MARINE RESOURCES COMPANION PLAN

December 2016

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

SWAP
California State Wildlife Action Plan

Photo Credit:

Left:
Moss Beach shoreline from the Fitzgerald Marine Reserve
Date: 19 May 2007
Photographer: Robert E. Nylund via Wiki Commons

Right:
Playful California sea lions in the kelp forest off San Miguel Island, California, Channel Islands NMS
Date: 27 September 2010
Photographer: Claire Fackler via NOAA/NOS/NMS/CINMS; National Marine Sanctuaries Media Library

Prepared by Blue Earth Consultants, LLC

December 2016

Disclaimer:

Although 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 the California Department of Fish and Wildlife leadership team and staff; the California Fish and Game Commission; cooperating state, federal, and local government agencies and organizations; California Tribes and tribal governments; and various partners (such as non-governmental organizations, academic research institutions, and citizen scientists).

Table of Contents

Text Boxes

Figures

Tables

Acronyms and Abbreviations

AFWA	**Association of Fish and Wildlife Agencies**
ASBS	**Areas of Special Biological Significance**
BLM	**U.S. Bureau of Land Management**
Blue Earth	**Blue Earth Consultants, LLC**
BOEM	**Bureau of Ocean Energy Management**
CARI	**California Aquatic Resources Inventory**
CBC	**California Biodiversity Council**
CCC	**California Coastal Commission**
CCNM	**California Coastal National Monument**
CDFG	**California Department of Fish and Game**
CDFW	**California Department of Fish and Wildlife**
CDPR	**California Department of Parks and Recreation**
CDWR	**California Department of Water Resources**
CEQA	**California Environmental Quality Act**
Ch.	**Chapter**
CNRA	**California Natural Resources Agency**
CRAM	**CA Rapid Assessment Method**
DOI	**U.S. Department of Interior**
DRECP	**Desert Renewable Energy Conservation Plan**
FGC	**California Fish and Game Commission**
HCP	**Habitat Conservation Plan**
IRWMP	**Integrated Regional Water Management Plan**
KEA	**Key Ecological Attribute**
LCC	**Landscape Conservation Cooperative**
LiMPETS	**Long-term Monitoring Program and Experiential Training for Students**
MARINe	**Multi-Agency Rocky Intertidal Network**
MCU	**Marine Conservation Units**
MLMA	**Marine Life Management Act**
MLPA	**Marine Life Protection Act**
MPA	**Marine Protected Areas**
MSLT	**MPA Statewide Leadership Team**
NCCP	**Natural Community Conservation Planning**
NEPA	**National Environmental Policy Act**
NFWF	**National Fish and Wildlife Foundation**
NGO	**Non-governmental Organization**
NMFS	**National Marine Fisheries Service**
NMS	**National Marine Sanctuary**
NOAA	**National Oceanic and Atmospheric Administration**
NPS	**National Park Service**
NRCS	**Natural Resources Conservation Service**

NRDC	**Natural Resources Defense Council**
NSF	**National Science Foundation**
OPC	**California Ocean Protection Council**
OSPR	**Office of Spill Prevention and Response**
PISCO	**Partnership for Interdisciplinary Studies of Coastal Oceans**
RAMP	**Regional Advance Mitigation Planning**
RCCA	**Reef Check California**
RCD	**Resource Conservation District**
RLF	**Resources Legacy Fund**
RMP	**Resources Management Plan**
ROV	**Remote-Operated Vehicle**
RPB	**Regional Planning Body**
SCC	**California State Coastal Conservancy**
SCCWRP	**Southern California Coastal Water Research Project**
SCWRP	**Southern California Wetland Recovery Project**
SFEI	**San Francisco Estuary Institute**
SGCN	**Species of Greatest Conservation Need**
SLC	**California State Lands Commission**
SLR	**Sea Level Rise**
SMRMA	**State Marine Recreational Management Areas**
SWAP	**State Wildlife Action Plan**
SWG	**State and Tribal Wildlife Grants**
SWRCB	**State Water Resources Control Board**
TNC	**The Nature Conservancy**
USACE	**U.S. Army Corps of Engineers**
USEPA	**U.S. Environmental Protection Agency**
USFWS	**U.S. Fish & Wildlife Service**
USGS	**U.S. Geological Survey**
WCB	**Wildlife Conservation Board**
WRAMP	**State Wetland and Riparian Area Monitoring Plan**

1. Introduction

The California State Wildlife Action Plan 2015 Update (SWAP 2015; see Text Box 1) provides a vision and a framework for conserving California's diverse natural heritage. SWAP 2015 also calls for the development of a collaborative framework to sustainably manage ecosystems across the state in balance with human uses of 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 undertook the preparation of companion plans for SWAP 2015. 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 partnerships and by mutually managing and conserving the state's natural and cultural resources. Text Box 2 highlights important definitions for SWAP 2015 and the companion plan process.

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) as defined by 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, matched with approximately $19 million in state government support for 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). 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]

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)*:* An aspect of a target's biology or ecology that, if present, defines a healthy target and, if missing or altered, would lead to 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.

Target: Same as *conservation target* defined above.

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 as defined in SWAP 2015.

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)

1.1 SWAP 2015 Statewide Goals

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

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, that affect 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 (see Text Box 3) were created collaboratively with partners and will be instrumental in implementing SWAP 2015 (See Appendix C).

Text Box 3 Companion Plan Sectors

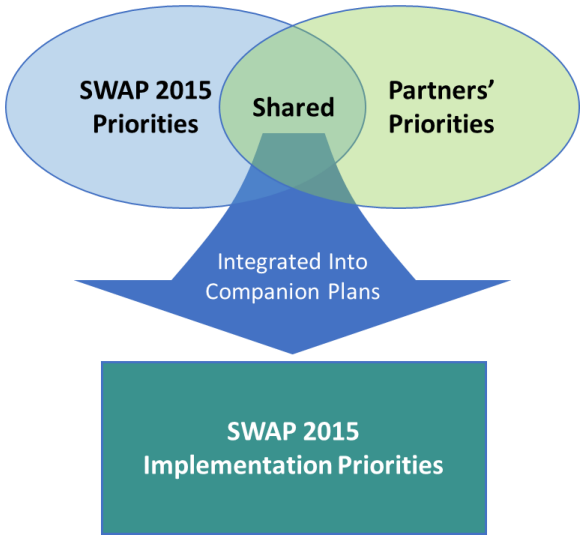
- Agriculture
- Consumptive and Recreational Uses
- Energy Development
- Forests and Rangelands
- Land Use Planning
- Marine Resources
- Transportation Planning
- Tribal Lands
- Water Management

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, shared priorities come together in the companion plans and become elevated as implementation priorities for SWAP 2015.

The companion plans respond to feedback from many sources, including CDFW staff and partners involved in 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 are also aligned with the National Fish, Wildlife, and Plants Climate Adaptation Strategy (U. S. Fish and Wildlife Service [USFWS] 2012), which emphasizes increased partner engagement as a best practice in climate change adaptation. Developing the companion plans also directly helps CDFW comply with recently enacted legislation, 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" (CDFW 2012).

Figure 1: Aligning SWAP 2015 and Partner Priorities



CDFW selected sector categories based on the department's needs as well as the themes identified in other existing plans, including the 2009 California Climate Adaptation Strategy (California Natural Resources Agency [CNRA] 2009), the 2014 Safeguarding California Plan (CNRA 2014), The President's Climate Action Plan (Executive Office of the President 2015), and the National Fish, Wildlife, and Plants Climate Adaptation Strategy (USFWS 2012).

Companion Plan Development

Because the companion plans focused on teamwork during their development, they inherently help set a stage for implementing SWAP 2015 through future collaborations. Together, SWAP 2015 and the associated companion plans describe the context and strategic direction of integrated planning and management efforts that are crucial for sustaining California's ecosystems. The SWAP 2015 companion plan management team, composed of CDFW and Blue Earth staff, provided general direction to the companion plan development teams to develop each sector plan (see Appendix G). To form sector teams, CDFW sought statewide representation of public and private partners with topic expertise and who were heavily involved in natural resource conservation and management (see Appendix C).[1]

Beginning in early 2015, Blue Earth facilitated a series of four web-based collaboration meetings for each sector. A kickoff meeting provided development teams with an overview of SWAP 2015 and the

[1] Although the management team sought to engage a broad range of partners, CDFW recognizes that there are many other partners who play important roles in conserving and managing natural resources in California who were not involved in developing the companion plans.

companion plan development process, followed by three sector-specific meetings. During these sector meetings, 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 shared priorities, as well as collaboration opportunities for achieving those mutual interests.

Two internal drafts of the companion plans were reviewed by the development teams prior to the public release of the third draft in the fall of 2015. The final nine companion plans were published incorporating responses to public comments.

Companion Plan Content

Each companion plan addresses the following components:

- SWAP 2015 overview
- Companion plans overview—approach, purpose, development process, and content
- Sector overview
- Common themes across sectors
- Common priority pressures and strategies across sectors
- Priority pressures and strategies for the sector
- Potential collaboration activities
- Potential partners and resources
- Evaluating implementation
- Desired outcomes
- Next steps

2. Marine Resources Sector

2.1 Marine Resources in California

The Marine Province which was defined for the first time under SWAP 2015, stretches along California's entire coastline of approximately 1,100 miles and extends offshore to the three-mile territorial limit (CDFW 2015). The large array of ecosystems and habitats in California's marine environment contains a high level of plant and animal diversity and abundance. Because of the productivity of its marine ecosystems, California's ocean economy revenues are among the top five in the nation (National Ocean Economics Program 2014). Many Californians depend on a healthy marine environment for their livelihoods, including continuity of traditional cultural heritage (in terms of consumptive and non-consumptive uses). Examples of consumptive and non-consumptive uses include fishing, shellfish and other types of aquaculture, wildlife viewing, and ocean recreation. The coast's natural beauty and many economic opportunities support residents and attract visitors. In 2010, more than 80% of the state's approximate 39 million residents lived in coastal watershed counties, compared with a national average of 52% (National Oceanic and Atmospheric Administration [NOAA] 2013; U.S. Census Bureau 2015).

This unique province includes ridges, submarine canyons, and kelp forests that are home to a diverse array of plants and animals. Typically, California's shallow continental shelf is narrower, no wider than

five miles, than at the Atlantic and Gulf coasts (Johnson and Sandell 2014). The "California current" brings colder northern waters southward along the shore as far as Baja California, while the "southern California countercurrent" flows into the Santa Barbara Channel. These currents and other minor currents drive nutrient cycling and delivery and disperse larval marine invertebrates along the coastline and among marine ecosystems (Gaines et al. 2003; Gaines et al. 2010).

