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Collaborative Water Management: A guide to Enhancing Streamflow and Water Supply Reliability in California's Rural Watersheds and Communities

30x30 California: Advancing 30x30: Conservation of Lands Advisory Panel Summary Document

Mind the Gaps: The Case for Truly Comprehensive Groundwater Management

Cannabis farms in CA rely on wells outside of regulated groundwater basins

The rise in climate change-induced federal fishery disasters in the US

Beyond Protection: Fisheries Co-Benefits of No-Take Marine Reserves

Opportunities for Fishery Partnerships to Advance Climate-Ready Fisheries Science and Management

Natural Communities Commonly Associated with Groundwater Version 2.0

Managing Groundwater to Ensure Ecosystem Function

Rewilding Agricultural Landscapes: A California Study in Rebalancing the Needs of People and Nature

Beyond the boundaries: How regulation-centered marine protected area information improves ocean protection assessments

Nature-Based Climate Solutions: A Roadmap to Accelerate Action in California

Base of fresh water, groundwater salinity and well distribution across California

Advancing 30x30: Conservation of Coastal Waters Advisory Panel Summary Document

Water Affordability Dashboard

Dairying, Ranching and Climate Management

UC ANR Drought Resources

Tracking CyanoHABs: Mapping Harmful Algal Blooms Reported in US Fresh Waters

Farther Together: Seven Best Practices for Engaging Communities to Create a Healthy, Resilient Region for All

Climate Central Coastal Risk Screening Tool

How biochar works, and when it doesn't: A review of mechanisms controlling soil and plant responses to biochar

Water Reuse Action Plan

Freshwater Health Index

The Status of Tribes and Climate Change Report (STACC)

California's Water Market Fact Sheet

AR6 Climate Change 2021: The Physical Science Basis

Rx for Hot Cities Climate Resilience through Urban Greening and Cooling in LA

Cooling Cities, Slowing Climate Change and Enhancing Equity: Costs and Benefits of Smart Surfaces Adoption for Baltimore

Smart Surface Analytic Tool

Delivering Urban Resilience: Costs and benefits of city-adoption of smart surfaces across Washington, DC, Philadelphia and El Paso to strengthen resilience, improve health and livability, reduce urban inequality, and slow global warming while saving billions of dollars.

Resilient Rural America Project

Rapid assessment to facilitate climate-informed conservation and nature-based solutions

Community-enabled Lifecycle Analysis of Stormwater Infrastructure Costs (CLASIC)

Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts

Fish: Guidelines for eating Fish and Shellfish

Critical aquifer overdraft accelerates degradation of groundwater quality in California's Central Valley during drought

Adaptation Capability Advancement Toolkit (Adapt-CA)

Drought Management and Climate Adaptation of Small, Self-Sufficient Drinking Water Systems in California

Management of Groundwater and Drought
Under Climate Change

Indigenizing the North American Model of
Wildlife Conservation

Use of Good Neighbor Authority Across the West

National Nonpoint Source Pollution Control Program - Basic Training

Human Right to Water Data Tool (CalHRTW 1.0)

Avoided Emissions and geneRation Tool (AVERT)

Coastal Risk Screening Tool

Water Conservation Tracking Tool

Prioritizing and Enhancing Green Infrastructure

Data and Tools

Because it's Worth It: New Approaches for Delivering Sustainable Water Infrastructure to Disadvantaged CA Cities

CCRCN Blue Carbon Inventory

Tools and Resources to Help Measure Electrification Impacts - Find Your Tool

Tools and Resources to Help Measure Impacts - Find Your Tool

Department of the Interior Climate Action Plan

USACE Climate Action Plan

Working Lands, Working Communities Initiative Survey Results

Volunteer Monitoring Map

Volunteer Monitoring Program Directory

California environmental organizations

Seizing the Drought

Learn to Identify Cyanobacteria Blooms

California Trash Monitoring Methods and Assessments Playbook

California's Groundwater (Bulletin 118)

The Status of Tribes and Climate Change Report (STACC)

Achieving Water Equity in CA: Restructuring Water Management, Governance & Engagement

OpenET

Groundwater Management Principles & Strategies to Monitor, Analyze & Minimize Impacts to Drinking Water Wells: A Framework for State Action to Support Drought Resilient Communities

Energy Savings and Impacts Scenario Tool (ESIST)

Cover Crop Calculator - A Tool for Conservation Planners and Producers

Proceedings - Sustainable & Resilient Resource Roundtable Web Workshop: EPA Climate Change Indicators

Typical Rainwater Catchment Operation & Maintenance Guidance

Rainwater Catchment - Operation and Maintenance Demonstration

Visualizing the Three-Dimensional Footprint of Ocean Uses: A Guide to Building and Applying Space Use Profiles for Ocean Management

Coastal Recreation in California: Beyond the Beach

The Economic Value of America's Estuaries

Extreme Weather

NRCS Rainfall Simulator Demo

Regenerative Farming - Session 3

Soil Microbiology and Soil Health

Pacific Lamprey Assessment 2018

Slope stability of streambanks at saturated riparian buffer sites

An introduction to Stormwater Indicators

Monitoring to Demonstrate Environmental Results: Guidance to Develop Local Stormwater Monitoring Studies Using Six Example Study Designs

