilitated discussions, the

⁹ Due to the geographical differences across California, some pressures may not apply to certain regions.



development team prioritized pressures and strategies based on member knowledge and involvement in the sector. Below is a list of the prioritized pressures and strategies.

5.1 Priority Pressures

Dams and water management/use – The management of water resources to meet water (stream and off-stream use) and power supply needs and to accommodate communities and agricultural production results in numerous pressures on rivers, wetlands, estuaries, and aquifers. This includes changing natural water flow patterns either deliberately or as a result of other activities, such as dam construction, dam operations, sediment control, salt regime change, wetland filling for mosquito control, levees and dike construction, surface water diversion, groundwater pumping, channelization, artificial lake creation, and illegal diversions.

5.2 Priority Strategy Categories

Highlighted below are the top six strategy categories the development team prioritized by short-term (immediate/tactical) and long-term timeframes in alphabetical order – **Data Collection and Analysis, Direct Management, Law and Policy, Land Acquisition, Easement, and Lease, Management Planning, and Partner Engagement**. The information below is combined into a more comprehensive table shared in Section 6. *Collaboration Opportunities and Potential Resources by Strategy Category* (Table 3). The strategy category definitions described below include information from SWAP 2015 with additional insights gathered during the sector development team meetings (CDFW, 2015; Ch. 4.2). The example strategies and conservation activities were prioritized by development team members early in the companion plan process.

Data Collection and Analysis (long-term) – Data collection and analysis is the utilization of robust data and thorough analysis to inform and facilitate more effective implementation of conservation strategies under other categories.

- Example strategies include: assessing and conducting research on groundwater; improving data availability across programs and agencies; and conducting analysis of data to directly inform resource management and regulatory decisions.
- Conservation activities include: advancing integration of data management/data exchange; conducting water monitoring and producing monitoring result reports; and building a distributed and accessible network of spatial datasets.

Direct Management (short-term) – Direct management is the participation in and implementation of activities that support stewardship of habitats and natural processes to maintain, enhance, and restore species population and ecological functions/conditions.

- Example strategies include: improving fish passage; managing barriers on water movement; managing water flows/use; and restoring natural flows.
- Conservation activities include implementing wetland and riparian restoration and controlling point and non-point sources to ensure attainment of water quality objectives.



Law and Policy (short- and long-term) – Law and policy is the development, revision, guidance, and implementation of legislation, regulations, policy, and voluntary standards to improve conservation stewardship of species and habitats.

- Example strategies include: advocating for effective enforcement of laws; strengthening alignment of policies between government agencies; supporting legislative actions; and writing permits to improve habitat.
- Conservation activities include: improving conservation planning alignment on policies and regulations between government agencies; working on wetland and riparian protection policies; and improving greenhouse gas goals.

Land Acquisition, Easement, and Lease (short-term) – Land acquisition, easement, and lease are types of transactions and agreements that help set aside or obtain land or water rights, which support conservation of the land, water, and/or habitat that species depend upon.

- Example strategies include: acquiring water rights and purchasing land and/or acquiring easements.
- Conservation activities include: amending marsh restoration agreements through mitigation requirements in Clean Water Act Section 401 Certifications or other permits; interagency planning to restore wetlands; working with local landowners on species conservation; and improving water management through habitat restoration.

Management Planning (long-term) – Management planning is the development of management plans or processes for species, habitats, and natural processes/conditions that will lead to implementation of more effective conservation strategies.

- Example strategies include integrating resource management activities and providing input on project planning and decision-making processes.
- Conservation activities include: applying an integrated water management approach; monitoring mitigation concurrent with construction; encouraging low-impact development; and coordinating habitat conservation planning, natural community conservation planning, and habitat protection and restoration efforts under Sections 401 and 404 of the Clean Water Act.

Partner Engagement (long-term) – Partner engagement is the process for engaging and developing collaboration among State and Federal agencies, Tribes and tribal communities, non-governmental organizations, private landowners, and other partners to achieve shared conservation objectives and enhance coordination across jurisdictions and areas of interest.

- Example strategies include establishing collaborative partnerships and establishing/developing co-management partnerships.
- Conservation activities include: engaging multiple partners at the regional scale; developing integrated water management plans with natural resource stewardship; engaging tribal groups and landowners in projects; and broadening watershed focus by integrating working groups.

Text Box 6. Identified Pressures and Strategies for Future Consideration

SWAP 2015 describes the 29 major pressures (Table 1) on the State’s ecosystems (CDFW, 2015; Ch. 2.5.2). The list below provides additional pressures and strategies the development team identified as important for this sector that should be considered during future SWAP updates. These pressures and strategies were not highlighted as top priorities for the water management sector under the main SWAP 2015.¹

Pressures

- Land use
- Population growth

Strategies

- Improve management planning and direct management implementation by increasing achievement of water management, water sustainability, hatchery management, and pollution control objectives.
- Develop strategies to address habitat and migratory pathway (aquatic and terrestrial) impacts from water transportation and diversion including operation and development of fish catching devices and maintenance of fisheries below dams.
- Develop approaches to address non-point source pollution controls (e.g., strategies for sediment, nutrients, and mercury).
- Improve permitting and licensing processes by incorporating considerations of water and habitat impacts in decision-making.
- Improve use and implementation of promulgated rules and legislation including Total Maximum Daily Loads (TMDLs) to promote water quality improvements.

¹ Note: Some additional pressures identified by development teams may already be addressed in SWAP 2015.

6. Collaboration Opportunities for Joint Priorities

This section describes the potential alignment opportunities for SWAP 2015 with existing plans and strategies from other sector agencies and organizations that development team members have identified. Section 6.1 introduces the four categories that are used to organize such opportunities; they are based on jurisdiction and locality of plans and strategies. Following Section 6.1, collaboration opportunities and resources identified by each strategy category are shared in Table 3, *Collaboration Opportunities and Potential Resources by Strategy Category*. For a more extensive list of plans, strategies, and documents identified through the companion plan development process, please see Appendix B.¹⁰ SWAP 2015 integration with other partners’ programs is an integral part of balancing the needs of wildlife with the needs of society and is explored in SWAP 2015 (CDFW, 2015; Ch. 7.1.2).

¹⁰ This is not an exhaustive list of sector plans and strategies in alignment with SWAP 2015 goals.



6.1 Alignment Opportunities by Jurisdiction and Locality

The section below describes four categories of locality and jurisdiction broadly where potential alignment opportunities typically fit: Federal, State, Regional and Multi-partner, and Non-governmental. These categories are based on jurisdiction and locality of the management and conservation efforts. Example opportunities for each category are also provided here.

Federal

Plans identified in this category typically draw upon national guidance reflecting the goals and strategies of Federal agencies and organizations. For example, the U.S. Environmental Protection Agency (USEPA) and USFWS have several types of conservation and management plans such as the USEPA *Wetlands Compensatory Mitigation Guidance* and the USFWS *Water Project Biological Opinions* that determine potential impacts to wildlife. The U.S. Navy's *Integrated Natural Resources Management Plan* also helps guide conservation actions in California. Although these plans guide Federal agency interventions, they also play a key role in how these agencies engage in collaboration with states and other partners.