Seasonal changes in wind direction commonly create seasonal patterns for currents, and climate change impacts may affect these historic patterns significantly. Northwesterly winds help trigger an upwelling of cold, nutrient-rich water from the depths, leading to high primary productivity (e.g., phytoplankton density and abundance and/or kelp forests) that attract foraging marine life. When these northwesterly winds abate each fall, a surface current, known as the "Davidson current", develops and flows north of Point Conception. Overlaying these annual patterns are climate cycles of both short-term and long-term fluctuations in frequency, intensity, and duration. Other sources of variability appear in atmospheric pressure (e.g., El Niño and La Niña[2]) and large-scale changes in ocean temperatures, local winds, topography, tidal currents, and discharge from rivers (CDFG 2008).

The combined 220,000 square miles of the state's Marine Province and federal waters also contain some of the busiest shipping lanes and ports in the world and multi-million-dollar commercial and recreational fisheries, in addition to supporting coastal tourism. The Marine Province includes over 124 marine protected areas (MPA) established under the Marine Life Protection Act (MLPA)(CDFW 1999). California's protected areas include MPAs (i.e., State Marine Reserves, State Marine Conservation Areas, and State Marine Parks), State Marine Recreational Management Areas (SMRMAs), Special Closures, Areas of Special Biological Significance Special Closures, and National Marine Sanctuaries (CDFW 2015).[3]

The Marine Province, as described in SWAP 2015, contains six conservation targets (an element of biodiversity at a project site) or ecosystems: 1) embayments, estuaries, and lagoons; 2) intertidal zone; 3) nearshore pelagic zone; 4) mid-depth zone; 5) deep zone; and 6) offshore rocks (CDFW 2015). However, in SWAP 2015, conservation strategies had only been developed for the embayments, estuaries, and lagoons target (CDFW 2015). This particular ecosystem was chosen as the first target for development of a conservation strategy because of the availability of recent/current information from other strategic planning processes, its juxtaposition at the land-sea interface, its critical role as a nursery and refuge for countless marine species, its vulnerability to climate change impacts (such as sea level rise and ocean acidification), and the greater need for coordination efforts among multiple partners with jurisdiction over its management. The five additional targets will be addressed in future SWAP updates.

Although SWAP 2015 primarily focuses on embayments, estuaries, and lagoons, for the purposes of this companion plan all targets were discussed and considered when identifying priority conservation

[2] For more information regarding oscillation impacts on climate in the California Current region, see NOAA Fisheries, "Pacific Decadal Oscillation," 2014. Web. 28 Oct. 2015. http://www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/ca-pdo.cfm.
[3] For more information on the definitions for each type of protected area, see CDFW, "Definitions and Acronyms," 2015. Web. 28 Oct. 2015. http://www.dfg.ca.gov/marine/mpa/defs.asp#mma For more information on California's protected areas by region, see CDFW, "MPA Outreach Materials," 2014. Web. 28 Oct. 2015. http://www.dfg.ca.gov/marine/mpa/guidebooks.asp.

strategies. The Marine Province is divided into four Marine Conservation Units (MCUs): North Coast, North Central Coast, Central Coast, and South Coast. For the purposes of SWAP 2015, the boundary[4] between each MCU uses those defined and used in the MLPA process (CDFG 2008). Conservation strategies for the Marine Province were developed across the province as a whole and not differentiated by conservation unit due to the similarities in treats and pressures affecting every unit in the Province.

The marine resources sector is critical for implementing SWAP 2015.[5,6] The global significance and biological diversity of the Marine Province necessitate careful consideration of management actions for marine fauna and flora across the Pacific Ocean (CDFG 2005). In addition, vulnerability to climate change impacts—including sea level rise (SLR), coastal erosion, ocean acidification and hypoxia, and sea surface temperature changes—have potentially significant impacts on the Marine Province ecosystems and the species that rely on them.

2.2 Current Marine Resources Management and Conservation in California

Effectively conserving California's natural and cultural heritage in the context of significant anticipated growth and change is an important goal for the future. Many agencies (state and federal) and organizations focus on conservation of California's marine resources. For example, the Bureau of Land Management (BLM), in co-management with CDFW, developed the California Coastal National Monument (CCNM) Resources Management Plan (RMP) to advance collaborative conservation and management of natural resources along the coast (BLM 2005). Similarly, the California Coastal Commission (CCC), along with other state agencies (CDFW, California Ocean Protection Council [OPC], California State Lands Commission [SLC], and State Water Resources Control Board [SWRCB]), addressed the goal of protecting marine and ocean resources through inter-agency coordination, policy review, and implementation of the CCC's 2013–2018 Strategic Plan (CCC 2013). Another example is the efforts of the California State Coastal Conservancy (SCC) in partnership with state, federal, and local agencies, with Tribes, and with non-governmental organizations (NGOs) to protect the coast through the development and implementation of projects that restore fish and wildlife habitat and provide access to the coast.

[4] For more information, see: CDFW, "California's MPA Network, 2014. Web. 28 Oct. 2015. http://www.dfg.ca.gov/marine/mpa/mpa_summary.asp.

[5] CDFW defines California's state waters as the three-nautical mile maritime limit as shown on NOAA navigational charts. For more information, see NOAA, "Approved Maritime Limits for California," 2005. Web. 20 Oct. 2015. http://www.nauticalcharts.noaa.gov/csdl/boundarymetadata_CA.html.

[6] These are ocean waters within three-nautical miles of the most seaward driving features at mean lower low water along the California coastline, coastline of islands, offshore rocks, and within three-nautical miles from a line that extends between selected points across the mouth of coastal bays (primarily Monterey Bay). For more information, see FindLaw, "United States v. State of California 332 U.S. 19 (1947)," 2015. Web. 22 Jul. 2015. http://caselaw.findlaw.com/us-supreme-court/332/19.html#t1.

The OPC and SLC also have strategic planning documents that identify priorities and outline opportunities to leverage resources and improve collaboration in supporting marine management. In addition, many of the state agencies listed previously represent part of the MPA Statewide Leadership Team that acts as a standing body to help facilitate active and engaged communication among MPA network management partners (Oceanspaces 2014). By continuing to manage and collaborate on planning in the Marine Province, CDFW and other partners can work together to protect and conserve the state's natural and wildlife resources while providing new opportunities to use the Province for its scenic, recreational, and commercial values.

Text Box 4: Examples of Collaborative Conservation Efforts

There are numerous collaborative conservation management efforts found in California. Below are three such examples related to marine resources. The partners addressed in each description are indicated in **bold**.

- *Integrating Marine Management and Defense Planning*: The **U.S. Navy** and **Port of San Diego** partnered with **CDFW** and **USFWS** to update the San Diego Bay Integrated Natural Resource Management Plan (INRMP), which guides the integration of land-use activities on San Diego Bay Naval installations with broader natural resource management and conservation goals. Through this cooperation the 2013 INRMP was aligned with federal and state conservation priorities for fish and wildlife conservation and management on the military installations (e.g., conservation of rare and sensitive wildlife and plants). The INRMP also reflects the goals of a 2006 Memorandum of Understanding signed between the **Department of Defense**, **USFWS**, and **International Association of Fish and Wildlife Agencies** that encourages military installations to implement projects that will ensure conservation of natural resources and sustained military activities (Unified Port of San Diego 2013).
- *Restoring Estuary Function*: Humboldt County's Salt River Ecosystem Restoration Project is an example of how a local community and partner agencies can collaborate toward mutually beneficial goals. Implementation of the project has resulted in increased hydraulic and estuarine ecosystem function within the Salt River, and reintroduction of tidal flows to Riverside Ranch benefitting upstream sediment reduction efforts. The project has also helped fish (e.g., coastal cutthroat trout, tidewater goby, longfin smelt, Coho salmon) and wildlife species of concern while reducing flooding to nearby agricultural lands and infrastructure. The project is led by the **Humboldt County Resource Conservation District (RCD)** and includes numerous **local**, **state**, and **federal** partners (e.g., the **City of Ferndale**, **CDFW, SLC**, **NOAA Fisheries**, and **USFWS**) (Humboldt County Resource Conservation District 2015).
- *Collaborative Monitoring of California's Network of MPAs:* The state has invested $16 million to support baseline monitoring of the statewide MPA network to inform MPA management and broader priorities such as climate change, water quality, and fisheries management. Federal agency collaboration (e.g., with National Marine Sanctuaries) can also provide strong partnerships and lead to significant funding and support for projects (e.g., seafloor mapping as a part of statewide MPA network baseline data). The **California Ocean Science Trust**, **OPC**, and **CDFW** collaboratively planned and implemented the statewide, scientifically-rigorous MPA monitoring program on a regional basis, as each regional network of MPAs was implemented (CDFW 2015). These collective efforts are fostering a statewide understanding of conditions and trends inside and outside of state MPAs.

3. Common Themes across Nine Sectors

Equally important to discussion topics unique to each sector are the common themes across all sectors. This section summarizes the two major overarching themes discussed through the course of developing the nine companion plans: climate change and integrated regional planning.

3.1 Climate Change-related Issues

Climate change continues to be one of the major pressures forcing us to examine the relationship between modern society and nature. Describing climate science, however, has been difficult due to its inherent complexity. Because of this and other factors, our society has not been able to fully embrace the seriousness of the implications of climate change. In the most recent analyses, the global average temperature is projected to increase in the range of 0.3–4.8°C (0.5–8.6°F) by 2100, and in California, the increase is projected to be 1.5°C (2.7°F) by 2050 and 2.3–4.8°C (4.1–8.6°F) by 2100 (IPCC 2014; CNRA 2014).

The effects of climate change are already present. Global sea level rise over the past century has exceeded the mean rate of increase during the previous two millennia, and the earth's surface temperature over each of the last three decades has been successively warmer than any previous decade since 1850. The evidence of these observed climate change impacts is manifested the strongest and most comprehensively in natural systems where many species of terrestrial, freshwater and marine organisms have shifted their geographic ranges, migration patterns, abundances, and life cycle activities in response to ongoing climate change (IPCC 2014).

As climate conditions are inextricably linked to the welfare of environments and societies, even the most conservatively projected increase in global mean temperatures would trigger significant changes to socio-economic and ecosystem conditions. Food production, energy and water development, and preparation and response to catastrophic events are examples of human systems that would be negatively affected by climate change. Pressures and stresses to ecosystems identified in SWAP 2015 will likely increase in magnitude and severity through the compounding effects of climate change (SWAP 2015).

Accordingly, the potential far-reaching effects on California's natural resources induced or exacerbated by climate change were a common concern among sectors, and cross-sector collaboration was considered critical for ecosystem adaptation while avoiding disasters.