Local Greenhouse Gas Inventory Tool

Aquifer Risk Map - Domestic Wells and Small Systems

The ResilientCA Adaptation Planning Map (RAP-Map)

Explaining Extreme Events from a Climate Perspective

Disaster and Risk Mapping Tool

Measuring Cost-Effectiveness of Environmental Water Transactions: A Report for the Klamath Riverkeeper and the California Coastkeeper Alliance

Integrating Land Use and Water Management: Planning and Practice

Sustainable Groundwater Management Act Governance Strategies Summary Report

A Toolkit for Developing Effective Projects Under the Federal Wildlife Crossings Pilot Program

2022 Roadmap to Shared Prosperity: Building Equitable Economies

Confronting the Wildfire Crisis: A Strategy for Protecting Communities and Improving Resilience in America's Forests

CNPS Rare Plant Inventory

Pollinator-Friendly Parks: Enhancing our Communities by Supporting Native Pollinators in our Parks and other Public Spaces

From the Ground Up
How Land Trusts and Conservancies Are Providing Solutions to Climate Change

California Water Watch

Vision for Sustainable Stormwater Management

State Agency Sea-Level Rise Action Plan for California

Water's Net Zero Plus: A Call to Action for Climate Mitigation

Optimum tank size for large rainwater harvesting system

2020-2022 California Integrated Report (Clean Water Act Section 303(d) List and 305(b) Report)

Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target

Climate Change and Health Playbook: Adaptation planning for Justice, Equity, Diversity and Inclusion

Small Farm Tech Hub

Ready-to-Fund Resilience Toolkit

Harnessing Natural Infrastructure to Protect the Built Environment

2022 California Municipal Guide

Benefits of Publicly Owned Water Systems

Incorporating Nature-based Solutions into
Community Climate Adaptation Planning

The Resilience Factor: A Competitive Edge
for Climate-Ready Cities

Climate Change & Social Vulnerability in the
United States" A Focus on Six Impacts

Coastal Resilience Mapping Portal

Tribal Adaptation Planning Resources
Toolkit

2020-2021 ICARP Impact Report

ICARP Resilience Metrics White Paper

Natural and Working Lands Climate Smart Strategy

30x30 California: Acceleratin Conservation of California's Nature

Toward a Resilient California

2022 Watershed University Summit

Learning Exchange Directory

Incorporating Nature=based Solutions into Community Climate Adaptation Planning

Racial Equity Resource Hub: Access, Understand, Operationalize Racial Equity

Protecting Californians from Extreme Heat: A State Action Plan to Build Community Resilience

CAKE's Dashboard: Toolkits and Guides

Fostering Inclusivity & Respect: Engagement with Indigenous Peoples in the Management and Presentation of Protected Areas in North America

Watershed Framework

Climate Adaptation Toolkit for Marine and Coastal Protected Areas

Climate Impacts on Natural Capital:
Consequences for the Social Cost of Carbon

Resilience of U.S. coastal wetlands to
accelerating sea level rise

Using Participatory Science at EPA: Vision
and Principles

Dry Well Reporting System

The State of Climate Adaptationin the
Marine and Coastal United States,
Territories, and Commonwealths

Solutions in Focus: Key Themes for Ecosystem-based Adaptation

CO-IMPACT

Three Decades and Growing: A Retrospective of Sustainability in the California Wine Community

Farms Under Threat 2040 Choosing an Abundant Future

Restoration Project Information Sharing Framework: A resource for coordinated monitoring and reporting on ecosystem restoration

Exploring the Use Biochar-Amended Filters in Stormwater Management

Supporting Land Conservation in California: A Toolkit of Financial Incentives for Landowners and Communities

Application Guide for the 2022 Sea Level Rise Technical Report

2022 Sea Level Rise Technical Report

Building Alliances for Climate Action

Tackling the Climate Crisis Together

Heat & Health Tracker

California Groundwater Projects Tool

Extreme Weather Toolkit: Heavy Rain and Flooding

Heat.gov

California Climate Dashboard

General Plan Fire Hazard Planning Technical Advisory

Climate change shrinks and fragments salmon habitats in a snow-dependent region

Microplastics Data Portal

Migration and transformation of coastal wetlands in response to rising seas.

Riparian research and management: Past, present, future: Volume 1

California Urban Water Data Reporting: Potential solutions for high quality, timely water use and supply data

Resilience Funding Summary Charts

Increasing the Resilience of Ecological Restoration to Extreme Climatic Events

Climate Mapping for Resilience and Adaptation

Conservation Finance Network Virtual Boot Camp

State Public Finance Laws Database

Working Lands, Working Communities Initiative Special Report

Unfencing the Future: Voices on How Indigenous and Non-Indigenous People and Organizations Can Work Together Toward Environmental and Conservation Goals

Mycelium Map: Healing Severed Connections for Justice & Equity in Landscape Stewardship

Weaving the Strands Together: Case studies in inclusive and equitable landscape conservation