State

Plans identified in this category reflect numerous State agency priorities, strategies, and conservation actions of California. These plans and strategies guide decision-making, resources allocation, and implementation priorities of the State agencies. Examples of key statewide plans and strategies include, but are not limited to, DWR's *California Water Plan Update 2013* and *Draft Central Valley Flood System Conservation Strategy*, as well as the Delta Stewardship Council's *Delta Plan*.

Regional and Multi-partner

Numerous regional and multi-partner plans help guide conservation efforts across California. These plans and strategies, like those in the Federal and State categories, describe strategies and activities that align with this companion plan and SWAP 2015. At a regional level, NCCPs and HCPs can be used to inform a wide array of conservation planning efforts. Many of the large-scale, multispecies HCPs and NCCPs are habitat-based plans that encourage future development to occur in already developed areas, while setting up a system of large contiguous protected lands based on a comprehensive landscape-level conservation strategy designed for the planning area. Planning at this scale provide regional protection for plants, animals, and their habitats, while allowing compatible and appropriate economic activity. In addition, many of the Joint Ventures based in California have developed plans that describe regional conservation interventions such as the Central Valley Joint Venture's *Implementation Plan*, as well as county general plans. Sustainable community plans, such as those funded through the California Strategic Growth Council (SGC), often include regional and local plans and policies that benefit natural resources in ways consistent with conservation goals outlined in SWAP 2015.

Non-governmental

Like the plans described above, private landowners and non-governmental organizations also play a key role in wildlife conservation and they have plans that describe their desired future conservation outcomes and management priorities compatible with those of SWAP 2015. For example, the San



Francisco Estuary Partnership’s *Rethinking Our Grandest Plan for the Estuary* is a comprehensive plan that highlights the need for adaptation to changing environmental and anthropogenic conditions.

6.2 Collaboration Opportunities and Potential Resources by Strategy Category¹¹

For each prioritized strategy category described in Section 5 above, Table 3 below shares example conservation activities that are, will, or might be implemented in the next 5-10 years. These conservation activities are listed adjacent to example potential partners and financial resources that development team members identified. Although the table below shares examples of potential activities where partnerships could occur at different spatial scales (statewide, regional, and local/site-specific), other activities addressing priority strategies should be considered as this is not a comprehensive list.¹² Similarly, while the identified example conservation activities could apply across many spatial scales and jurisdictions, the current table highlights the most relevant scale of implementation. As described earlier in this document, Table 3 does not indicate a willingness and/or commitment on behalf of these organizations or entities to partner, fund, or provide support for the strategy implementation.

¹¹ Disclaimer: Please note this is not an exhaustive list of potential partners and financial resources. The organizations listed in Table 3 were identified through this companion plan process, but their identification here does not indicate agreement to partner and/or provide financial resources for the conservation activities.

¹² **Statewide** indicates actions occurring across the state. **Regional** indicates efforts that occur at a smaller than statewide scale and across more than one locality or site. **Local/Site-specific** indicates activities occurring at a specific location (e.g., city or park unit) or site (e.g., Morro Bay Estuary or Mojave Desert).

Table 3. Collaboration Opportunities and Potential Resources by Strategy Category

Example Conservation Activities	Example Potential Partners	Example Potential Financial Resources
Priority Strategy: Data Collection and Analysis		
<p>Statewide</p> <ul style="list-style-type: none"> • Advance integration of data management/data exchange • Build distributed network of common spatial datasets <p>Regional</p> <ul style="list-style-type: none"> • Adopt resolution on strategic integrated regional conservation and development planning <p>Local/Site-specific</p> <ul style="list-style-type: none"> • Conduct fact assessments • Conduct reporting by permittees as required by mitigation/Monitoring and Reporting Programs under the regulation of permitting actions or site cleanups • Lead adaptation efforts in each sector • Make databases available to public, citizen monitoring groups, and watershed stewardship organizations • Monitor data collection efforts (e.g., the Delta) • Outline primary risks of climate change vulnerabilities • Prioritize financial and political support for data sharing • Utilize existing databases and data visualization tools (e.g., DataBasin, EcoAtlas) for conservation planning efforts 	<p>Federal</p> <ul style="list-style-type: none"> • USFWS <p>State</p> <ul style="list-style-type: none"> • CBC • CDFW • DWR • CA Energy Commission (CEC) • CA Water Quality Monitoring Council and its working groups: <ul style="list-style-type: none"> ○ Healthy Watersheds Partnership ○ California Wetland Monitoring Workgroup ○ California Estuary Monitoring Workgroup ○ Bioaccumulation Oversight Group • Delta Conservancy • Delta Stewardship Council • GAMA Program of SWRCB • SGC • Surface Water Ambient Monitoring Program (SWAMP) of SWRCB <p>Local/County</p> <ul style="list-style-type: none"> • Water and Utility Districts <p>NGO/Foundation</p> <ul style="list-style-type: none"> • Audubon CA • Bay Foundation • CA Coastkeeper Alliance • Central Valley Joint Venture • Heal the Bay • Local Agency Formation Commission for San Bernardino County (LAFCO) • Open Space Districts • Point Blue Conservation Science • Resource Conservation Districts (RCDs) • San Francisco Bay Joint Venture • San Francisco Estuary Institute • Santa Ana Watershed Project Authority • Surfrider Foundation • TNC • Waterkeeper Alliance 	<p>Federal</p> <ul style="list-style-type: none"> • USEPA Wetland Program Development Grants

Example Conservation Activities	Example Potential Partners	Example Potential Financial Resources
	<ul style="list-style-type: none"> Western Riverside County Agricultural Coalition 	
Priority Strategy: Direct Management		
<p>Statewide</p> <ul style="list-style-type: none"> Raise awareness on flood protection efforts from other agencies to refine flood system management <p>Regional</p> <ul style="list-style-type: none"> Contribute to basin planning by focusing on water quality objectives to protect aquatic life and wildlife beneficial uses (e.g., warm and cold water and estuarine habitats) <p>Local/Site-specific</p> <ul style="list-style-type: none"> Adopt instream flow standards to support fisheries and habitats Contribute to implementation of riparian restoration (e.g. mitigation for permits/in lieu fees) Control point and non-point sources to ensure compliance with water quality objectives Engage the agriculture industry in contributing to improved water quality and climate solutions Establish simplified permitting process for implementation of small-scale, voluntary habitat restoration projects Focus on long-term license or relicense of hydroelectric projects Guide cap-and-trade investments in agriculture to achieve other environmental, health and economic benefits Implement wetland and riparian area protection policies Integrate research, education and technical assistance, and financial incentives to support agricultural producers Manage water flows/use and restore natural flows Plan groundwater management Reset flow objectives as needed 	<p>Federal</p> <ul style="list-style-type: none"> Bureau of Reclamation National Oceanic and Atmospheric Administration (NOAA) Fisheries USFWS <p>State</p> <ul style="list-style-type: none"> CalEPA CDFW Delta Conservancy DWR SWRCB and the nine Regional Water Quality Control Boards (RWQCBs) <p>Local/County</p> <ul style="list-style-type: none"> Water and Utility Districts <p>NGO/Foundation</p> <ul style="list-style-type: none"> CA Climate and Agriculture Coalition Network LAFCO Open Space Districts RCDs WCB 	<p>Federal</p> <ul style="list-style-type: none"> Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) <p>State</p> <ul style="list-style-type: none"> Greenhouse Gas Reduction Fund (cap and trade) In lieu fees Proposition 1 Small Communities Grant State Revolving Fund Storage Grant Program Supplemental Environmental Projects through Water Board enforcement actions