Two key discussion points amongst sectors were to strategically assess the state's climate change vulnerabilities and implement adaptation actions. These actions included, but were not limited to: establishing a well-connected reserve system to increase ecosystem integrity (e.g. habitat resilience and mobility); incorporating climate change related factors (e.g. carbon sequestration, habitat shifts and sea level rise) into natural resource management; improving regulations to reduce greenhouse gas emissions; developing research guidelines to comprehensively evaluate climate change effects; and raising awareness of climate change.

3.2 Integrated Regional Planning

California presents a landscape that is ecologically, socioeconomically, and politically intricate. The current status of the state's ecosystems reflects not only the interactions between biological and abiotic components, but also among ecosystems and diverse human activities that are further controlled by mandates imposed on regulated activities.

The concept of integrated regional planning arises from the realization that addressing only one aspect of a complicated human/nature system is not sustainable. Paraphrased from the definition in the California Water Plan, integrated regional planning 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). Expected outcomes of adopting an integrated regional planning approach include; maximizing limited resources to meet diverse demands, receiving broader support for natural resource conservation, and sustaining and improving ecosystem conditions, both for intrinsic and resource values.

Integrated regional planning begins with accepting diverse priorities and values articulated by the stakeholders of a region. With this mutual understanding, attempts are made, often through intense negotiations, to integrate various activities associated with multiple interests occurring in the region. Expected tasks under integrated regional planning include: identifying conflicting or redundant activities occurring in a region, minimizing redundant activities by aligning similar efforts, streamlining and integrating needed processes across different priorities, and collaborating and complementing efforts to effectively achieve mutual and/or diverse interests. As an example, integrated regional planning could result in zoning a region and limiting activities within each zone to avoid or reduce incompatible activities occurring in the region, or deferring timing to reduce negative consequences of interactive activities occurring in a region. In sum, integrated regional planning requires trust, open-mindedness, transparency, patience, strategic thinking, and collaboration among partners who seek to use the same or similar resources from different perspectives.

Establishing a framework for integrated regional planning was considered as one of the state's top priorities across sectors. Related topics included: preparing, approving, and implementing regional and landscape-level conservation plans; systematically pursuing necessary resources to implement conservation strategies; coordinating effective partnerships; adapting to emerging issues; and reviewing and revising the plans. Several existing plans were recognized as ongoing integrated regional planning efforts: Natural Community Conservation Plans (NCCPs), Habitat Conservation Plans (HCPs), Habitat Connectivity Planning for Fish and Wildlife (CDFW 2015), the Master Plan for Marine Protected Areas, individual species management plans, and SWAP 2015 and related endeavors, including this companion plan.

SWAP 2015, Chapter 7 describes implementation and integration opportunities, and identifies where partners can engage in cooperative implementation. Such opportunities include programs under various state and federal agencies such as Regional Advance Mitigation Planning (RAMP) by Caltrans and CDWR;

California Water Plan, California Water Action Plan, and the Central Valley Flood System Conservation Strategy by CDWR; Fire and Resource Assessment Program by CALFIRE; and federal programs under regulations such as the Central Valley Project Improvement Act, and the National Forest Management Act (CDFW 2015).

4. Commonly Prioritized Pressures and Strategy Categories across Sectors

SWAP 2015 adopted the Open Standards for the Practice of Conservation (Conservation Measures Partnership 2013), a conservation planning framework, and applied the process to select actions needed to conserve focal ecological components (conservation targets). The process started with examining the status of targets by identifying and evaluating their key ecological attributes, factors influencing their compromised conditions (stresses), and the sources of these stresses (pressures). Based on the situational analysis, conservation strategies (sets of actions) were selected for each target, either to improve the conditions of key ecological attributes, or to reduce the negative impacts from the stresses and pressures (CDFW 2015).

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". 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. Table 1 below lists the 29 standard pressures addressed under SWAP 2015.

Table 1: SWAP 2015 Pressures

• Agricultural and forestry effluents • Air-borne pollutants • Annual and perennial non-timber crops • Catastrophic geological events[1] • Climate change • Commercial and industrial areas[2] • 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 areas[2] • Industrial and military effluents[4, 5] • Introduced genetic material • Invasive plants/animals	• Livestock, farming, and ranching • Logging and wood harvesting • Marine and freshwater aquaculture • Military activities • Mining and quarrying • Other ecosystem modifications[6] • Parasites/pathogens/diseases • Recreational activities • Renewable energy • Roads and railroads • Shipping lanes[7] • Tourism and recreation areas • Utility and service lines • Wood and pulp plantations
Pressures include the following: [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)	

4.1 Strategy Categories across Sectors

SWAP 2015 outlines 11 categories of conservation strategies (Table 2) under which regional strategies are organized, similar to the manner in which the regional goals are tiered under the statewide conservation goals (CDFW 2015). These regional strategies, grouped in various categories, are meant to work synergistically to achieve the statewide goals and priorities.

Table 2: SWAP 2015 Conservation Strategy Categories

• Data Collection and Analysis	• Law and Policy
• Direct Management	• Management Planning
• Economic Incentives	• Partner Engagement
• Environmental Review	• Outreach and Education
• Land Acquisition, Easement, and Lease	• Training and Technical Assistance
• Land Use Planning	(CDFW, 2015)

The three most common priority strategy categories across the nine sectors were Data Collection and Analysis (7 sectors prioritized this strategy), Management Planning (7 sectors), and Partner Engagement (5 sectors). The strategy categories identified as most relevant to the marine resources sector are described in Section 5.2 below.

5. Marine Resources Priority Pressures and Strategy Categories

As described in SWAP 2015, pressures such as resource extraction, loss of habitat, pollution, invasive species, changing water quality, ocean acidification, and global climate change could affect biodiversity and natural resources in the state. These factors contribute to changes that can have profound impacts on marine ecosystems. The effects of climate change are already being seen in the marine sector, including increases in sea level, changes in upwelling, and range shifts in marine species (Largier et al. 2010). Likewise, ecosystem stresses on freshwater, estuarine, and ocean hydrology and water quality; coastal and ocean dynamics; sediment characteristics; and geophysical disturbance regimes drive the need for conservation activities within this sector. Although challenges exist, these seemingly negative aspects of pressures present opportunities for improving ecological health through collaborative conservation work.

For the purpose of developing companion plans, CDFW went through the pressures and strategy categories that were selected for various conservation targets under SWAP 2015 (CDFW 2015). Those elements considered relevant to each sector were collected from the document and prioritized by importance to the sector. Section 5.1 and 5.2 provide the results of this prioritization, and Text Box 5 lists pressures and strategies considered important but not included in this plan (for future consideration).

5.1 Priority Pressures

Using the Open Standards for the Practice of Conservation framework, 20 human-caused pressures for the Marine Province were identified (please see Appendix D) (CDFW 2015).[7] This list was refined to identify the top three pressures for the marine resources sector:

Climate change – Climate change can affect ecosystems in a variety of ways, including shifts in precipitation, temperature, rates of coastal erosion, ocean chemistry (e.g., shifts occurring in response to increased concentrations of carbon dioxide in the atmosphere), weather, ocean circulation, and sea level. Climate change may also exacerbate stresses experienced by vulnerable wildlife and habitats, such as habitat loss and fragmentation, timing mismatches of adequate prey availability and breeding seasons, creation of migration barriers, increases in presence and prevalence of invasive species, and hypoxia.

Agriculture and forestry effluents – Agricultural and forestry practices can have a range of direct and indirect ecosystem effects on habitats along or near the land-sea interface, both positive and negative. Examples include providing and/or impacting potential habitat for migratory bird species, impacting water quality from erosion and chemical pollutants such as pesticides, animal hormones, and antibiotics, supporting land management practices, and using or diverting water.

Housing and urban areas; commercial and industrial areas - shoreline development – Economic and population growth, which are drivers of increased development, lead to an increased need for housing, commercial/industrial development, tourism and recreation services, transportation, and other infrastructure. This increase in development creates pressures on the state's natural resources across multiple scales (upland, shoreline, and marine). Examples of these pressures include urban runoff, coastal armoring, and introduction of plastics to the ocean.

5.2 Priority Strategy Categories

The top three strategy categories selected for this sector are the following: data collection and analysis, law and policy, and management planning. These categories are described below.

Data Collection and Analysis – Data collection and analysis is the collection and utilization of scientifically robust data to develop more effective management strategies and facilitate implementation and enforcement of conservation strategies, polices, and laws under other categories. Example strategies include: supporting ecosystem and human use monitoring; compiling data results (e.g., Rocky Intertidal Monitoring Program) for integrated management; integrating data into management/enforcement; and encouraging research that addresses questions that would improve ability to manage this ecosystem.

[7] Before the companion plan development team process, the SWAP 2015 major pressures list was examined and ranked based on severity, scope, and irreversibility in the impact contribution compared to other pressures; therefore, some pressures (e.g., fishing and harvesting aquatic resources) did not make the ranked list provided for the companion plan process.

Law and Policy – Law and policy is the development, revision, guidance, implementation, and enforcement of laws, regulations, policy, and voluntary standards to improve conservation stewardship of species and habitats. Example strategies include: developing and implementing policies, practices, and permitting guidelines that minimize impacts (e.g., human, environment) on the shoreline and wetlands, particularly those within MPAs; and full implementation of the Marine Life Management Act (MLMA), MLPA, and National Ocean Policy Implementation Plan (West Coast), as well as other conservation-oriented marine resource management laws and policies.

Management Planning – 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: coordinating with relevant local, regional, state, and federal agencies on shoreline and water quality management planning; and improving management approaches for fostering the sustainability and resilience of marine and coastal ecosystems.

Text Box 5: Additional Pressures and Strategies for Future Consideration

Pressures

- *Note: All additional pressures fall into one or more of the 29 categories of major pressures listed in SWAP 2015.*

Strategies

- Develop and implement monitoring plans for wildlife and ecosystem conservation
- Enforcement of regulations and fines for malfeasance.
- Increase partnership and collaboration with partners from multiple sectors (e.g., government, NGO, and public).
- Strengthen monitoring and inspection protocols for hull fouling and ballast water organisms; including possible regulations.

6. Collaboration Opportunities for Joint Priorities

Conservation programs in California are managed by diverse partners, including state and federal agencies, local governments, and NGOs. Because SWAP 2015 is a comprehensive conservation plan, integrating their work into SWAP is crucial for impactful conservation outcomes for the state (SWAP 2015 Chapter 7). While the full array of relevant efforts is too extensive to list here, potential alignment opportunities were identified. Conservation activities considered most relevant to each prioritized strategy category (as described in Section 5.2) are summarized in Table 3. Potential partners and financial resources for implementing these conservation activities are listed in the Appendix E and F. Together, Table 3 and Appendix E and F summarize the key findings for this sector.

Alignment Opportunities and Potential Resources

Table 3 highlights conservation activities by the strategy categories that the team considered important for collaboration, and which could be implemented over the next 5–10 years. While some activities are

applicable across many spatial scales and jurisdictions, they are assigned only to the most relevant scale and jurisdiction. The information in Table 3 is not comprehensive, and does not obligate any organization to fund or provide support for strategy implementation.