Increasing Collaborative Capacity and Infrastructure for Landscape Stewardship

Climate Crossroads: California's Readiness to Act on Climate Resilience

PACE Recommendations Report

PACE Curriculum

Innovative Approaches for Strengthening Coastal and Ocean Adaptation

Beyond Barriers to Implementation: A Water Sector Perspective on Sea Level Rise Adaptation

Climate Change Adaptation Checklist for Climate Smart Projects: A Tool for the California Department of Fish & Wildlife

Climate Change Adaptation Checklist for Climate Smart Projects: A Tool for Natural Resource Agencies

Indicators of Climate Change in CA 4th Edition

Indicators of Climate Change: Impacts on California Tribes

Beneficial Bird Habitat Assessment and Native Plant Tool

State of the Birds 2022

Beaver Recruitment Strategy for Tásmam Koyóm

Gridded Soil Survey Geographic (gSSURGO) Database

RE-Powering Tracking Matrix

Stakeholder Engagement Guide for Nature-Based Solutions

Global Bird Collision Mapper

Final 2022 Scoping Plan Update and Appendices

Green Infrastructure: Cost-effective solutions to flooding

PACE Final Report

Model Recycling Program Toolkit

A Quick Guide to Adaptation Planning for Natural Resources Professionals

Collection of Native Case Studies on Climate Change

Climate TRACE

Document Summary

This two page document summarises all California Legislation in 2018 that is relevant to climate change

This report is required by Streets and Highways Code Section 156.1 andprovides an annual update on the California Department of Transportation's (Caltrans) progress for January 1, 2018, to December 31, 2018, on locating, assessing and remediating fish passage barriers on the State Highway System.

The California Fire Plan is the state's road map for reducing the risk of wildfire. The Fire Plan is a cooperative effort between the State Board of Forestry and Fire Protection and the California Department of Forestry and Fire Protection. By placing the emphasis on what needs to be done long before a fire starts, the Fire Plan looks to reduce fire fighting costs and property losses, increase firefighter safety, and to contribute to ecosystem health.

The 2018 Roadmap to Shared Prosperity outlines the California Economic Summit's plans for comprehensive agenda to address with a triple bottom line approach to solving the state's biggest challenges:

1. Creating the California Dream Index, a new scorecard for tracking the state's progress toward improving economic mobility.
2. Developing a poverty prescription through innovative "two generation" strategies and system change efforts that can improve results with adequate investments in a smarter safety net and put the CA Dream within reach of every child.
3. Encourage early childhood strategies that support community, regional, and state efforts to coordinate and expand high quality learning and nurturing for all children age 0 to 5 through system change strategies, partnerships, and adequate investments.
4. Continuing the Summit's "One Million Challenges," ongoing initiatives to close gaps in skilled workers, livable communities, and well-paying jobs.

This report is the sixth in an annual series to look back at HTF over the past year and to look forward to the years to come with annual and multi-decadal HTF projections building upon past studies (Sweet and Park, 2014; Sweet et al., 2018). The report provides 1) an assessment of HTF that occurred in 2019 relative to measured flood-frequency trends, 2) maps of areas potentially exposed to HTF, and 3) a 2020 outlook based upon temporal trends and predicted strength of the El Niño Southern Oscillation (ENSO).

This document contains the updated Environmental Justice Element Section in Chapter 4 of the General Plan Guidelines

This document is intended as a roadmap for meeting California's water needs through the 21st Century.

This draft report first presents an overview of the framework and tool. Next, it introduces each of the three components—water quality, water accessibility and water affordability—alongwith the indicators that comprise each component. The report then explains how the tool might work, walking readers through a series of hypothetical cases with supporting visual information. Finally, following a brief conclusion, the draft report includes a number of appendices that review various technical aspects of the discussion. OEHHA welcomes, and looks forward to receiving the public's input on this draft document.

This brochure provides an introductory guide to California water right law for smaller water users that meet their own water needs without relying on a larger entity to deliver water to them.

A Guide to Pesticide Regulation in California was published in 2017. In its 135 pages is information on pesticide laws and regulations, the Department of Pesticide Regulation's organizational structure, an explanation of regulatory and registration processes, a description of local and state enforcement, and details on DPR initiatives to protect people and the environment. It is an update to the 2011 DPR guide.

This guidebook introduces a process and principles that local governments and their partners can use to design equitable clean energy programs in their communities. When equity is approached intentionally, municipalities and their partners can create programs that prioritize making clean energy technologies accessible and benefcial to LMI households. Centering equity in clean energy program design and planning is critical to building a just transformation to a clean energy future.

This research published by the Proceedings of the National Academy of Sciences USA examines jet stream and moisture patterns in California over a centuries-long time period—1571 to 2013—which is nearly four times longer than the instrumental period of record that begins in the latter part of the 19th century. The length of the study enhances the understanding of dynamics that may contribute to extreme impacts from wildfires, as well as precipitation extremes. The work provides a stronger foundation and a longer-term perspective for evaluating regional natural hazards within California and the economic risks to one of the world's largest economies.