Example Conservation Activities	Example Potential Partners	Example Potential Financial Resources
<ul style="list-style-type: none"> Update plans (e.g., Bay Delta upgrade to septic systems through small community grants plan) Write permits to improve habitat (e.g., rare water bodies such as desert vernal pool areas) 		
Priority Strategy: Land Acquisition, Easement, and Lease		
<p>Local/Site-specific</p> <ul style="list-style-type: none"> Amend marsh agreements to restore wetlands Develop easement strategies with multiple objectives Focus on agricultural land stewardship strategies Improve water management through habitat restoration and levees Lease water rights in critical habitat areas Participate in ongoing wetland restoration programs (e.g., Suisun Marsh) Purchase land with senior water rights or directly purchase water rights Work with local landowners on species conservation 	<p>Federal</p> <ul style="list-style-type: none"> Bureau of Reclamation USFWS <p>State</p> <ul style="list-style-type: none"> CDFW CA Department of Conservation CDFW Delta Conservancy DWR <p>Local/County</p> <ul style="list-style-type: none"> Water and Utility Districts <p>NGO/Foundation</p> <ul style="list-style-type: none"> LAFCO Open Space Districts RCDs (e.g., Suisun RCD) Santa Ana Watershed Project Authority TNC WCB 	<p>Federal</p> <ul style="list-style-type: none"> NRCS EQIP <p>State</p> <ul style="list-style-type: none"> CDFW Proposition 1 <p>Non-governmental</p> <ul style="list-style-type: none"> WCB
Priority Strategy: Law and Policy		
<p>Statewide</p> <ul style="list-style-type: none"> Adopt wetland and riparian area protection policies Improve conservation planning alignment on policies and regulations between government agencies Improve greenhouse gas goals by looking at natural infrastructure functions and opportunities to analyze executive orders <p>Local/Site-specific</p> <ul style="list-style-type: none"> Adopt water quality standards that support fish, wildlife, habitats, and ecosystems uses of water, including in-stream flow standards 	<p>State</p> <ul style="list-style-type: none"> CBC DWR SWRCB and RWQCBs <p>NGO/Foundation</p> <ul style="list-style-type: none"> Bay Foundation CA Coastkeeper Alliance Heal the Bay LAFCO Surfrider Foundation Waterkeeper Alliance Western Riverside County Agricultural Coalition 	<p>Federal</p> <ul style="list-style-type: none"> NRCS EQIP

Example Conservation Activities	Example Potential Partners	Example Potential Financial Resources
<ul style="list-style-type: none"> Identify beneficial uses in wetland and riparian areas that have to be protected in water quality and water rights actions Take actions for land acquisition where appropriate and add ecosystem values in planning 		
Priority Strategy: Management Planning		
<p>Regional</p> <ul style="list-style-type: none"> Include consistent regional-scale methods for planning and conservation assessments Integrate water management approach with environmental stewardship <p>Local/Site-specific</p> <ul style="list-style-type: none"> Address reservoir health and drinking water source issues Encourage low-impact development Filter salts, nitrogen, and other dissolved solids from groundwater Focus on waste discharge requirements (e.g., 401, 404) Monitor mitigation concurrent with construction Keep storm water on site and maintain open space between structures Recommend and target floodplain guidance Use de-salters for groundwater basins Utilize wetland and riparian area protection policies 	<p>Federal</p> <ul style="list-style-type: none"> USFWS <p>State</p> <ul style="list-style-type: none"> CBC CDFW DWR SGC SWRCB and RWQCBs <p>Local/County</p> <ul style="list-style-type: none"> Water and Utility Districts <p>NGO/Foundation</p> <ul style="list-style-type: none"> LAFCO Open Space Districts RCDs Santa Ana Watershed Project Authority TNC Western Riverside County Agricultural Coalition 	<ul style="list-style-type: none"> See non-strategy specific resources below
Priority Strategy: Partner Engagement		
<p>Statewide</p> <ul style="list-style-type: none"> Engender collaboration between organizations so that each considers the needs of other organizations in the collection and assessment of data, rather than the requirements of individual organizational mandates <p>Regional</p> <ul style="list-style-type: none"> Develop integrated water management plans with natural resource stewardship components 	<p>Federal</p> <ul style="list-style-type: none"> Bureau of Reclamation USFWS <p>State</p> <ul style="list-style-type: none"> CalEPA CA Water Quality Monitoring Council <ul style="list-style-type: none"> Bioaccumulation Oversight Group CA Wetland Monitoring Working Group 	<ul style="list-style-type: none"> See non-strategy specific resources below

Example Conservation Activities	Example Potential Partners	Example Potential Financial Resources
<ul style="list-style-type: none"> Engage multiple partners at the regional scale Include variety of public and private stakeholders in communications and partnerships <p>Local/Site-specific</p> <ul style="list-style-type: none"> Broaden watershed focus by integrating working groups Engage tribal groups and landowners in projects to understand land values to benefit water quality Manage healthy watersheds to create combined framework for engagement and evaluation Provide collaboration on water quality and ecosystem health Encourage groups to come together to develop water management plans and water budgets to show relative sources/uses and sustainability plans 	<ul style="list-style-type: none"> CA Estuary Monitoring Group Healthy Watersheds Partnership CDFW Delta Conservancy DWR <p>Local/County</p> <ul style="list-style-type: none"> Water and Utility Districts <p>NGO/Foundation</p> <ul style="list-style-type: none"> Bay Foundation CA Coastkeeper Alliance Heal the Bay LAFCO Open Space Districts RCDs Santa Ana Watershed Project Authority Surfrider Foundation TNC Waterkeeper Alliance Western Riverside County Agricultural Coalition 	

6.3 Potential Financial Resources for Joint Implementation

The list below provides additional potential financial resources identified for implementing sector conservation activities addressed under SWAP 2015 and the companion plans. The list is similar to the third column of Table 3, but the funding could be applied to more than one strategy category considered under the sector discussion.