Table 3: Collaboration Opportunities by Strategy Category

Data Collection and Analysis

Potential Conservation Activities

Statewide

- Modernize techniques for data collection (e.g., electronic data and enforcement records management systems)
- Implement long-term MPA monitoring statewide

Regional

- Collect and organize baseline and ephemeral data in the marine region
- Collect data on invasive species for regulations updates on hull fouling and ballast water
- Conduct MPA monitoring that uses the MPA monitoring framework by implementing regional MPA monitoring plans
- Work with science and marine community to develop/report monitoring broadly to meet data management needs and climate initiatives

Local/Site-specific

- Assess wetlands using the CA Rapid Assessment Method (CRAM)
- Collect data through wetland restoration projects
- Conduct marine resource assessments and make recommendations
- Conduct monitoring on areas/species such as rocky intertidal, marine birds, marine mammals, eelgrass, longfin smelt, and sea turtles (e.g., via ROV, scuba)
- Develop new indices for monitoring and evaluation
- Distribute publications to local communities and partners about MPA regulations, resources, and monitoring results
- Have managers identify and prioritize their information needs based on SWAP 2015 goals
- Improve fish passage through use of estuary enhancement data
- Increase tidal zone monitoring and data collection
- Map wetlands using standard statewide protocols (e.g., CA Aquatic Resources Inventory [CARI])
- Stipulate that monitoring is consistent with the State's Wetland and Riparian Area Monitoring Plan (WRAMP), as appropriate

Law and Policy

Potential Conservation Activities

Statewide

- Coordinate permitting analysis and communication processes among coastal agencies
- Ensure effective enforcement by Fish and Wildlife wardens
- Evaluate if laws are supporting conservation objectives effectively
- Identify areas that need additional policy guidance
- Integrate SLR under existing policies to allow for wetland migration
- Monitor and enforce compliance with ballast water regulations and hull biofouling prevention programs
- Protect coastal resources through agency policy review and updated guidance
- Provide input on marine resources of concern and analyze how concerns can elevate/highlight/protect

resources under Local Coastal Plans/Coastal Act
- Regulate development (e.g. shoreline armoring, housing, docks, roads) in coastal zone under Coastal Act (e.g., limit increase in erosion rates from coastal armoring)
- Support investment in marine law enforcement capacity
- Track MPA enforcement and violations cases statewide
- Work with prosecutors to identify needed changes in relevant code sections to support stronger enforcement of existing marine/ coastal resource protection laws

Regional
- Work with communities to encourage greater compliance with MPA regulations

Local/Site-specific
- Develop viable list of marine restoration options (e.g., eelgrass, native oyster, and salt marsh restoration, land purchases for habitat restoration to accommodate sea level rise) that would directly benefit MPAs and marine resources in general.
- Improve public understanding of buffers and seasonal island closures to increase compliance to protect seabirds, marine mammals, and other marine resources

Management Planning

Potential Conservation Activities

Statewide
- Convene working groups among State natural resource managers and Federal partners to increase communication and collaboration
- Develop a statewide outreach and education plan on ecosystem services provided by embayments, estuaries, and lagoons (e.g., citizen science guide)
- Enhance the multi-agency coastal project review process to harmonize coastal management (e.g., modeled after SCWRP's work plan project evaluation)
- Improve coordination and collaboration on MLPA involvement
- Work with partners to develop statewide MPA enforcement, compliance, and permitting plan

Regional
- Create documents, materials, and processes to increase inter-agency and cross-sector collaboration on protection measures to identify habitat pressures and stresses
- Determine method to conduct resource valuation of ecosystem services
- Develop implementable restoration plans in estuaries and wetlands
- Develop SLR adaptations for coastal wetlands

Local/Site-specific
- Balance water reuse to benefit key species
- Develop new storm water programs and manage flow to reduce pollutants entering marine waters
- Develop site-specific plans for coastal lagoons and key species
- Identify needs and gaps for management planning
- Consider wildlife needs in management of water and floods in estuaries/wetlands
- Provide input to assessments and planning processes
- Restore juvenile fish rearing habitat
- Set goals on habitat distribution and SLR resiliency
- Support Community MPA Collaboratives to ensure local expertise informs management decisions

7. Evaluating Implementation Efforts

Implementing SWAP 2015 and its nine companion plans is a complex undertaking. This section (and SWAP 2015 Chapter 8) emphasizes the importance of adaptive management based on performance monitoring and evaluation during the implementation stage.

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

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 for adaptive management; and
3. effects monitoring, which addresses if and how the target conditions are being influenced by strategy implementation.

Monitoring and evaluating SWAP 2015 implementation are critical steps to demonstrate and account for the overall progress and success achieved by the plan. By incorporating lessons learned through monitoring conservation activities and evaluating for future actions, CDFW and partners have opportunities to improve performance and adapt emerging needs that were not previously considered. For stakeholders including decision-makers, partners, and funders, the resulting data would be useful for not only understanding the status of SWAP 2015 and companion plan implementation, but also to prioritize resource allocations necessary for managing natural resources in the state.

SWAP 2015 developed performance measures for each strategy category (SWAP 2015 Chapter 8). These measures are critical in assessing SWAP 2015 performance and will be used for estimating the plans' overall contributions to natural resource conservation in California.

8. Desired Outcomes

Desired outcomes for this sector over the next 5–10 years, within the context of SWAP 2015, were identified and are provided below. These outcomes are organized by the selected strategy categories described in Section 5.2, and are not listed in order of priority.

Data Collection and Analysis

- Partnerships and coordination developed for aligning strategies, and conservation actions for data collection and analysis articulated in plans and strategies.
- Continued and new activities to track the progress towards outcomes and goals of SWAP 2015 and companion plans (e.g., through MPA monitoring) and data synthesized, in a usable format, to inform the understanding of SWAP 2015 implementation progress, ocean health, and needs for adaptive management. Progress on implementation shared with partners and the public.

- Climate change impact assessments and data inform decisions on habitat conservation, protection, and acquisition (e.g., identify wetland areas facing sea level rise impacts to understand viability for protection, conservation, and acquisition).
- Statewide information management systems or a repository created that allows agencies, decision-makers, and the public to access coastal and ocean data including information for management, law enforcement, and policy decision-making (e.g., California Environmental Quality Act/National Environmental Policy Act [CEQA/NEPA] and tracking of law enforcement actions and cases).

Law and Policy

- Increased availability of information (e.g., from CDFW and partners) to guide project review, permitting processes and laws, and policies related to ocean and coastal habitats including MPAs.
- CDFW, in collaboration with partners, identifies thresholds of significance as guidance to public agencies for potentially incorporating thresholds in permitting and impact evaluation processes.
- CDFW and partners provide data that informs recommendations for changes to permitting law and policy related to MPA resource impacts.
- Expanded State involvement in the West Coast Regional Planning Body.

Management Planning

- Broader engagement of scientific community in project cycle including planning, development, and implementation.
- Regional and sub-regional partners identified and engaged. Key players for developing and implementing coherent and consistent marine management planning and implementation and existing regional monitoring efforts also identified.
- Increased tribal participation at initial phase of project scoping and throughout planning and implementation of projects.

9. Next Steps

The key next steps identified to ensure successful implementation of the companion plan over the next five years are: partnership and collaboration; human and financial resources; and monitoring, evaluation, and adaptive Management. Additional next-steps to consider as a secondary priority are listed under “Additional Next Steps” (below).

Partnership and Collaboration

- Engage and define roles and plan of action for existing and potential partners to identify tangible and mutually beneficial opportunities to implement SWAP 2015 and companion plans.
- Seek opportunities to prioritize conservation actions by region, and build upon partnerships with organizations engaged in natural resource management plan implementation.

- By strategy, identify specific partners and working groups interested in supporting (through financial or human resources) conservation actions relevant to SWAP 2015 and companion plans (e.g., ongoing partnership meetings with interested partners).
- Develop collaborative pilot projects focused on addressing sector strategies, identified pressures, and desired outcomes described in SWAP 2015 and companion plans.

Human and Financial Resources

- Request additional funding from the state (or other sources) to support CDFW's implementation and adaptation (as necessary) of SWAP 2015 and companion plans, and request additional funding to improve permitting guidance and develop implementation of mitigation practices.
- Seek commitments (e.g., leadership, management) from CDFW and relevant partners to support implementation and integration of SWAP 2015 and companion plans including increasing staff capacity and expertise (e.g., increase CDFW's Office of Spill Prevention and Response [OSPR] capacity and expertise to rapidly respond in the event of contaminant spills in or near marine environments), and seek support for acquisition and upgrades to data management systems.
- Build upon the information shared in the companion plan to develop a table or short document that identifies key resources (human and financial) available for implementation of SWAP 2015 and companion plan priorities.

Monitoring, Evaluation, and Adaptive Management:

- Continue support for data collection, analysis, translation, and aggregation of data for decision-making.
- Seek resources to develop and implement a monitoring and evaluation protocol that tracks progress towards achieving SWAP 2015, companion plan goals, and desired outcomes.
- Adopt common metrics and protocols to measure metrics statewide, sub-regionally, and locally and among user groups and institutions.

Additional Next Steps

- Develop and share more detailed information describing and linking priority pressures, strategies, and conservation activities at multiple scales of intervention (State, regional, and local).
- Develop a timeline and work plan for implementation of the prioritized SWAP 2015 and companion plan conservation actions.
- Seek ways to link companion plans together to enhance integrated regional planning and implementation (e.g., link to MPA Statewide Leadership Team work plan).
- Build upon the initial work focused on embayments, estuaries, and lagoons to develop more specific SWAP 2015 strategies and conservation activities for other target ecosystems (refer to SWAP Chapter 1.2.1 under "Vision Components" on working landscapes).

10. Acknowledgements

This companion plan was developed in collaboration with many partners who deserve special recognition for their time and commitment (Please see Appendix C). CDFW and Blue Earth express our warmest gratitude to those who were involved in the plan's development, as well as to the organizations that generously offered their staff time. As an initial step toward building a collaborative approach for implementing SWAP 2015 and the nine sector-focused companion plans, CDFW will develop an operational plan that describes logistics for moving forward.

Appendices

Appendix A: References

Bureau of Land Management (BLM). 2005. California Coastal National Monument Resource Management Plan. Print. http://www.blm.gov/style/medialib/blm/ca/pdf/pdfs/pa_pdfs/coastalmonument_pdfs/ccnm_rmp.Par.49cee191.File.dat/RMP_Printable.pdf.

California Coastal Commission (CCC). 2013. Strategic Plan 2013-2018. http://www.coastal.ca.gov/strategicplan/CCC_Final_StrategicPlan_2013-2018.pdf.