In this report we build upon increasing interest in multi-objective approaches to management of freshwater ecosystems (see recent summary in Diringer 2019). To be clear, we are not proposing major legislative reforms to state or federal ESAs or other foundational environmental legislation. Rather, we are recommending a shift in the way these acts are implemented in order to improve ecosystem outcomes that benefit both people and nature and anticipate an uncertain future. We propose that water managers in California adopt ecosystem-based principles and practices wherever possible. This sets improving freshwater ecosystem health—and the multiple benefits derived from those ecosystems—as a top priority, rather than focusing narrowly on mitigating project impacts to species protected by state and federal laws.

The purpose of this guide is to help water right holders –and those assisting them – understand their options for keeping water instream in California. This guide briefly describes some of the most common types of instream flow transactions (i.e., methods for restoring flow for environmental purposes), and discusses in detail how to navigate the process of completing an instream flow dedication by changing a water right, as permitted by Water Code Section 1707. The intended audience for this document includes both water rights holders and practitioners, such as staff for land trusts, water trusts, Resource Conservation Districts (RCDs), and other organizations. This guide focuses on instream dedications via the change petition process administered by the State Water Resources Control Board (State Water Board). Other publications – for example, the Trust for Public Land's Water Acquisition Handbook (2003) – provide a more general overview of acquiring water for environmental purposes in California. This guide will provide a description of the change petition process, and offer advice on how to navigate, troubleshoot, and work in partnership with the State Water Board and other natural resource agencies to complete an instream flow dedication.

The USDA Forest Service has collaboratively developed a suite of tools to assess and measure the current state of a community's forest, and to inform plans to maintain and strengthen that urban forest.
All of these tools, whether used together or separately help communities understand the make-up, condition and value (social, economic and environmental) of their unique urban forest. The data collected and analyzed from these cutting-edge tools also provide compelling backstories and economic incentives for smart policy making and budget justifications. The tools and technologies described below can be used individually or in conjunction to collect key information about urban data that are vital to any sustainable and practical urban forestry and resiliency plan - for communities of all sizes. Trees and green space management is complex and crosses many boundaries: regulatory, social and economic. Selecting the right combination of tools allows anyone to customize their starter pack.

iTree
Urban FIA
STEW-MAP
Urban Tree Canopy
FLAT
On-line Adaptation Workbook

The Open and Transparent Water Data Act (AB 1755, Dodd) requires the Department of Water Resources, in consultation with the California Water Quality Monitoring Council, the State Water Resources Control Board, and the California Department of Fish and Wildlife, to create, operate, and maintain a statewide integrated water data platform; and to develop protocols for data sharing, documentation, quality control, public access, and promotion of open-source platforms and decision support tools related to water data. A team of partner agencies is collaborating with and learning from others – including State and federal agencies, data experts, data providers, and data consumers – to chart a successful path forward.

This Working Paper proposes a method whereby any decision-maker can calculate the cost required to deliver sustainable water management to a geography. The paper also estimates the costs of delivering sustainable water management for all countries and major basins—estimated globally as US $1.04 trillion (2015$) annually from 2015 to 2030.

Funds land-use, housing, transportation, and land preservation projects to support infill and compact development that reduces greenhouse gas ("GHG") emissions.

Study findings suggest that, while impacts are highly sensitive to uncertain climate projections, farmers have considerable flexibility to adapt to changes in local weather, resource conditions, and price signals by adjusting crops, rotations, and production practices. Such adaptation, using existing crop production technologies, can partially mitigate the impacts of climate change on national agricultural markets. Adaptive redistribution of production, however, may have significant implications for both regional land use and environmental quality.

The Agricultural Lands Discharge Program (Program) addresses water quality impacts associated with activities on agricultural lands in the North Coast Region (Region). There are approximately 350,000 acres of agricultural lands in the Region, which are primarily used for vineyards, orchards, row crops, grain, alfalfa, hay pasture, and dairies. Agricultural discharges can contain pollutants such as pesticides, nutrients, organic matter, salts, pathogens, and sediment. These pollutants can harm aquatic life or make surface or groundwater unusable for drinking water or agricultural uses. Activities on agricultural lands can also result in the removal or suppression of riparian vegetation, which provide shade and other ecological functions to waterbodies. The Program is designed to meet the requirements of the California Water Code, the State Nonpoint Source Policy, and the Total Maximum Daily Loads (TMDLs) developed for certain watersheds in the Region.

This book delves into the development opportunities for peripheral areas explored through the emerging practices of agritourism, wine tourism, and craft beer tourism. It celebrates the entrepreneurial spirit of people living in peri-urban regions.

Protecting the air we breathe is one of the highest priorities of the Department of Pesticide Regulation (DPR). We focus not only on preventing health problems that can be caused by pesticide air toxins, but also on reducing pesticide emissions that contribute to air pollution.
This web page contains links to toxic air contaminants, volatile organic compound emissions, and air monitoring activities