Development team participants suggested a range of potential funding sources; however, this information is intended to serve as a starting point for outreach and potential engagement and does not represent a comprehensive list of all potential funding sources.

Federal Funding Programs

- NRCS - EQIP
- USEPA Wetland Program Development Grants

State Funding Programs

- CDFW
- DWR - Sustainable Groundwater Management Act
 - FloodSAFE Environmental Stewardship and Statewide Resources Office
 - Integrated Regional Water Management Plans (IRWMPs) program



- Delta Conservancy
- Proposition 1
 - Storage Grant Program
- RWQCB grants
- Suisun Marsh Plan amendment
- WCB

7. Evaluating Future Collaboration Efforts

Implementation of SWAP and its nine companion plans is a complex undertaking. The first section below describes the desired outcomes and outputs of the water management companion plan implementation identified through the development team discussions. A desired outcome is an improved (and intended) future state of a conservation factor due to implementation of actions or strategies (CDFW, 2015; Ch. 11). Through the companion plan process, the management team defined a desired output as a deliverable that can be measured by the activities and processes that will contribute to accomplishing the desired outcomes and goals. The list of desired outcomes and outputs in the sub-section below is followed by a high-level description emphasizing the importance of adaptive management to SWAP 2015 and the companion plans, and how their implementation effectiveness would be evaluated by applying the adaptive process addressed under the main document.

7.1 *Desired Outcomes and Outputs*

Participants were asked what the sector's top desired outcomes and outputs are in the next 5-10 years, based on the development team discussions, their knowledge of the sector, and within the context of SWAP 2015. The identified outcomes and outputs for each strategy category, not listed in order of priority, are provided below.

Data Collection and Analysis

- Data is accessible, available, and usable for users beyond water resource professionals. User-friendly data visualization tools and products (e.g., presentation of data through Geographic Information System tools) created and existing tools (e.g., EcoAtlas and Data Basin) shared to promote use of data for various users involved in decision-making processes.
- Analysis of, access to, and application of integrated, high-quality data and information for decision-making processes and investments promoted to achieve SWAP 2015 and companion plan goals. Data shared with key audiences (e.g., decision-makers, agency staff, and conservation groups) involved in management and land conservation decision-making.
- Appropriate performance measurement metrics designed that accurately track project investments and implementation. High-quality data collected for each metric that helps partners assess performance.
- Existing recommendations and data collection efforts (e.g., the 2014 Delta Stewardship Council Environmental Summit recommendations) used in decision-making.

Direct Management

- Partner and agency awareness regarding flood protection efforts, flood plains, and instream flow regimes increased.
- New standards for flow objectives reset for priority California streams to reflect current flow regimes and standards instituted in management plans. Outcomes of flow management standards and data used to establish flexible flow regimes for top priority streams to benefit fish and wildlife.
- Existing water quality plans and stream flow metrics incorporated into current management activities (e.g., the Bay Delta San Francisco Estuary Water Quality Control Plan and the Federal Energy Regulating Commission relicensing program).
- Importance of ground water management highlighted and known (e.g., how ground water basins affect stream flow and what mechanisms and direct management support for integrated groundwater management).

Land Acquisition, Easement, and Lease

- Assessment and designation of protected area acreage improved and increased at the watershed scale through creation of master plans for each hydrologic region and/or watershed and maps of priority areas.
- Water rights obtained to support conservation of habitats and ecosystems.
- Additional management practices and actions (beyond easements) promoted so that key audiences (e.g., landowners) have higher awareness about and understanding of conservation strategies to better manage working lands for conservation and improved wildlife habitat and ecosystems values (e.g., agricultural and urban land stewardship framework and toolbox).
- Water and soil management improved through habitat restoration, control of Hydraulic Conditions of Concern, and sediment load movement within flow regimes for healthy streambed ecosystems.

Law and Policy

- Water quality control planning improved through development of water quality standards that recognize and support ecosystems and habitats (e.g., identification of wetland and riparian areas to establish standards for statewide adoption by SWRCB).
- Alignment and consistency of laws and policies across resource management sectors improved to encourage achievement of SWAP 2015 and companion plan conservation goals.

Management Planning

- Water management approaches (e.g., groundwater sustainability plan, reservoir reoperation plan) modified to incorporate environmental stewardship.
- Criteria designed to improve ecological conditions for easement standards in various regions (e.g., the Delta).
- See 4th bullet under *Direct Management*.



Partner Engagement

- Collaboration among entities involved in integrated regional water management increased.
- Greater investment secured in integrated regional water management planning at the watershed scale.
- Multi-partner collaboration for data collection and scoping increased.
- SWAP 2015 and companion plans used as the cornerstone for defining conservation priorities and informing statewide resource planning and habitat improvement projects in partners' investments and environmental stewardship actions.
- State and Regional Water Boards and other partners engaged in drought management efforts that link available water supply and quality of supply in decision-making.

7.2 Evaluating Implementation Efforts

SWAP 2015 sets a stage for adaptive management, including implementation evaluation, by developing the plan based on the Open Standards for the Practices of Conservation (CDFW, 2015; Ch. 1.5.4). SWAP 2015 implementation will be monitored over time in concert with other conservation activities conducted by CDFW and its partners. SWAP 2015 recognizes three types of monitoring (CDFW, 2015; Ch. 8.3):

1. Status monitoring, which tracks conditions of species, ecosystems, and other conservation factors (including negative impacts to ecosystems) through time
2. Effectiveness monitoring, which determines if conservation strategies are having their intended results and identifies ways to improve actions that are less effective (i.e., adaptive management)
3. Effect monitoring, which addresses if and how the target conditions are being influenced by strategy implementation

Monitoring the SWAP and companion plan implementation and evaluating the monitoring results are critical steps for CDFW and partners to demonstrate and account for the overall progress and success achieved by SWAP 2015. By incorporating lessons learned through monitoring and evaluation into future actions, CDFW and its partners have opportunities to improve performance on coordination and collaboration and to adapt emerging needs that were not considered during the time of the plan development into future actions. Similarly, monitoring and the evaluation results could help inform stakeholders, including decision-makers, partners, and funders, about the status of the plan implementation, as well as where to best deploy resources to achieve desired outcomes and outputs effectively.

SWAP 2015 developed performance measures for each strategy category (CDFW, 2015; Ch. 8.3). These measures are critical in helping guide the Department and partners in assessing the effects and effectiveness of SWAP 2015 and the companion plans, as well as the level of the companion plan's contribution to the conservation of California's ecosystem.

8. Next Steps

During the third and final companion plan development team meeting, participants were asked to identify key next steps to ensure successful implementation of the companion plan, ideally within the next one to five years. The feedback fell into three primary categories which were used to organize the information: Partnership and Collaboration, Human and Financial Resources, and Communication and Outreach. Suggestions outside of these categories are listed under “Additional Next Steps.”