California Department of Fish & Game (CDFG). 1999. Marine Life Protection Act, California Fish and Game Code Section 2850-2863. https://www.wildlife.ca.gov/Conservation/Marine/MPAs/MLPA

CDFG. 2005. California's Wildlife Action Plan. http://www.dfg.ca.gov/SWAP/2005/docs/SWAP-2005.pdf.

CDFG. 2008. California Marine Life Protection Act – Master Plan for Marine Protected Areas. https://www.dfg.ca.gov/marine/pdfs/revisedmp0108.pdf.

CDFW. 2012. Assembly Bill 2402, Fish and Game Code Section 703.5. http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120AB2402.

CDFW. 2015a. California's Marine Protected Area (MPA) Network. Web. 24 Mar. 2015. http://www.dfg.ca.gov/marine/mpa/mpa_summary.asp.

---. 2015b. California State Wildlife Action Plan (SWAP). https://www.wildlife.ca.gov/SWAP/Final.

---. 2015c. Habitat Connectivity Planning for Fish and Wildlife. Web. 27 Oct. 2015. www.wildlife.ca.gov/Conservation/Planning/Connectivity.

---. 2015d. MPA Research and Monitoring Activities. Web. 28 Jul. 2015. http://www.dfg.ca.gov/marine/mpa/monitoring.asp.

CDFW. 2016. A Climate Change Vulnerability Assessment of California's Terrestrial Vegetation. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=116208&inline.

California Department of Water Resources (CDWR). 2014. California Water Plan Update 2013. Web. 22 Oct. 2015. http://www.waterplan.water.ca.gov/cwpu2013/final/index.cfm.

California Natural Resources Agency (CNRA). 2009. California Climate Adaptation Strategy, http://resources.ca.gov/climate/safeguarding/Statewide_Adaptation_Strategy.pdf.

CNRA. 2014. Safeguarding California Plan. http://resources.ca.gov/climate/safeguarding.

Conservation Measures Partnership. 2013. The Open Standards for the Practice of Conservation – Version 3.0, http://www.conservationmeasures.org/.

Executive Office of the President. 2013. The President's Climate Action Plan, 2013. Web. 27 Oct. 2015. https://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf.

FindLaw. 2015.United States v. State of California 332 U.S. 19 (1947). Web. 22 July 2015. http://caselaw.findlaw.com/us-supreme-court/332/19.html#t1.

Gaines, S., B. Gaylord, and J. Largier. 2003. Avoiding Current Oversights in Marine Reserve Design. Ecological Applications 13:32–46.

Gaines, S., S. Lester, C. Grorud-Colvert, C. Costello, and R. Pollnac. 2010. Evolving Science of Marine Reserves: New Developments and Emerging Research Frontiers. Proceedings of the National Academy of Sciences 107(43):18251-18255.

Humboldt County Resource Conservation District. 2015. Salt River Ecosystem Restoration Project. Web. 28 Jul. 2015. http://humboldtrcd.org/index_files/salt_river_ecosystem_restoration_project.htm.

Intergovernmental Panel on Climate Change. 2014. Climate Change 2014 Synthesis Report: Approved Summary for Policymakers. http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf.

Johnson, M. L., and J. Sandell. 2014. Advances in Marine Biology: Marine Managed Areas and Fisheries. Vol 68. London, Elsevier. UK.

Largier, J.L., B.S. Cheng, and K.D. Higgason, editors. 2010. Climate Change Impacts: Gulf of the Farallones and Cordell Bank National Marine Sanctuaries. Report of a Joint Working Group of the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries Advisory Councils. http://farallones.noaa.gov/manage/climate/pdf/climate_report.pdf.

Maslin, M. 2014. Climate Change: A Very Short Introduction. 3rd ed. Oxford University Press, UK..

National Ocean Economics Program (NOEP). 2014. State of the U.S. Ocean and Coastal Economies. http://oceaneconomics.org/Download/.

National Oceanic and Atmospheric Administration (NOAA). 2013. National Coastal Population Report: Population Trends from 1970 to 2020. http://stateofthecoast.noaa.gov/features/coastal-population-report.pdf.

OceanSpaces. 2014. MPA Statewide Leadership Team. Web. 29 Oct. 2015. http://oceanspaces.org/organization/mpa-statewide-leadership-team.

OceanSpaces. 2015. MPA Monitoring. Web. 28 Jul. 2015. http://oceanspaces.org/monitoring.

Unified Port of San Diego. 2013. San Diego Bay Integrated Natural Resource Management Plan.. https://www.portofsandiego.org/environment/clean-water/doc_download/5730-inrmp-september-2013.html.

U.S. Census Bureau. 2015. California – Quick Facts. Web. 27 May 2016. https://www.census.gov/quickfacts/table/PST045215/06.

U.S. Fish and Wildlife Service (USFWS). 2012. National Fish, Wildlife, and Plants Adaptation Strategy, Web 27 Oct. 2015. http://www.wildlifeadaptationstrategy.gov/.

Appendix B: Plans, Strategies, and Documents Identified by the Development Team

Allison, G. W., S. D. Gaines, J. Lubchenco, and H. P. Possingham. 2003. Ensuring Persistence of Marine Reserves: Catastrophies Require Adopting an Insurance Factor. Ecological Applications 13.1 (2003): S8-S24. Ecological Society of Americahttps://www.jstor.org/stable/3099994?seq=1#page_scan_tab_contents.

Boehm, A., M. Jacobson, M. O'Donnell, M. Sutula, W. W. Wakefield, S. Weisberg, and E. Whiteman. 2015. Ocean Acidification Science Needs for Natural Resource Managers of the North American West Coast. Oceanography Oceanog 25.2 (2015): 170-181. http://dx.doi.org/10.5670/oceanog.2015.40.

Bureau of Land Management (BLM). 2005. California Coastal National Monument Resource Management Plan. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/pa_pdfs/coastalmonument_pdfs/ccnm_rmp.Par.49cee191.File.dat/RMP_Printable.pdf.

California Biodiversity Council (CBC). 2013. Strengthening Agency Alignment for Natural Resource Conservation. http://ucanr.edu/sites/CBC/files/204079.pdf.

California Coastal Commission (CCC). 2013. Strategic Plan 2013-2018. http://www.coastal.ca.gov/strategicplan/CCC_Final_StrategicPlan_2013-2018.pdf.

California Department of Fish and Game (CDFG). 1993. Elk River Wildlife Area Management Plan. CDFW, Northcoast Region (1), Redding, CA.

CDFG. 2001. California's Living Marine Resources: A Status Report. https://www.dfg.ca.gov/marine/status/status2001.asp. (Updates available at http://www.dfg.ca.gov/marine/status/index.asp.

CDFG. 2003. Leviathan Mine Natural Resource Damage Assessment Plan. Natural Resource Damage Assessment (NRDA) and Restoration. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=17524&inline=true.

CDFG. 2005a. Regional Profile Central Coast Study Region. http://www.dfg.ca.gov/marine/pdfs/rpccsr_091905.pdf.

---. 2005b. Salt River Watershed Assessment. http://coastalwatersheds.ca.gov/Portals/1/Watersheds/NorthCoast/SaltRiver/docs/SRWA_ExecSummary_FINAL.pdf.

CDFG. 2006. Redwood Creek Basin Assessment. http://coastalwatersheds.ca.gov/LinkClick.aspx?fileticket=RdpZadEj%2fRg%3d&tabid=195&mid=512.

CDFG. 2007. Regional Profile North Central Coast Study Region. http://www.dfg.ca.gov/marine/pdfs/nccprofile/profile.pdf.

CDFG. 2008. Master Plan for Marine Protected Areas. http://www.dfg.ca.gov/marine/mpa/masterplan.asp

CDFG. 2009a. Draft Recommendations for Considering Water Quality and Marine Protected Areas in the MLPA South Coast Study Region. CA MLPA Master Plan Science Advisory Team. http://www.dfg.ca.gov/mlpa/pdfs/agenda_060409g1.pdf.

---. 2009b. Regional Profile South Coast Study Region. http://www.dfg.ca.gov/marine/pdfs/rpsc/body_part1.pdf.

CDFG. 2010a. Lower Eel River Basin Assessment. http://coastalwatersheds.ca.gov/LinkClick.aspx?fileticket=IqyBZ%2bNXqhg%3d&tabid=669&mid=1186.

---. 2010b. Regional Profile North Coast Study Region. http://www.dfg.ca.gov/marine/pdfs/rpnc0410/profile.pdf.

CDFW. 2013. Fay Slough Wildlife Area Land Management Plan DRAFT.

CDFW. 2015. Fishing and Hunting Regulations. Web. 24 Apr. 2015. https://www.wildlife.ca.gov/regulations.

California Department of Water Resources (CDWR). Various Basin Plans. Regional Water Quality Monitoring Boards. Various dates. http://www.waterplan.water.ca.gov/waterquality/basin_plan.cfm.

California Environmental Associates. 2012. California Current Ecosystem Assessments. http://www.ceaconsulting.com/work/case_studies.aspx?v=1&c=1&cs=42.

California Natural Resources Agency (CRNA). 2014. Safeguarding California: Reducing Climate Risk. http://resources.ca.gov/docs/climate/Final_Safeguarding_CA_Plan_Jul_31_2014.pdf.

California Ocean Protection Council (OPC). 2014. The California Collaborative Approach: Marine Protected Areas Partnership Plan. http://www.opc.ca.gov/webmaster/ftp/pdf/docs/mpa/APPROVED_FINAL_MPA_Partnership_Plan_12022014.pdf.

California Ocean Science Trust. 2010. North Central Coast MPA Monitoring Plan. 2010. http://oceanspaces.org/sites/default/files/regions/files/ncc_monitoring_plan_and_appendices.pdf.

California Ocean Science Trust. 2011. South Coast MPA Monitoring Plan. 2011. http://oceanspaces.org/sites/default/files/regions/files/sc_mpa_monitoring_plan_full.pdf.

California Ocean Science Trust (COST). 2013. Putting the Pieces Together: Designing Expert Judgment Processes for Natural Resource Decision-Making. http://www.oceansciencetrust.org/wp-content/uploads/2015/07/PuttingThePiecesTogether-FINAL.pdf.

COST. 2014a. Central Coast MPA Monitoring Plan. http://oceanspaces.org/sites/default/files/regions/files/central_coast_monitoring_plan_final_october2014.pdf.

---. 2014b. Citizen Science and Ocean Resource Management in California: Guidance for Forming Productive Partnerships, CA, USA. http://oceanspaces.org/sites/default/files/ccsi_guidance.pdf.

California State Coastal Conservancy (SCC). 2013. Strategic Plan 2013-2018. http://scc.ca.gov/files/2013/03/SCC-Strategic-Plan-2013-18.pdf.