The integration of soil value in agronomic micro-level decision-making and macro-scale policy development has grown immensely in recent years. Major threats to soil resources and their impact on human well-being require a comprehensive estimation of soil's economic worth, highlighting the need for sustainable and pragmatic conservation strategies. However, the absence of formal markets for numerous soil amenities, coupled with the heterogeneity of stakeholder cognition and spatio-environmental factors, obfuscates the valuation process for soil and similar public goods. This paper aims to address such concerns by evaluating stakeholders' willingness-to-pay (WTP) for soil conservation as a proxy indicator for its explicit value. Two contingent valuation method (CVM) formats, the payment card (PC) and the dichotomous choice (DC), were used to analyze WTP in Norzagaray, Philippines. Results suggest farmers' income, education, land tenure type, level of environmental consciousness, and proximity to amenities influence their inclination to spend on soil conservation measures. Econometric analyzes indicate a compensating surplus corresponding to the mean WTP estimate of ₱79.98 (PC-CVM) and a Turnbull WTP estimate of ₱99.47 (DC-CVM). Estimated WTP values can be used in future benefit-transfer studies, and the findings of the econometric models can be used in developing strategies that would promote greater stakeholder acceptance and participation. The approach presented here provides another step towards a more comprehensive characterization of soil value that integrates environmental valuation and econometric modeling with geospatial data.

This report presents an accounting of the violations record for the calendar year 2019. USEPA requires states to issue this Annual Compliance Report by July 1st of each year and make the report available to the public. USEPA requires that the Annual Compliance Report summarize the compliance status for the following rules from the National Primary Drinking Water Regulations:
Chemical (Phase II/V) Rule:
Inorganic contaminants (IOC)
Synthetic organics (SOC)
Volatile organics (VOC)
Radionuclide Rule (RAD)
Total Coliform Rules (TCR)
Total Coliform Rule (TCR)
Revised TCR (rTCR)
Disinfectants and Disinfection By-Products Rule (DBPR)
Stage 1 DBPR
Stage 2 DBPR
Surface Water Treatment Rules (SWTR)
Surface Water Treatment Rule
Filter Backwash Rule (FBR)
Interim Enhanced SWTR (IESWTR)
Long Term 1 Enhanced SWTR (LT1)
Long Term 2 Enhanced SWTR (LT2)
Groundwater Rule (GWR)
Lead and Copper Rule (LCR)
Public Notification Rule (PN)
Consumer Confidence Report Rule (CCR)
Variances and exemptions (V/E)

Farmlands are currently among the dominant uses of the land. When managed under low-input farming systems, farmlands are associated with diverse cultural and natural heritages around the world. Known in Europe as high nature value (HNV) farmlands, these agricultural landscapes and their associated farming systems evolved as tightly coupled socioecological systems, and are essential to biodiversity conservation and the delivery of ecosystem services to society. However, HNV farmlands are vulnerable to socioeconomic changes that lead to either agricultural intensification or land abandonment. We present a range of plausible future scenarios for HNV farmlands, and discuss the related management options and expected socioecological outcomes for each scenario. We then provide recommendations for policy, practice, and research on how to best ensure the socioecological viability of HNV farming systems in the future.

The following Groundwater Sustainability Plan (GSP) chapter templates were developed by Environmental Defense Fund and New Current Water and Land, LLC to assist Groundwater Sustainability Agencies (GSAs) with incorporating multi-benefit replenishment and water trading mechanisms into GSPs. These chapter templates provide an initial framework that can be adapted to reflect regional conditions and objectives.

Private lands in the American West are undergoing a land-use conversion from agriculture to ex-urban development, although little is known about the ecological consequences of this change. Some nongov-ernmental organizations are working with ranchers to keep their lands out of development and in ranching, ostensibly because they believe biodiversity is better protected on ranches than on exurban developments. However, there are several assumptions underlying this approach that have not been tested. To better inform conservation efforts, we compared avian, mesopredator, and plant communities across the gradient of inten-sifying human uses from nature reserves to cattle ranches to exurban developments. We conducted surveys atrandomly selected points on each type of land use in one Colorado watershed between May and August of2000 and 2001. Seven bird species, characterized as human commensals or tree nesters, reached higher den-sities (all p 0.02) on exurban developments than on either ranches or reserves. Six bird species, character-ized as ground and shrub nesters, reached greater densities (all p 0.015) on ranches, reserves, or both ofthese types of land use than on exurban developments. Domestic dogs (Canis familiaris) and house cats (Feliscatus) were encountered almost exclusively on exurban developments, whereas coyotes (Canis latrans) weredetected more frequently (p 0.047) on ranchlands than exurban developments. Ranches had plant com-munities with higher native species richness and lower non-native species richness and cover than did the other types of land use (all p 0.10). Our results support the notion that ranches are important for protecting biodiversity and suggest that future conservation efforts may require less reliance on reserves and a greater focus on private lands.

BIOS is a system designed to enable the management, visualization, and analysis of biogeographic data collected by the California Department of Fish and Wildlife and its Partner Organizations. In addition, BIOS facilitates the sharing of those data within the BIOS community. BIOS integrates GIS, relational database management, and ESRI's ArcGIS Server technology to create a statewide, integrated information management tool that can be used on any computer with access to the Internet.

This report is based on a review of existing literature, analysis of various policies, conversations with countless water and land-use experts, and an evaluation of the principles and opportunities faced by comunities in California. Four general recommendations emerged to provide opportunities that can significantly affect the potential success of integrating water management and land-use planning, while also being politically feasible in a number of situations.