Partnership and Collaboration

- Encourage and support increased interagency collaboration at the management level to help answer conservation questions, allocate sufficient staff capacity, and conserve resources through coordinated implementation of SWAP 2015 and companion plans.
- Ensure use and integration of recommendations and strategies from SWAP 2015 and companion plans across sectors. Incorporate recommendations in future relevant documents and conservation actions by incorporating information and citing SWAP 2015 and companion plans as major interagency documents demonstrating productive collaboration.

Human and Financial Resources

- Across partners, incorporate priorities from SWAP 2015 and companion plans into project planning and implementation efforts and prioritize existing conservation projects with sufficient implementation funds that address the long-term goals of SWAP 2015 and companion plans.
- Encourage and obtain agency and partner support to leverage information and cross-reference priorities and recommendations common to all sector companion plans through integrated regional planning (e.g., through support of the SGC).
- Identify mechanisms for implementing recommendations and strategies in SWAP 2015 and companion plans.
- Determine program goals and available resources alignment and potential synergies between SWAP 2015 and companion plans and other relevant planning documents (e.g., the Delta Plan and the California Water Plan)

Communication and Outreach

- Prepare a communication plan for SWAP 2015 and companion plans that targets multiple audiences and identifies venues to share information (e.g., the SGC, California Biodiversity Council [CBC], Delta Council, the Governor and legislature). Continued communication and outreach will ensure awareness of and ongoing engagement on SWAP 2015 and companion plan implementation.
- Obtain support (human and financial) at the statewide and regional levels through various mechanisms (e.g., State Wildlife and Tribal Grants) for outreach efforts to promote SWAP 2015 and companion plans.

Additional Next Steps

- Provide input to the 2018 Update of the State Water Plan’s environmental stewardship and ecosystem objectives and actions so that they align with the companion plan.



- Draw upon the recommendations from the 2014 Delta Stewardship Council’s Environmental Data Summit to organize and expand upon identified conservation activities and next steps highlighted throughout this companion plan.

9. Closing

This companion plan was developed in collaboration with many partners who deserve special recognition for their time and commitment (please see Appendix D for a list of development team members). As an initial step towards building a collaborative approach for implementation of SWAP 2015 and the nine sector-focused companion plans, CDFW will develop a work plan that describes actions to implement the plans and address the next steps identified.

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Appendices

Appendix A: List of Potential Partners and Coordination Bodies

Disclaimer: Please note this is not an exhaustive list of potential partners. The organizations listed in here were identified through this companion plan process, but their identification here does not indicate agreement to partner and/or provide financial resources for the conservation activities. Furthermore, the strategy categories checked off for each organization were completed to the best knowledge of the development team members; some organizations' efforts were unknown (blank cells).

Potential Partners/Coordination Bodies	Data Collection and Analysis	Direct Management	Land Acquisition, Easement, and Lease	Law and Policy	Management Planning	Partner Engagement
Association of CA Water Agencies (ACWA)						✓
Bay Foundation	✓			✓		✓
Bureau of Reclamation		✓	✓			✓
CA Association of Resource Conservation Districts						✓
CA Association of Sanitation Agencies						✓
CA Biodiversity Council (CBC)	✓			✓	✓	✓
CA Climate and Agriculture Coalition Network		✓				✓
CA Coastal Conservancy						✓
CA Department of Conservation			✓			✓
CA Department of Fish and Wildlife (CDFW)	✓	✓	✓	✓	✓	✓
CA Department of Food and Agriculture (CDFA)			✓			
CA Department of Water Resources (DWR)	✓	✓	✓	✓	✓	✓
CA Department of Conservation - Division of Oil, Gas and Geothermal Resources (DOGGR)						✓
CA Energy Commission (CEC)	✓					✓
CA Environmental Protection Agency (CalEPA)		✓				✓
CA Lake Management Society						✓
CA Rangeland Conservation Coalition		✓				✓
CA Water Plan State Agency Steering Committee						✓
CA Water Quality Monitoring Council <ul style="list-style-type: none"> Bioaccumulation Oversight Group CA Wetland Monitoring Working Group CA Estuary Monitoring Group Healthy Streams (Watershed) Partnership 	✓					✓
Central CA Tribal Chairs Association						✓
Central Valley Flood Protection Board		✓	✓			✓
Central Valley Joint Venture	✓					✓
Coastkeeper	✓			✓		✓

Potential Partners/Coordination Bodies	Data Collection and Analysis	Direct Management	Land Acquisition, Easement, and Lease	Law and Policy	Management Planning	Partner Engagement
Delta Conservancy	✓	✓	✓			✓
Delta Stewardship Council	✓					✓
Farm Bureau						✓
Fish Passage Improvement Program and Forum						✓
Flood Control Agencies/Districts						✓
Floodplain Managers Associations						✓
Former Water Plan Groups						✓
Groundwater Ambient Monitoring and Assessment (GAMA) Program	✓					✓
Heal the Bay	✓			✓		✓
Local Agency Formation Commission for San Bernardino County (LAFCO)	✓	✓	✓	✓	✓	✓
Mountain Counties Water Resources Association						✓
National Association Lake Management Society (NOMS) California Chapter						✓
NOAA Fisheries		✓				✓
Northern CA Tribal Chairs Association						✓
Open Space Districts	✓	✓	✓		✓	✓
Public Trust Agencies						✓
Resource Conservation Districts (RCDs)	✓	✓	✓		✓	✓
San Francisco Bay Joint Venture	✓					✓
San Francisco Estuary Institute	✓					✓
Santa Ana Watershed Project Authority	✓		✓		✓	✓
Sierra Nevada Conservancy						✓
Southern CA Tribal Chairs Association						✓
Southern CA Wetlands Recovery Project						✓
State Water Resources Control Board (SWRCB) <ul style="list-style-type: none"> • Division of Water Rights • Public Trust Unit • Regional Water Quality Control Boards (RWQCBs) 	✓	✓		✓	✓	✓
Strategic Growth Council (SGC)	✓				✓	✓
Suisun Resource Conservation District			✓			✓
Surfrider Foundation	✓			✓		✓
The Nature Conservancy (TNC)			✓			✓
Tribal Communities						✓
U.S. Army Corps of Engineers (USACE)						✓
U.S. Fish & Wildlife Service (USFWS)	✓	✓	✓		✓	✓

Potential Partners/Coordination Bodies	Data Collection and Analysis	Direct Management	Land Acquisition, Easement, and Lease	Law and Policy	Management Planning	Partner Engagement
Waste Water Treatment Plants		✓				✓
Water and Utility Districts	✓	✓	✓		✓	✓
Waterkeeper Alliance	✓			✓		✓
Watershed Authorities <ul style="list-style-type: none"> • San Bernardino • San Gabriel Valley Watershed Authority 						✓
Western Riverside County Agricultural Coalition	✓			✓	✓	✓
Wildlife Conservation Board		✓	✓			✓

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Appendix C: CDFW Companion Plan Management Team