California State Water Resources Control Board (SWRCB). 2012. California Ocean Plan. http://www.swrcb.ca.gov/water_issues/programs/ocean/docs/cop2012.pdf.

SWRCB. 2014. Storm Water Strategic Initiative. http://www.swrcb.ca.gov/water_issues/programs/stormwater/docs/strategy_initiative/swsi_cncptppr_6092014.pdf.

California Wetland Monitoring Workgroup. 2010a. California Strategic Plan for Wetlands and Riparian Protection and Restoration Draft. http://www.mywaterquality.ca.gov/monitoring_council/wetland_workgroup/docs/2010/cwmw_strat.pdf.

---. 2010b. California Wetland Monitoring Workgroup Tenets of a State Wetland and Riparian Monitoring Program (WRAMP). http://www.mywaterquality.ca.gov/monitoring_council/wetland_workgroup/docs/2010/tenetsprogram.pdf.

Cannata, Steve. 2014. Ocean Ranch Unit Estuary Restoration Feasibility Study. CDFW unpublished report. Northcoast Region (1), Redding, CA.

Cannata, Steve. Recommendations: Eel River Estuary. CDFW unpublished report. Northcoast Region (1) Redding, CA.

Central Coast Wetlands Group. 2013. Using New Methodologies to Assess Bar-built Estuaries along California's Coastline. https://ccwg.mlml.calstate.edu/sites/default/files/documents/BBE_Assessment_report.pdf.

Duncan, B. E., K.D. Higgason, T.H. Suchanek, J. Largier, J. Stachowicz, S. Allen, S. Bograd, R. Breen, H. Gellerman, T. Hill, J. Jahncke, R. Johnson, S. Lonhart, S. Morgan, J. Roletto, F. Wilkerson. 2014. Ocean Climate Indicators: A Monitoring Inventory and Plan for Tracking Climate Change in the North-central California Coast and Ocean Region. Report of a Working Group of the Gulf of the Farallones National Marine Sanctuary Advisory Council. Marine Sanctuaries Conservation Series ONMS-14-09. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 81pp. http://sanctuaries.noaa.gov/science/conservation/pdfs/indicators14.pdf.

EcoAtlas. 2015. Statewide Map Projects Summaries. San Francisco Estuary Institute, 2015. Web. 23 Apr. 2015. http://ecoatlas.org/.

Gleason M. G., S. Newkirk, M. S. Merrifield, J. Howard, R. Cox, M. Webb, J. Koepcke, B. Stranko, B. Taylor, M. W. Beck, R. Fuller, P. Dye, D. Vander Schaaf, and J. Carter. 2011. A Conservation Assessment of West Coast (USA) Estuaries. The Nature Conservancy. http://hdl.handle.net/1957/28058.

Halpern, B. S., C. V. Kappel, K. A. Selkoe, F. Micheli, C. M. E., C. Kontgis, C. M. Crain, R. G. Martone, C. Shearer, and S. J. Teck. 2009. "Mapping Cumulative Human Impacts to California Current Marine Ecosystems." Conservation Letters 2.3 (2009): 138-148. http://onlinelibrary.wiley.com/doi/10.1111/j.1755-263X.2009.00058.x/full.

Hughes, B. B., M. D. Levey, J. Ann Brown, M. C. Fountain, A. B. Carlisle, S. Y. Litvin, C. M. Greene, W. N. Heady, and M. G. Gleason. 2014. Nursery Functions of U.S. West Coast Estuaries: The State of Knowledge for Juveniles of Focal Invertebrate and Fish Species. The Nature Conservancy. Print. http://www.pacificfishhabitat.org/media/pmepsokreport/tnc_ca_fishnurseries_lowres.pdf.

Hutto, S., K. Higgason, J. Kershner, W. Reynier, and D. Gregg. 2015. Climate Change Vulnerability Assessment for the North-central California Coast and Ocean. Marine Sanctuaries Conservation Series ONMS-15-02. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 473 pp. http://sanctuaries.noaa.gov/science/conservation/pdfs/vulnerability-assessment-gfnms.pdf.

Jaques, Deborah. 2011. Lake Earl Western Grebe Annual Monitoring Report 2011. Pacific Eco Logic. Print. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=45720.

Kaplan, I. C., I. A. Gray, and P. S. Levin. 2012."Cumulative Impacts of Fisheries in the California Current. Fish and Fisheries (2012): 1-13. ftp://ftp.pcouncil.org/pub/Briefing%20Books/BB_CDs/BB_CD_1113/ECOSYSTEM_WORKSHOP_MTLS_ELECTRONIC_ONLY/Kaplan%20et%20al.%202012%20%28Cumulative%20impacts%20of%20fisheries%20in%20the%20California%20Current%29.pdf.

Largier, J., B. Cheng, and K. Higgason, editors. 2010. Climate Change Impacts: Gulf of the Farallones and Cordell Bank National Marine Sanctuaries. Report of a Joint Working Group of the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries Advisory Councils. http://farallones.noaa.gov/manage/climate/pdf/climate_report.pdf.

MPA Collaborative Implementation Project. 2015. The Collaborative Implementation Project Provides Structure for Addressing Local Ocean Management Needs. Web. 23 Apr. 2015. http://mpacollaborative.org/aboutus.html.

Multi-Agency Rocky Intertidal Network (MARINe). 2011. Coastal Biodiversity Survey Protocol. http://www.eeb.ucsc.edu/pacificrockyintertidal/biodiversityprotocol.pdf.

National Ocean Council. 2013. National Ocean Policy Implementation Plan. https://www.whitehouse.gov/sites/default/files/national_ocean_policy_implementation_plan.pdf.

National Oceanic and Atmospheric Administration (NOAA). 1997. Monterey Bay Sanctuary Citizen Watershed Monitoring Network. Monterey Bay National Marine Sanctuary. Web. 21 Jul. 2015. http://montereybay.noaa.gov/monitoringnetwork/welcome.html.

NOAA. 1999. Agriculture and Rural Lands Plan. Monterey Bay National Marine Sanctuary. Web. 21 Jul 2015. http://montereybay.noaa.gov/resourcepro/ag.html.

NOAA. 2006. Desalination Feasibility Study for the Monterey Bay Region. Monterey Bay National Marine Sanctuary. http://montereybay.noaa.gov/resourcepro/resmanissues/pdf/110806desal_final.pdf.

NOAA. 2008a. Beach Closure and Microbial Contamination Action Plan. Monterey Bay National Marine Sanctuary. Web. 21 Jul 2015. http://montereybay.noaa.gov/resourcepro/beach_plan.html.

---. 2008b. Coastal Armoring Action Plan. Monterey Bay National Marine Sanctuary. http://montereybay.noaa.gov/resourcepro/resmanissues/pdf/101508armoring_plan.pdf.

---. 2008c. Management Plan WQPP Action Plan III: Marinas and Boating. Monterey Bay National Marine Sanctuary. Web. 21 Jul. 2015. http://montereybay.noaa.gov/resourcepro/marinas.html.

NOAA. 2009. WQPP Action Plan I: Implementing Solutions to Urban Runoff. Monterey Bay National Marine Sanctuary. Web. 21 Jul. 2015. http://montereybay.noaa.gov/resourcepro/urban.html.

NOAA. 2010. Guidelines for Desalination Plants in the Monterey Bay National Marine Sanctuary. Monterey Bay National Marine Sanctuary. http://montereybay.noaa.gov/resourcepro/resmanissues/pdf/050610desal.pdf.

NOAA. 2011. National Marine Sanctuaries of the West Coast Ocean Acidification Action Plan. National Marine Sanctuary Program. http://sanctuaries.noaa.gov/about/pdfs/wc_onms_plan.pdf.

NOAA. 2012a. Evaluation of Erosion Mitigation Alternatives. Monterey Bay National Marine Sanctuary. http://montereybay.noaa.gov/research/techreports/esapwa2012.pdf.

NOAA. 2012b. Regional Monitoring Action Plan II. Monterey Bay National Marine Sanctuary. Web. 21 Jul. 2015. http://montereybay.noaa.gov/resourcepro/monitoring.html.

NOAA. 2014. Monterey Bay Sea Level Rise Vulnerability Assessment. Monterey Bay National Marine Sanctuary. http://montereybay.noaa.gov/resourcepro/resmanissues/pdf/140616erosion-vuln_tech-methods.pdf.

NOAA.2015. Wetlands and Riparian Corridors Action Plan. Monterey Bay National Marine Sanctuary. Web. 21 Jul. 2015. http://montereybay.noaa.gov/resourcepro/wetlands_plan.html.

NOAA Fisheries and U.S. Fish & Wildlife Service (USFWS). 2014. Programmatic Biological Opinion on the U.S. Environmental Protection Agency's Issuance and Implementation of the Final Regulations. http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/upload/Final-316b-Biological-Opinion-and-Appendices-May-19-2014.pdf.

National Park Service (NPS). 1997. Kelp Forest Monitoring Handbook Volume 1: Sampling Protocol. Channel Islands National Park. http://science.nature.nps.gov/im/units/medn/assets/docs/protocols/chis_kelp-handbook1.pdf.

NPS. 2000. Redwood State and National Parks General Plan/General Management Plan. http://www.parks.ca.gov/pages/21299/files/GMP.pdf.

NPS. 2005. Final General Management Plan/Wilderness Study/Environmental Impact Statement. Channel Islands National Park. http://parkplanning.nps.gov/document.cfm?parkID=292&projectID=11063&documentID=65517

Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO). 2009. Subtidal Monitoring Protocols. Web. 09 Jul. 2015. http://www.piscoweb.org/research/science-by-discipline/ecosystem-monitoring/kelp-forest-monitoring/subtidal-sampling-protoco#FishSurve.

Southern California Coastal Water Research Project (SCCWRP). 2012. Technical Design for a Status & Trends Monitoring Program to Evaluate Extent and Distribution of Aquatic Resources in California. http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/706_StatusTrendsMonitorAqResources.pdf.

Sullivan, R. M. 2012. Wildlife Area Maps. CDFW unpublished report. Marine Region (7). Sacramento, CA.

Sullivan, R. M. 2013. Back to the Future: Programmatic Sea Level Rise Vulnerability Assessment with Recommendation's for Fay Slough, Mad River Slough, and Elk River Slough Wildlife Areas. CDFW unpublished report. Marine Region (7). Sacramento, CA.

Sullivan, R. M. Crescent City Marsh Wildlife Area Land Management Plan Draft. CDFW unpublished report. Marine Region (7). Sacramento, CA.

Sullivan, R. M. 2014. Mad River Slough Wildlife Area Land Management Plan Draft. CDFW unpublished report. Marine Region (7). Sacramento, CA.