Droughts are a recurring feature of California’s climate. Major droughts provide an opportunity to review management responses and derive policy lessons that can better prepare society for the next one. Here we take stock of how California’s cities and suburbs have responded to recent droughts, review the state’s evolving role in urban drought management, and recommend actions to increase urban areas’ drought resilience.

Forest pests (insects and diseases) annually destroy 10 times the volume of timber lost due to forest fires. Native bark beetles took hold in Southern California forests following severe drought years and caused unprecedented tree mortality. The introduced Pitch Canker Disease has attacked Monterey pine along the central coast. Sudden Oak Death, caused by Phytophthora ramorum, has been found in 14 counties in California and has killed thousands of oaks. CAL FIRE's forest pest specialists help protect the state's forest resources from native and introduced pests, conduct surveys and provide technical assistance to private forest landowners, and promote forest health on all forest lands.
This web page contains resource management links and pest management information for specific pests

The California Resources Agency operates and maintains the Cal-Atlas Geospatial Clearinghouse, formerly the California Spatial Information Library (CaSIL) operated by CERES. CaSIL was transitioned to the new Cal-Atlas site in late 2008. The Cal-Atlas site facilitates the coordinated and sustainable development, maintenance, licensing and sharing of geospatial data and web map services by California government agencies, partners and stakeholders. California government agencies work with the California GIS Council, regional GIS collaboratives and the broader California GIS community to define the data architecture, systems, standards, agreements and processes for a fully integrated and effective California Spatial Data Infrastructure.

DTSC regulates and provides information about hazardous waste control and clean up. Collects and analyzes data on water, soil, sediment concentrations.

The California Communities Environmental Health Screening Tool: CalEnviroScreen 3.0 was updated in June 2018. CalEnviroScreen is a screening methodology that can be used to help identify California communities that are disproportionately burdened by multiple sources of pollution. This version updates CalEnviroScreen in a variety of ways. CalEPA has used CalEnviroScreen 3.0 to designate disadvantaged communities pursuant to Senate Bill 535 in April 2017. All materials related to CalEnviroScreen 3.0 are available here.

One of the primary functions of the CalFish website is to provide access to fisheries-related data and maps online. To this end, we have developed a Internet Map Server (IMS) application and a Tabular Data Query System. These two systems provide two different ways to access many of the same datasets (e.g., anadromous fish abundance, Barriers, and Restoration Projects). Tools include CalFish Interactive Mapper, CalFish Tabular Query System, Data Downloads, and Additional Data

This web page "aims to raise awareness
about approaches to agricultural water management that support the viability of
agriculture, conserve water, and protect ecological integrity in California." It contains pages regarding on-farm practices, case studies and resources including technical support, policy reports, and news articles.

In 2006, Governor Schwarzenegger signed Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006 (Act), into law. The Act requires the Air Resources Board (ARB or Board) in coordination with other agencies to reduce the emission of greenhouse gases. The ARB assists local air districts to control the emission of criteria pollutants from electrical generation equipment. Specific programs include:
proposed rules to regulate power plants
biomethane renewable resources
renewable electricity standard
combined heat and power systems
distributed generation

This plan proposes management actions for addressing aquatic invasive species (AIS) threats to the State of California. It focuses on the non-native algae, crabs, clams, fish, plants and other species that continue to invade California’s creeks, wetlands, rivers, bays and coastal waters. State surveys of California's coastal waters have identified at least 312 species of aquatic invaders. These invaders cause major impacts: disrupting agriculture, shipping, water delivery, recreational and commercial fishing; undermining levees, docks and environmental restoration activities; impeding navigation and enjoyment of the state's waterways; and damaging native habitats and the species that depend on them. As the ease of transporting organisms across the Americas and around the globe has increased, so has the rate of AIS introductions.

The goal of this Biodiversity Initiative and Roadmap is to secure the future of California's biodiversity. This goal is not a value judgment picking winners or losers between the environment and the economy. Securing biodiversity benefits the State's short- and long-term environmental and economic health.

This web site is the first place to look for climate related science, policy, and business information regarding climate change in California. It also has links to the California Climate Strategy, AB32, current news and events, and a video primer on explaining climate change.

This brochure summarizes the observations, projections, and challenges that climate change poses for water resources management in California, and highlights climate change content developed for the California Water Plan Update 2013.

The Coastal Commission adopted the Strategic Plan on April 12, 2013 following two public hearings. The Plan addressed a need for the Commission to update its Strategic Plan (last approved in 1997). This update was also required by the National Oceanic and Atmospheric Administration (NOAA), which is the lead federal agency that provides significant federal funding to the Commission under the Coastal Zone Management Act (CZMA). The Plan contains a discussion of the agency's background and legal mandates, the Commission's vision, mission, and core values, and seven program goals with associated objectives and actions. Appendix A of the Plan presents an implementation schedule for each action, and indication of whether additional funding would be required to implement each action. The status of the Commission's implementation of the plan can be monitored on this web page under the dashboard link, which provides the current status and background information for each action.

The California Data Exchange Center (CDEC) installs, maintains, and operates an extensive hydrologic data collection network including automatic snow reporting gages for the Cooperative Snow Surveys Program and precipitation and river stage sensors for flood forecasting.