Name	Title
Armand Gonzales	SWAP 2015 Project Lead
Junko Hoshi	SWAP 2015 Assistant Project Lead
Kurt Malchow	SWAP 2015 Companion Plan Development Lead

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Appendix D: Water Management Companion Plan Development Team Members and Affiliations

Affiliation	Participant
California Department of Fish and Wildlife	James Rosauer Peter Ode
California Department of Water Resources	Emily Alejandrino Francisco Guzman Katherine Spanos Michael Perrone Paul Massera Ted Frink Kamyar Guivetchi
California Environmental Protection Agency - Santa Ana Regional Water Quality Control Board	Glenn Robertson
California Water Quality Monitoring Council/ State Water Resources Control Board	Jon Marshack
California Environmental Protection Agency – State Water Resources Control Board	Amber Villalobos Jeff Wetzel
Sacramento-San Joaquin Delta Conservancy	Kristal Davis-Fadtke Shakoora Azimi-Gaylon
The Nature Conservancy	Jeanne Brantigan Susan Tatayon
U.S. Fish and Wildlife Service - Land Conservation Cooperatives	Rebecca Fris

Appendix E: Glossary

Most terms in this section originate from the glossary in the Conservation Measures Partnership's (CMP) Open Standards for the Practice of Conservation (Version 2.0). These definitions are based on current usage by many CMP members, other conservation organizations, and planners in other disciplines. Some terms have been added or refined to clarify how CDFW uses them.

activity: a task needed to implement a strategy, and to achieve the objectives and the desirable outcomes of the strategy.

anadromous: refers to fish species that spend most of their lives in the ocean but migrate to freshwater rivers and streams to spawn.

aquatic: growing, living in, or frequenting fresh water, usually open water; compare with wetland.

aquifer: an underground reservoir of water.

bay: a body of water connected to an ocean or lake, formed by an indentation of the shoreline.

bioaccumulation: the uptake and concentration of chemicals by living systems.

biodiversity: the full array of living things.

climate change vulnerability: refers to the degree to which an ecological system, habitat, or individual species is likely to be negatively affected as a result of changes in climate and often dependent on factors such as exposure, sensitivity, and adaptive capacity.

conservation: the use of natural resources in ways such that they may remain viable for future generations. Compare with preservation.

distribution: the pattern of occurrences for a species or habitat throughout the state; generally more precise than range.

ecosystem function: the operational role of ecosystem components, structure, and processes.

ecosystem health: the degree to which a biological community and its nonliving environmental surroundings function within a normal range of variability; the capacity to maintain ecosystems structures, functions, and capabilities to provide for human need.

ecosystem processes: the flow or cycling of energy, materials, and nutrients through space and time.

ecosystem: a natural unit defined by both its living and non-living components; a balanced system for the exchange of nutrients and energy. Compare with habitat.

estuary: an area in which salt water from the ocean mixes with flowing fresh water, usually at the wide mouth of a river.



evaluation: an assessment of a project or program in relation to its own previously stated goals and objectives.

fragmentation: the process by which a contiguous land cover, vegetative community, or habitat is broken into smaller patches within a mosaic of other forms of land use/land cover; e.g., islands of an older forest age class immersed within areas of younger-aged forest, or patches of oak woodlands surrounded by housing development.

goal: a formal statement detailing a desired outcome of a conservation project, such as a desired future status of a target. The scope of a goal is to improve or maintain key ecological attributes. A good goal meets the criteria of being linked to targets, impact oriented, measurable, time limited, and specific.

habitat: where a given plant or animal species meets its requirements for food, cover, and water in both space and time. May or may not coincide with a single macrogroup, i.e., vegetated condition or aquatic condition. Compare with ecosystem.

impact: the desired future state of a conservation target. A goal is a formal statement of the desired impact.

landscape: the traits, patterns, and structure of a specific geographic area, including its biological composition, its physical environment, and its anthropogenic or social patterns. An area where interacting ecosystems are grouped and repeated in similar form.

monitoring: the periodic collection and evaluation of data relative to stated project goals and objectives. Many people often also refer to this process as monitoring and evaluation (abbreviated M&E).

native: naturally occurring in a specified geographic region.

nonpoint: pollution whose source cannot be ascertained, including runoff from storm water and agricultural, range, and forestry operations, as well as dust and air pollution that contaminate waterbodies.

outcome: an improved (and intended) future state of a conservation factor due to implementation of actions or strategies. An objective is a formal statement of the desired outcome.

output: a deliverable that can be measured by the activities and processes that will contribute to accomplishing the desired outcomes and goals.

population: the number of individuals of a particular taxon in a defined area.

pressure: an anthropogenic (human-induced) or natural driver that could result in impacts to the target by changing the ecological conditions. Pressures can be positive or negative depending on intensity, timing, and duration. See also direct pressure and indirect pressure.

private land: lands not publicly owned, including private conservancy lands.



program: a group of projects which together aim to achieve a common broad vision. In the interest of simplicity, this document uses the term “project” to represent both projects and programs since these standards of practice are designed to apply equally well to both.

project: a set of actions undertaken by a defined group of practitioners – including managers, researchers, community members, or other stakeholders – to achieve defined goals and objectives. The basic unit of conservation work. Compare with program.

public: lands owned by local, state, or federal government or special districts.

range: the maximum geographic extent of a taxon or habitat; does not imply that suitable conditions exist throughout the defined limits. Compare with distribution.

rangelands: any expanse of land not fertilized, cultivated, or irrigated that is suitable and predominately used for grazing domestic livestock and wildlife.

result: the desired future state of a target or factor. Results include impacts which are linked to targets and outcomes which are linked to threats and opportunities.

richness: a measure of diversity; the total number of plant taxa, animal species, or vegetation types in a given area.

riparian: relating to rivers or streams.

salmonids: collective term for a family of fish that includes salmon and trout.

Species of Greatest Conservation Need (SGCN): all state and federally listed and candidate species, species for which there is a conservation concern, or species identified as being highly vulnerable to climate change.

stakeholder: any individual, group, or institution that has a vested interest in the natural resources of the project area and/or that potentially will be affected by project activities and have something to gain or lose if conditions change or stay the same. Stakeholders are all those who need to be considered in achieving project goals and whose participation and support are crucial to its success.

strategy: a group of actions with a common focus that work together to reduce pressures, capitalize on opportunities, or restore natural systems. A set of strategies identified under a project is intended, as a whole, to achieve goals, objectives, and other key results addressed under the project.

stress: a degraded ecological condition of a target that resulted directly or indirectly from pressures defined above (e.g., habitat fragmentation).

total maximum daily load (TMDL): a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, as well as an estimation of the percentage originating from each pollution source. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that



the waterbody can be used for state-designated purposes. The calculation must also account for seasonal variation in water quality.

watershed: defined here as a stream or river basin and the adjacent hills and peaks which "shed," or drain, water into it.

wetland: a general term referring to the transitional zone between aquatic and upland areas. Some wetlands are flooded or saturated only during certain seasons of the year. Vernal pools are one example of a seasonal wetland.

wildlife: all species of free-ranging animals, including but not limited to mammals, birds, fishes, reptiles, amphibians, and invertebrates.