Sullivan, R. M. 2015. Avian Monitoring, Resource Assessment, and Management Implications of the McDaniel Slough Restoration Project for the Mad River Slough Wildlife Area. CDFW unpublished report. Marine Region (7). Sacramento, CA.

Teck, S. J., B. S. Halpern, C. V. Kappel, F. Micheli, K. A. Selkoe, C. M. Crain, R. Martone. 2010."Using Expert Judgement to Estimate Marine Ecosystem Vulnerability in the California Current. Ecological Applications 20.5 (2010): 1402-1416. Ecological Society of America.

http://www.ewi.tudelft.nl/fileadmin/Faculteit/EWI/Over_de_faculteit/Afdelingen/Applied_Mathematics/Risico_en_Beslissings_Analyse/Papers/Using_expert_judgment_to_estimate_marine_ecosystem_-_California_Current.pdf.

U.S. Air Force. 2006. Integrated Natural Resources Management Plan Draft. http://www.keesler.af.mil/shared/media/document/AFD-061107-019.pdf.

U.S. Coast Guard and U.S. EPA. 2013. Area Contingency Planning Handbook. http://www.epa.gov/oem/docs/oil/frp/EPA_ACP_Handbook.pdf.

U.S. Fish & Wildlife Service (USFWS). 2005. Seabird Conservation Plan - Pacific Region. http://www.fws.gov/pacific/migratorybirds/PDF/Seabird%20Conservation%20Plan%20Complete.pdf.

USFWS. 2007. Castle Rock National Wildlife Refuge – Information Synthesis. http://www.fws.gov/uploadedFiles/Region_8/NWRS/Zone_1/Humboldt_Bay_Complex/Humbolt_Bay/Sections/Documents/Castle%20Rock%20Final%20Report.pdf.

USFWS. 2009. Farallon National Wildlife Refuge – Final Comprehensive Conservation Plan and Environmental Assessment. http://www.fws.gov/cno/docs/FNWR_CCP_FINAL.pdf.

USFWS. 2011. Don Edwards San Francisco Bay National Wildlife Refuge – Comprehensive Conservation Plan. http://www.fws.gov/cno/refuges/DonEdwards/DonEdwards.cfm.

U.S. Navy. 2012. Integrated Natural Resources Management Plan. http://www.denix.osd.mil/nr/upload/inrmps-2.pdf.

Appendix C: Companion Plan Development Team Members and Affiliations

Affiliation	Participant
California Coastal Commission	Jonna Engle
California Department of Fish and Wildlife	Steve Cannata
California Department of Fish and Wildlife - Marine Region	Debbie Aseltine-Neilson
California Department of Fish and Wildlife - Office of Spill Prevention and Response	Holly Gellerman
California Department of Parks and Recreation	Laurie Archambault
California Natural Resources Agency - Ocean Protection Council	Cyndi Dawson
California Ocean Science Trust	Benét Duncan
California State Lands Commission	Jason Ramos Jennifer DeLeon Nicole Russell
California Water Resources Control Board	Maria de la Paz Carpio-Obeso
David and Lucile Packard Foundation	Heather Ludemann
Elkhorn Slough National Estuarine Research Reserve	Kerstin Wasson
National Oceanic and Atmospheric Administration - National Marine Sanctuaries - West Coast Region	Lisa Wooninck
Resources Legacy Fund	Jocelyn Herbert
Southern California Coastal Water Research Project	Eric Stein
The Nature Conservancy	Michael Bell Tom Dempsey
U.S. Bureau of Land Management	James Weigand
U.S. Fish and Wildlife Service - Land Conservation Cooperatives	Rebecca Fris
U.S. Navy – Southwest Region	Walt Wilson

Appendix D: Potential Pressures Affecting Embayments, Estuaries, and Lagoons[8]

Pressure	Definition
Agricultural and Forestry Effluents	Includes runoff from crop and rangelands, dairies and stockyards. Generally high in sediments, nutrients, and pollutants, medium in pathogens. Primarily through watershed inputs.
Airborne Pollutants	Includes particulates, pollutants, pathogens, etc. deposited from the air.
Climate Change	Human generated greenhouse gas (e.g., carbon dioxide, methane) emissions that contribute to climate change, such as released from vehicle exhausts and industrial emissions; includes ocean acidification and hypoxia, sea level rise, and increased storm surge.
Dams and Water Management/Use	Diversion of watershed and groundwater inputs, including for agriculture and urban use; altered inputs due to dams and levees; controlled inputs (dikes and weirs).
Fishing, Harvesting, and Collecting Aquatic Resources	Extraction of marine species and associated indirect impacts; includes scientific collecting.
Garbage and Solid Waste	Includes plastics, discarded food items, household items, etc.
Housing and Urban Areas; Commercial and Industrial Areas - Shoreline Development	Current and potential commercial and residential development, as well as agricultural development (e.g., grape production); may create artificial structures.
Industrial and Military Effluents- Hazardous Spills	Oil, gasoline, solvents, etc.
Industrial and Military Effluents, Household Sewage and Urban Wastewater- Point Discharges	Includes discharges from industry, power plants, sewage plants, aquariums and aquaculture facilities; generally medium in sediments and nutrients, high in pollutants and pathogens.
Invasive Plants/Animals	Non-native species directly, either intentionally or unintentionally, brought into the system, rather than movement of species into the system from adjacent areas (e.g., moving in from Mexican waters).
Logging and Wood Harvesting	Removal of timber resulting in erosion, sedimentation, and deposition of particulates into waterways.
Marine and Freshwater Aquaculture	Kelp and other algae, invertebrates, fish pens and aquaculture operations in fresh and marine waters.
Other Ecosystem Modifications - Modification of Mouth/Channels	Dredging, widening mouth, armoring channels.
Other Ecosystem Modifications - Ocean/Estuary Water Diversion/Control	Jetties, breakwaters at mouth of embayments, estuaries, and inlets; intake pipes for power plants, aquariums, aquaculture facilities, etc.; levee, dikes, and weirs for controlling water flow within estuary (water discharged from power plants and other facilities covered under "Industrial and military effluents - Point Discharges").
Other Ecosystem Modifications- Artificial Structures	Artificial structures currently in place along the shoreline (floating and submerged), including pier pilings, as well as potential for new artificial structures.
Parasites/Pathogens/Diseases	Pathogens introduced from outside (e.g., from feces of native and non-native species) or developing/growing within system.

[8] Source: SWAP 2015

Pressure	Definition
Recreational Activities	Primarily disturbance of sensitive habitats or species; includes vessel use.
Shipping Lanes - Ballast Water	Water released from vessel storage tanks as they enter coastal waters.

Appendix E: Potential Partners for Collaboration

Please note that the following table does not provide an exhaustive list of potential partners. The organizations listed here were identified through the sector discussions, but the listing does not imply that they have agreed to partner or to implement SWAP 2015.Also note that the table was completed to the best of the team's knowledge. Where specific organizational efforts or orientations were unknown to the team, corresponding cells were left blank. An asterisk (*) indicates a new opportunity added by CDFW after the team discussions; therefore it was not addressed by the sector team.

Potential Partners	Data Collection and Analysis	Law and Policy	Management Planning
Audubon CA	✓	✓	✓
Beach Ecology Coalition	✓		
Bolsa Chica Lowlands Restoration Project			✓
Bureau of Land Management (BLM)	✓		✓
Bureau of Ocean Energy Management (BOEM)	✓	✓	
CA Coastal Commission (CCC)	✓	✓	✓
CA Coastal Sediment Management Workgroup	✓		✓
CA Coastal Tribes	✓		
CA Coastkeeper Alliance and Individual Keepers	✓	✓	
CA Department of Fish and Wildlife (CDFW)	✓	✓	✓
CA Department of Parks and Recreation	✓	✓	
CA Fish and Game Commission (FGC)	✓	✓	✓
CA Landscape Conservation Cooperative (LCC)	✓		✓
CA Marine Sanctuary Foundation	✓		
CA Natural Resources Agency (CNRA)	✓	✓	✓
CA Ocean Protection Council (OPC)	✓	✓	✓
CA Ocean Science Trust	✓		✓
CA Sea Grant	✓		
CA State Coastal Conservancy (SCC)	✓	✓	✓
CA State Lands Commission (SLC)			✓
CA Department of Parks and Recreation (State Parks)	✓	✓	✓
CA Tribes and Tribal Communities	✓	✓	✓
CA Water Quality Monitoring Council	✓		
Center for Ocean Solutions		✓	
Central Coast Wetlands Group	✓		✓
City and County Governments	✓	✓	✓
Conservation Biology Institute	✓		✓
County Parks	✓		

Potential Partners	Data Collection and Analysis	Law and Policy	Management Planning
Elkhorn Slough Foundation	✓		
Environmental Defense Center	✓	✓	✓
Fish Habitat Partnerships	✓		
Friends of the Eel River	✓		
Golden Gate Salmon Association		✓	✓
Grunion Greeters, Pepperdine University	✓		
Greater Farallones National Marine Sanctuary (NMS) Climate Change Forum		✓	
Heal the Bay	✓	✓	
Humboldt Bay Initiative	✓		✓
Humboldt Bay Climate Change Group			✓
Humboldt Fish Action Council	✓		
Humboldt State University	✓		✓
LA Waterkeeper	✓	✓	
Laguna Ocean Foundation	✓		
Landowners	✓	✓	✓
LightHawk	✓		
Mattole Restoration Council	✓		
Mattole Salmon Group	✓		
Monterey Bay Aquarium		✓	
Morro Bay National Estuary Program	✓		✓
Moss Landing Marine Lab	✓		✓
MPA Collaborative Implementation Project	✓	✓	✓
MPA Statewide Leadership Team (MSLT)	✓		✓
MPA Watch	✓		✓
Multi-Agency Rocky Intertidal Network (MARINe)	✓		
National Estuarine Research Reserves System	✓		
National Oceanic and Atmospheric Administration (NOAA) • National Marine Fisheries Service (NMFS) • National Estuarine Research Reserves System • Office of National Marine Sanctuaries (NMS)	✓	✓	✓
National Park Service (NPS)	✓		✓
Natural Resources Conservation Service (NRCS)	✓		
Natural Resources Defense Council (NRDC)		✓	
Non-governmental Organizations (NGOs)	✓	✓	✓
North Pacific Landscape Conservation Cooperative (LCC)	✓		✓