Landscape conservation planning takes a proactive approach, identifying priority mitigation and conservation areas in advance of impacts, with the goal of preserving larger areas of higher habitat quality and connectivity. This type of advance planning also results in a more efficient and streamlined permitting approach for development projects.
This web page contains links to Natural Community Conservation Planning, Regional Conservation Investment Strategies, Conservation and Mitigation Banking, Habitat Connectivity, Advance Mitigation, Mitigation Land Management and Endowments, and Data and Tools

The Inventory, Monitoring, and Assessment Program (IMAP) provides goals, guidance, and standards for the Department's efforts to systematically evaluate the vegetation, wildlife, and physical natural resources of the State Park System. Evaluations consist of collecting data through various scientific means in each State Park System unit. Data is generally quantitative and consists of counts and measures of natural resources. Examples include measuring stream water quality, the distribution of various species of plants in an area, and counting the number of offspring of endangered animals. The data can be used to make status assessments of a unit's natural resources, such as what resources are present, where the resources are distributed, and how much of a resource is present. Data is also used to detect changes in resources over time so that trends in the unit's health can be ascertained and corrective management action can be taken. This page contains links to related pages such as Natural Resource Program Areas, IMAP Program Basics and Implementation, and Data Management.

California EcoAtlas provides access to information for effective wetland management. The maps and tools can be used to create a complete picture of aquatic resources in the landscape by integrating stream and wetland maps, restoration information, and monitoring results with land use, transportation, and other information important to the state's wetlands.

This Essential Habitat Connectivity Report includes three primary products: (1) a statewide Essential Habitat Connectivity Map, (2) data characterizing areas delineated on the map, and (3) guidance for mitigating the fragmenting effects of roads and for developing and implementing local and regional connectivity plans. These products will be made available for public use on two websites—BIOS, managed by the California Department of Fish and Game (http://bios.dfg.ca.gov), and Data Basin, managed by the Conservation Biology Institute (http://databasin.org). Both are interactive web-based systems that allow users to download, print, combine, comment on, or otherwise use the maps, data layers, and other information.

Compiles currently available fish passage information from many different sources, allows past and future barrier assessments to be standardized and stored in one place, and enables the analysis of cumulative effects of passage barriers in the context of overall watershed health.

The Forest Carbon Plan has the following vision for forest protection, enhancement, and innovation:
•Sustainable forests that are a net sink of carbon.
•Healthy forests that are adapted and/or resilient to anticipated climate change effects such asincreased warming, greater forest insect and disease threats, and higher wildland fire risks.
•Forests that provide for healthy watersheds and water supplies in terms of quality, quantity, and infrastructure).
•Forests that provide management opportunities that generate long-term economic benefits for landowners, workers, and communities.

The Strategic Plan provides direction to CAL FIRE staff. The plan includes three major goals: 1) maximize the benefits from the CFIP, 2) improve and streamline program administration, and 3) improve the management and health of forestland owned by nonindustrial landowners. The SP is focused on achievable action items.

California is the most geologically diverse and the second most seismically active state in the USA. The California Geological Survey (CGS) provides scientific products and services about the state's geology, seismology and mineral resources, including their related hazards, that affect the health, safety, and business interests of the people of California. We are one of the oldest geological surveys in the nation, and today produce more products and provide more services to more people than any other state survey. This web page contains links to geologic hazards, CGS Publications, Earthquake data and reports, and mineral resources program, aas well as information regarding outreach and current news.

This resource guide is intended to help your community identify the most appropriate intervention points related directly to land use that will help you achieve your community's water resource management goals.

The California Integrated Water Quality System (CIWQS) is a computer system used by the State and Regional Water Quality Control Boards to track information about places of environmental interest, manage permits and other orders, track inspections, and manage violations and enforcement activities. CIWQS also allows online submittal of information by Permittees within certain programs and makes data available to the public through reports.

On this web page, there are selected links and references to low impact development (LID) material available from other sources, as well as information and tools specifically developed by CASQA and partner organizations to support the California stormwater management community. There are links to Standard LID Design Plans & Specs, an LID toolbox, LID Code updates, online training, and presentations and publications.

Monitors a network of protected ocean regions (MPAs) to preserve biological diversity, promote recovery of wildlife populations and improve ecosystem health.

The California Natural Diversity Database (CNDDB) is an inventory of the status and locations of rare plants and animals in California. CNDDB staff work with partners to maintain current lists of rare species, as well as to maintain an ever-growing database of GIS-mapped locations for these species.

The California North Coast Ecoregional Plan was developed by The Nature Conservancy in 2001 to identify a portfolio of conservation areas that, with proper management, will ensure the long-term persistence of the ecoregion's biological diversity, including native aquatic and terrestrial systems, rare and common species, and the ecological processes needed to maintain them. The plan emphasizes ecological systems as conservation targets, functional landscapes as conservation areas, and builds on the results of a recent assessment of redwood forests in the region conducted by Save-the-Redwoods League.

Sets water quality objectives and a program of implementation for ocean waters of the state. Due for revision in 2019.

Website; data portal. "California believes in the power of unlocking government data. We invite all to search and explore our open data portal and engage with our data to create innovative solutions. We believe the California open data portal will bring government closer to citizens and start a new shared conversation for growth and progress in our great state." Data sets (> 2,500) include: grants portal, meteorological data, >1,700 natural resources data sets, > 1,600 water data sets, health and human services, and economy and demographic data sets.