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How Water Is Used in California - Agriculture

Where Does California's Water Go?

- California's water supports three main sectors: cities and communities, agriculture and environment.
- On average, the proportion of water used by each sector is 10 percent cities and communities, 40 percent agriculture, and 50 percent environment.
- This statewide ratio varies widely depending upon whether a year is wet or dry.
- All sectors overlap: water allocated for one purpose is often reused for another purpose downstream.

Where Does Water Devoted to Agriculture Go?

- California's unique geography and Mediterranean climate have allowed the state to become one of the most productive agricultural regions in the world. The Sierra Nevada Mountain range that lines the eastern edge of the state captures and stores winter precipitation that can be then used for summer irrigation in the Central Valley. This water, combined with the Mediterranean climate, permits the growing of a great number of crops.
- California produces more than 300 different crops and leads the nation in production of more than 80 commodities. California is the sole producer of 14 commodities including almonds, artichokes, dates, figs, raisins, pistachios, prunes and walnuts.
- There are approximately 77,900 farms and ranches in California, and their combined sales generated \$46.4 billion in 2013. The value of California's farm output leads the nation.
- Most of this production would not be possible without irrigation. In an average year, California agriculture irrigates more than 9 million acres.

Much of Our Water Has Multiple Purposes

- Water released from upstream reservoirs to control salinity in the Sacramento-San Joaquin Delta often serves the dual purpose of benefitting threatened and endangered native species in the Delta and meeting various requirements to maintain certain levels of flow in rivers.
- Keeping saltwater out of the Delta also ensures that the State Water Project and the federal Central Valley Project can deliver fresh water to 25 million Californians and millions of acres of farmland.
- Much of the water dedicated to agriculture in California serves dual purposes: for example, flood-irrigated rice fields serve as critical habitat for many species of migratory birds that fly through California.
- In California agriculture, water is seldom used only once. Applied water is often reused multiple times on the same farm or in the same region. Reuse of agricultural recoverable flows is a prominent characteristic of California agriculture.

Drought Diminishes Supplies to All Sectors

- California communities have been ordered to reduce their overall water use by an average of 25 percent compared to 2013. State regulators tailored mandatory cutback targets ranging from 8 percent to 36 percent for each community based on past conservation efforts.
- In dry years, environmental flows are naturally reduced, as are many regulatory flow and water quality requirements. Some streams have dried up entirely. Others are slack and warm enough to threaten native fish populations. In the past two years of severe drought, flow requirements for environmental purposes also have been reduced by state regulators struggling to balance multiple demands for water. The State Water Resources Control Board has issued 12 separate orders since January 2014 in the Sacramento-San Joaquin Delta alone, reducing flows required for environmental purposes. These reductions made over 400,000 acre-feet of water available for other purposes in 2014, and another 600,000 acre-feet that will be made available for other purposes in 2015.
- A recent analysis by the University of California, Davis, Center for Watershed Sciences estimates that in 2015, surface water deliveries to farmers will be reduced by 8.7 million acre-feet. Groundwater pumping will increase an estimated 6.2 million acre-feet, for a net loss of 2.5 million acre-feet to California's farms.
- For two consecutive years, many San Joaquin Valley farms dependent upon the Central Valley Project have gotten no water from the project. Farms in Kern County dependent upon the State Water Project have had deliveries cut 80 percent. State regulators have ordered thousands of long-time water rights holders, many of them farmers and irrigation districts, to stop taking water from California rivers and streams because there simply is not enough water to meet all needs.
- Farmers are responding to the water shortages by pumping groundwater where possible, buying water from more fortunate growers, or fallowing land. UC Davis economists estimate that in 2015, farmers will choose not to grow crops on about 564,000 acres, with a corresponding loss of revenue of \$856 million.

State Growers Using Water More Efficiently

- Between 1967 and 2010, the total applied water to crops was reduced by 5 percent, from 31.2 million acre-feet to 29.6 million acre-feet (one acre foot is enough to supply all the needs of roughly two typical households for a year).
- Economic efficiency in that same time frame increased 96.6 percent, from a value of \$651 per acre-foot to \$1,280.
- Over four decades (a roughly corresponding period), yields rose at an average rate of 1.42 percent per year as both crop varieties and farming practices have improved. That makes the 40-year yield increase about 57 percent.
- More than half of California's irrigated agricultural acreage has some sort of precision irrigation technique being used (e.g., subsurface drip, micro-sprinkler and drip) with the sharp trend of these practices increasing each year.
- The state is facilitating greater adaptation of precision techniques with the State Water Efficiency and Enhancement Program (SWEET), a grant program for farmers implementing irrigation systems that reduce water and energy use and cut greenhouse gas emissions.
- Projects funded under the program will save hundreds of thousands of acre-feet of water and reduce greenhouse gas emissions by more than 2 million metric tons.



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- California's water supports three main sectors: cities and communities, agriculture and environment.
- On average, the proportion of water used by each sector is 10 percent cities and communities, 40 percent agriculture, and 50 percent environment.
- This statewide ratio varies widely depending upon whether a year is wet or dry. In wet years, the proportion that serves environmental purposes can be 60 percent or more, while in dry years that proportion drops to roughly one-third.
- Water often serves double duty: Water allocated for one purpose is often reused for other purposes downstream.

Where Does Water Devoted to Environmental Purposes Go?

- The largest share of water for environmental purposes goes to "wild and scenic" rivers, which are protected by federal and state law from dam development. That share is roughly 23 percent in a dry year, 41 percent in a wet year.
- These "wild and scenic" rivers are primarily on the remote North Coast where there is little agricultural or urban demand. The Eel River, for example, carries a larger volume of water than either the San Joaquin or American River.
- Other environmental water use includes water to maintain habitat for fish within rivers and streams, water that supports wetlands for migratory birds, and water needed to maintain water quality.
- Dramatic changes in California's water use since its statehood have transformed our rivers, streams and estuaries. Today, more than 1,400 dams block fish migration and roughly 95 percent of native vegetation along Central Valley rivers and creeks has been lost, including wetlands that hosted migratory birds.
- One quarter of California's native freshwater fish species are listed as endangered or threatened under state and federal endangered species acts. According to scientific research, in 1975, 12 percent of California's freshwater fish species were either extinct or highly vulnerable to extinction. By 2010, 38 percent of native freshwater species were extinct or vulnerable to extinction.

Much of Our Water Has Multiple Purposes

- Protecting freshwater supplies for over 25 million Californians and millions of acres of farmland requires keeping saltwater out of the inner Sacramento-San Joaquin Delta. Preventing saltwater intrusion protects water quality for Delta residents and the State Water Project and the federal Central Valley Project, which convey and store fresh water for communities and farms across the state.
- Water released from upstream reservoirs that flows into the Delta to repel salt water intrusion often serves a dual purpose -- helping native fish.
- Much of the water dedicated to agriculture in California also supports environmental habitats. For example, flood-irrigated rice fields serve as critical feeding grounds for many species of migratory birds that fly through California.
- Some rivers with stretches that are designated "wild and scenic" eventually flow to the Central Valley and provide water for farms and cities.