Potential Partners	Data Collection and Analysis	Law and Policy	Management Planning
Northcoast Environmental Center		✓	✓
Ocean Conservancy		✓	
Pacific Birds Habitat Joint Venture	✓	✓	✓
Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)	✓		
Point Blue Conservation Science	✓	✓	
Reef Check CA (RCCA)	✓		
Resource Conservation Districts (RCDs) • Humboldt County RCD • Napa County RCD • Other RCDs	✓		✓
Resources Legacy Fund (RLF)	✓	✓	✓
Salmonid Restoration Federation	✓		
San Francisco Bay Joint Venture	✓	✓	✓
San Francisco Bay National Estuarine Research Reserve	✓		
San Francisco Estuary Partnership	✓		✓
Southern California Wetlands Recovery Project (SCWRP) - Wetland Managers Group	✓		✓
Sea Ranch Stewardship Task Force			
Seabird Protection Network	✓	✓	
Smithsonian Institute – Environmental Research Center	✓		
Sonoran Join Venture for Bird Conservation	✓	✓	✓
Southern CA Coastal Water Research Project (SCCWRP)	✓		
State Water Resources Control Board (SWRCB)	✓	✓	✓
Stewards of the Coast and Redwoods			
Surfrider Foundation		✓	
The Bay Foundation	✓		
The Bay Institute	✓		
Tomales Bay Watershed Council			✓
Trustee Councils		✓	
University of CA and CA State University Marine Labs/Programs	✓		
University of CA, Santa Cruz	✓		
U.S. Army Corps of Engineers (USACE)	✓	✓	✓
U.S. Department of Defense • U.S. Air Force • U.S. Navy	✓	✓	✓
U.S. Department of Interior (DOI)	✓		✓

Potential Partners	Data Collection and Analysis	Law and Policy	Management Planning
U.S. Environmental Protection Agency (USEPA) – • National Estuary Program	✓		
U.S. Fish and Wildlife (USFWS) • Office of Law Enforcement	✓	✓	✓
U.S. Geological Survey (USGS)	✓	✓	✓
United Anglers		✓	
West Coast Estuaries Initiatives	✓		✓
West Coast Governors Alliance for Ocean Health		✓	
West Coast Regional Planning Body (RPB)			✓
West Marin Environmental Action Committee	✓	✓	✓
Wildcoast	✓	✓	

Appendix F: Potential Financial Resources

Potential Financial Resources *(Note: this information is intended to serve as a starting point for outreach and potential engagement, and does not represent a comprehensive list of all the potential funding sources)*	Data Collection and Analysis	Law and Policy	Management Planning
Cabrillo Marine Aquarium	✓		
CA Coastal Commission (CCC) • **Education Program** • **Coastal License Plate Fund**			✓
CA Department of Fish and Wildlife (CDFW)	✓		
CA Ocean Protection Council (OPC)	✓	✓	✓
CA Sea Grant	✓		
CA State Coastal Conservancy (SCC)	✓		✓
Fish Habitat Partnerships	✓		
MPA Statewide Leadership Team (MSLT)	✓	✓	✓
National Oceanic and Atmospheric Administration (NOAA) • **National Marine Fisheries Service (NMFS)** • **National Estuarine Research Reserves System** • **Office of National Marine Sanctuaries (NMS)**	✓		
National Science Foundation (NSF)	✓		
Philanthropic Foundations	✓	✓	✓
PISCO	✓		
Resource Conservation Districts (RCDs) • **Humboldt County RCD** • **Napa County RCD** • **Other RCDs**	✓		
San Francisco Estuary Institute (SFEI)	✓		
Southern CA Coastal Water Research Project (SCCWRP)	✓		
State General Fund and Agency budgets		✓	✓
State Water Resources Control Board (SWRCB)	✓		✓
The Nature Conservancy	✓		
U.S. Environmental Protection Agency (USEPA) – • **National Estuary Program**	✓		
U.S. Fish and Wildlife (USFWS)	✓		
Wildlife Conservation Board	✓		

Potential funding sources available to multiple strategy categories:
BLM • **Annual Congressional Appropriations for the California National Monument** • **Competitive Grant Program for inventory, monitoring, and research**
NOAA Coastal and Estuarine Land Conservation Program
NOAA Estuary Restoration Act
Saltonstall-Kennedy Grant Program
USEPA Supplemental Environmental Project Settlement Funds
U.S. Navy Cooperative Research Agreements
CCC • **Whale Tail Grants Program** • **Permit/violation fees**
CDFW (*refer to CDFW on funding sources*) • **CA Cap-and-Trade Program** • **CA Sea Otter Fund (tax check-off)** • **Proposition 1** • **State Fish Restoration Grants Program**
Delta Stewardship Council
SCC • **Environmental License Plate Fund** • **Habitat Conservation Fund** • **Permit/violation fees**
SLC • **Kapiloff Land Bank Fund** • **Tidelands Revenues**
National Fish and Wildlife Foundation (NFWF)

Appendix G: Companion Plan Management Team

Name	Title
Armand Gonzales	**SWAP 2015 Project Lead, CDFW**
Junko Hoshi	**SWAP 2015 Assistant Project Lead, CDFW**
Kurt Malchow	**SWAP 2015 Companion Plan Development Lead, CDFW**
Tegan Hoffman	**Project Director and Facilitator, Blue Earth Consultants**
Sarah Eminhizer	**Project Manager and Facilitator, Blue Earth Consultants**
Jennifer Lam	**Associate, Blue Earth Consultants**
Diana Pietri	**Associate, Blue Earth Consultants**

Appendix H: Glossary

The definitions found here are referenced from SWAP 2015, and are mostly adopted from the glossary in the Conservation Measures Partnership's (CMP) Open Standards for the Practice of Conservation (Version 2.0). Some terms have been added or refined to clarify their use by CDFW.

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

adaptive management: the incorporation of a formal learning process into conservation action. Specifically, it is the integration of project design, management, and monitoring, to provide a framework to systematically test assumptions, promote learning, and supply timely information for management decisions.

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

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

biodiversity: the full array of living things in a habitat, whether that be a local environment or the whole planet.

conceptual model: a diagram that represents relationships between key factors that are believed to impact or lead to one or more conservation targets. A good model should link the conservation targets to pressures, opportunities, stakeholders, and intervention points (factors – pressures, opportunities, or targets – in a conceptual model where a team can develop strategies that will influence those factors). It should also indicate which factors are most important to monitor.

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

conservation strategy: designed to achieve desired outcomes for the conservation targets, called goals. In the most general sense, the overall goal of SWAP 2015 is to enhance ecosystems. Therefore, the conservation strategies are meant to work toward the ultimate goal of enhancing ecosystems.

contributing factor: a behind the scene socio-economic factor that contributes to produce pressures.

critical pressure: direct pressure that have been prioritized as being the most important to address.

direct pressure: primarily human actions that immediately degrade one or more conservation targets. For example, "logging" or "fishing." They can also be natural phenomena altered by human activities (e.g., increase in extreme storm events due to climate change). Typically tied to one or more stakeholders. Sometimes referred to as a "pressure" or "source of stress." Compare with indirect pressure.

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

disturbance regime: the characteristic pattern of natural- or human-caused events that disrupts the current physical and biological conditions of an area, such as floods, fires, storms, and human activity.

driver: a synonym for factor.

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.

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

endangered species: any species, including subspecies or qualifying distinct population segment, which is in danger of extinction throughout all or a significant portion of its range.

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

exotic species: a species of plant or animal introduced from another country or geographic region outside its natural range; non-native.

factor: a generic term for an element of a conceptual model including direct and indirect pressures, opportunities, and associated stakeholders. It is often advantageous to use this generic term since many factors – for example tourism – could be both a threat and an opportunity.

fauna: refers to all of the animal taxa in a given area.

fire regime: a measure of the general pattern of fire frequency and severity typical to a particular area or type of landscape.

flora: refers to all of the plant taxa in a given area.

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.

habitat quality: the capacity of a habitat to support a species.

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

indicator: a measurable entity related to a specific information need such as the status of a target/factor, change in a threat, or progress toward an objective. A good indicator meets the criteria of being: measurable, precise, consistent, and sensitive.

indirect pressure: a factor identified in an analysis of the project situation that is a driver of direct pressure. Often an entry point for conservation actions. For example, "logging policies" or "demand for fish." sometimes called a root cause or underlying cause. Compare with direct pressure.

information need: something that a project team and/or other people must know about a project. The basis for designing a monitoring plan.

introduced: refers to any species intentionally or accidentally transported and released into an environment outside its native range.

invasive: an introduced species which spreads rapidly once established and has the potential to cause environmental or economic harm. Not all introduced species are invasive.

invertebrate: an animal without an internal skeleton. Examples are insects, spiders, clams, shrimp, and snails.

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.

lagoon: a shallow body of water separated from a larger body of water by barrier islands or reefs.

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.

macrogroup: the fifth level in the National Vegetation Classification natural vegetation hierarchy, in which each vegetation unit is defined by a group of plant communities with a common set of growth forms and many diagnostic plant taxa, including many character taxa of the dominant growth forms, preferentially sharing a broadly similar geographic region and regional climate, and disturbance.

method: a specific technique used to collect data to measure an indicator. A good method should meet the criteria of accurate, reliable, cost-effective, feasible, and appropriate.

migrate; migratory: referring to animals that travel seasonally. Migrations may be local or over long distances.

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).

monitoring plan: the plan for monitoring a project. It includes information needs, indicators, and methods, spatial scale and locations, timeframe, and roles and responsibilities for collecting data.

native: naturally occurring in a specified geographic region.

non-native species: see exotic species.

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.

objective: A formal statement detailing a desired outcome of a conservation project, such as reducing a critical pressure. 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. A good objective meets the criteria of being: results oriented, measurable, time limited, specific, and practical. If the project is well conceptualized and designed, realization of a project's objectives should lead to the fulfillment of the project's goals and ultimately its vision. Compare to vision and goal.

opportunity: a factor identified in an analysis of the project situation that potentially has a positive effect on one or more targets, either directly or indirectly. Often an entry point for conservation actions. For example, "demand for sustainably harvested timber." In some senses, the opposite of a threat.

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.

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.

province: a regional unit defined under SWAP 2015 that is made out of several nearby conservation units.

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.

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.

scope: the broad geographic or thematic focus of a program or project. The State of California will serve as the broad geographic or thematic scope for the program which consists of a group of projects, which together aim to achieve a common broad vision.

sensitive species: plant and animal species for which population viability is a concern.

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.

strategic plan: the overall plan for a project. A complete strategic plan includes descriptions of a project's scope, vision, and targets; an analysis of project situation, an action plan, a monitoring plan, and an operational plan.

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).

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. All targets at a site should collectively represent the biodiversity of concern at the site.

taxon: the name that is applied to a group in biological classification, for example, species, subspecies, variety, or evolutionarily significant unit (ESU). The plural is taxa.

threat: see pressure.

viable: able to persist over time; self-sustaining.

vision: a description of the desired state or ultimate condition that a project is working to achieve. A complete vision can include a description of the biodiversity of the site and/or a map of the project area as well as a summary vision statement.

vision statement: a brief summary of the project's vision. A good vision statement meets the criteria of being relatively general, visionary, and brief.

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.