Drought Diminishes Supplies to All Sectors

- A recent analysis by the University of California, Davis, Center for Watershed Sciences estimates that in 2015, surface water deliveries to farmers will be reduced by 8.7 million acre-feet. Groundwater pumping will increase an estimated 6.2 million acre-feet, for a net loss of 2.5 million acre-feet to California's farms.
- California communities have been ordered to reduce their overall water use by an average of 25 percent compared to 2013. State regulators tailored mandatory cutback targets ranging from 8 percent to 36 percent for each community based on past conservation efforts.
- In dry years, environmental flows are naturally reduced, as are many regulatory flow and water quality requirements. Some streams have dried up entirely. Others are running slack and warm enough to threaten native fish populations.
- In the past two years of severe drought, flow requirements for environmental purposes also have been reduced by state regulators struggling to balance multiple demands for water. The State Water Resources Control Board has issued 12 separate orders since January 2014 in the Delta alone, reducing flows required for environmental purposes. These reductions made over 400,000 acre-feet of water available for other purposes in 2014, and another 600,000 acre-feet will be made available for other purposes in 2015.
- The state has been forced to rescue threatened and endangered fish species on many rivers across the state. Hatcheries have been evacuated due to low flows that make water temperatures lethally warm.
- Water deliveries to wildlife refuges have been reduced as much as 70 percent, raising concerns about waterfowl overcrowding and disease outbreaks.
- In key streams, the state is encouraging voluntary efforts among landowners and water users to maintain enough flow to allow fish to spawn.



Where Does California's Water Go?

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- Water often serves double duty: Water allocated for one purpose is often reused for another purpose downstream.

Where Does Water Devoted to Municipal and Industrial Purposes Go?

- California is the most populous state in the nation, with 38.7 million people as of January 2015. Demographers predict steady future growth, with the state's population projected to reach more than 51 million by 2060.
- Economists put the value of all goods and services produced in the state in 2014 at \$2.3 trillion, making California the 8th largest economy in the world.
- Total urban water use in California is approximately 9.5 million acre-feet a year. Of that, approximately half goes to landscaping. Roughly one-third of total urban water use goes to residential landscaping, with another 16 percent used on the landscapes of commercial and governmental institutions.
- Another third of total urban water use is used in people's homes and apartments, with an additional 9 percent used within commercial and institutional buildings.
- According to the Public Policy Institute of California, the share of water devoted to industry is shrinking. Industry now uses only 6 percent of urban water, down from 8 percent in 1990. Businesses and industry are getting more efficient, according to the PPIC, which found that water used by cities generated roughly 2.4 times more economic value per gallon in 2010 than it did in 1967.
- Water used to help generate electricity involves roughly 2 percent of total urban water use.
- Getting water to homes, parks, businesses, factories, and other enterprises within California's cities and towns is largely a local endeavor.
- Nearly 400 large water districts provide water for more than 90 percent of the state's population, while thousands of smaller utilities serve rural communities.

- Water from local aquifers and reservoirs makes up the largest share of the water that supplies California's municipal and industrial needs.
- But at least one-fourth of the water used in metropolitan Southern California and the San Francisco Bay Area comes from the Sacramento-San Joaquin Delta through the pumps and aqueducts of the State Water Project. Hundreds of billions of dollars of economic activity are tied to these water deliveries, from the tourist economy of San Diego to the manufacturing hub of Los Angeles to the technology company campuses of Silicon Valley.
- Water delivered from the Delta makes up some or all of the water supplies of two-thirds of the state's population, or 25 million people.

Much of Our Water Has Multiple Purposes

- Protecting water supplies that are drawn from the Delta involves the control of saltwater that pushes inland from San Francisco Bay.
- Water released from upstream reservoirs to flow into the Delta to repel salt water intrusion often serves the dual purpose of also helping native fish.
- Much of the water dedicated to agriculture in California also supports environmental habitats. For example, flood-irrigated rice fields serve as critical feeding grounds for many species of migratory birds.

Drought Diminishes Supplies to All Sectors

- This year, California communities were ordered to reduce their overall water use by an average of 25 percent compared to 2013. State regulators tailored mandatory cutback targets ranging from 4 percent to 36 percent for each community based on past conservation efforts.
- In response, local water districts have issued emergency regulations restricting outdoor water use; invested hundreds of millions of dollars in rebate programs to encourage homeowners to replace lawns and install more efficient toilets, washing machines, shower heads and other appliances and fixtures; altered rate structure to encourage conservation; boosted enforcement of water-use restrictions; and supported public awareness campaigns to help teach Californians how to save water every day.
- A recent analysis by the University of California, Davis, Center for Watershed Sciences estimates that in 2015, surface water deliveries to farmers will be reduced by 8.7 million acre-feet. Groundwater pumping will increase an estimated 6.2 million acre-feet, for a net loss of 2.5 million acre-feet to California's farms.

- Experts put the economic cost to California's farm economy at roughly \$2.7 billion and estimate that nearly 19,000 farm jobs -- most in the San Joaquin Valley -- have been lost due to drought.
- In dry years, environmental flows are naturally reduced, as are many regulatory flow and water quality requirements. Some streams have dried up entirely. Others are slack and warm enough to threaten native fish populations.
- In the past two years of severe drought, flow requirements for environmental purposes also have been reduced by state regulators struggling to balance multiple demands for water. The State Water Resources Control Board has issued 12 separate orders since January 2014 in the Delta alone, reducing flows required for environmental purposes. These reductions made over 400,000 acre-feet of water available for other purposes in 2014, and another 600,000 acre-feet that will be made available for other purposes in 2015.

Future Growth Will Use Water Wisely

- Steadily, California's homes and businesses are becoming more water-efficient. Despite growth, overall urban water use has remained relatively flat over the past 20 years. According to the PPIC, average per capita urban daily water use has fallen nearly 23 gallons to 178 gallons since 1995, helping the state to absorb growth without additional supplies.
- Landscaping offers great potential for future water savings. The state is updating a model landscape ordinance that would reduce the water use by new homes by 30 percent and cut water use on new commercial landscapes by 40 percent. The model ordinance sets efficiency standards that each community must meet or exceed. It also encourages the capture of rainwater and gray water.
- California is expected to add 472,000 single- and multi-family housing units with an associated 20,000 acres of new landscape over the next three years, according to state demographers. New landscape standards are critical to ensure that new plantings are as efficient as possible.
- New state regulations also will boost water-use efficiency indoors. Building standards will be updated to require bathroom faucets and urinals to use less water, which will save millions of gallons of water a year in new buildings.



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