CRAM is a cost-effective and scientifically defensible rapid assessment method for monitoring the conditions of wetlands throughout California. It is designed for assessing ambient conditions within watersheds, regions, and throughout the State. It can also be used to assess the performance of compensatory mitigation projects and restoration projects.

The link opens in new windowRecovery Strategy for California Coho Salmon (94 MB PDF Download) (Recovery Strategy) was adopted by the California Fish and Game Commission in February 2004. The primary objective of the Recovery Strategy is to return Coho Salmon to a level of sustained viability while protecting the genetic integrity of both the SONCC and CCC ESUs with the goals of delisting, thus making regulations or other protections under the CESA and ESA no longer necessary. A second objective of this Recovery Strategy is to achieve harvestable populations of Coho Salmon for tribal, recreational, and commercial fisheries (CDFG 2004).

The purpose of the plan is to help the Conservancy prioritize its work, allocating both its staff resources and funding to projects that achieve its objectives.

The Roads and Trails Program provides education and technical assistance to trail and open space managers and advocates regarding non-motorized trail planning, design, construction, funding and management throughout California.

This web page provides links to the California Recreational Trails Plan, California Trails & Greenways, and specific roads and trails management plans and other relevant information.

This action plan lays out our challenges, our goals and decisive actions needed now to put California's water resources on a safer, more sustainable path. While this plan commits the state to moving forward, it also serves to recognize that state government cannot do this alone. Collaboration between federal, state, local and tribal governments, in coordination with our partners in a wide range of industry, government and nongovernmental organizations is not only important—it is essential. The input and contributions received from all of these partners throughout the drafting of this action plan have resulted in a comprehensive and inclusive plan.

In the nearly five years since the plan's release, State agencies and their local, federal, and tribal partners have made significant progress. Even as the state careened from five years of severe drought to record-breaking rainfall and flood emergencies, steady advances were made on all 10 priority actions set forth in the Water Action Plan. This document provides highlights of actions by month and addresses each priority action in detail.

The California Water Plan is the State's strategic plan for sustainably managing and developing water resources for current and future generations. Required by Water Code Section 10005(a), it presents the status and trends of California's water-dependent natural resources; water supplies; and agricultural, urban, and environmental water demands for a range of plausible future scenarios.

These UC Davis documents provide detailed information about how to conduct scientifically sound watershed assessments. Volume I of the Manual currently contains 8 chapters. These flow from the introductory chapter (1), through chapters describing the details of assessment planning (2), fundamentals of watershed functioning (3), data collection (4), data analysis (5), and data integration (6). Chapter 7 gives details on how to structure an assessment report; and chapter 8 describes connecting the assessment with decision-making. Volume II is a compendium of tools for use in specific circumstances and with specific natural or human processes or conditions. This web site contains links to both documents as well other resources associated with watershed stewardship.

The California Watershed Portal was established in 2004 by the California Resources Agency and Cal/EPA. The Portal is currently being managed by the California Department of Conservation (DOC) Statewide Watershed Program. The information on this site will assist watershed managers, organizations, agencies and the public to find and use technical information, educational tools, training materials, grant announcements, upcoming events, and a number of other tools provided through the Portal to help manage and protect California's watersheds.

The WCB manages several funding programs including:
Acquisition
Agricultural Lands Management
Climate Adaptation
Forest Conservation
Habitat Enhancement Restoration
Oaks
Public Access
Rangeland Management
Riparian Restoration
Stream Flow Enhancement
Wetlands
Monitoring

California's 2017 Climate Change Scoping Plan: The Strategy for Achieving California's 2030 Greenhouse Gas Target (Plan) builds on the state's successes to date, proposing to strengthen major programs that have been a hallmark of success, while further integrating efforts to reduce both GHGs and air pollution. California's climate efforts will:

- Lower GHG emissions on a trajectory to avoid the worst impacts of climate change;
- Support a clean energy economy which provides more opportunities for all Californians;
- Provide a more equitable future with good jobs and less pollution for all communities;
- Improve the health of all Californians by reducing air and water pollution and making it easier to bike and walk; and
- Make California an even better place to live, work, and play by improving our natural and working lands.

This Assessment documents a number of serious challenges and threats to forest and rangelands that are impacting economic and environmental sustainability. In recent years, the frequency and severity of pest and wildfire events are unlike what we have experienced in the past, forcing us to reexamine our land and fire management policies and practices. Past Assessments raised issues related to land conversion and management practices, which have in part been addressed through actions such as revisions to the Forest Practices Rules, incentives for improved forest and range management, and use of conservation easements to protect working ranches and timberlands as well as important natural areas. However, current issues relate to overall ecosystem health at a landscape scale, and will require collaboration, cooperation, and investment in implementing science-based solutions that balance the objectives of different landowners and stakeholders. Even for issues where we are trending towards agreement, such as restoring natural fire regimes, finding solutions can be a complex process.

California's Climate Change Assessments contribute to the scientific foundation for understanding climate-related vulnerability at the local scale and informing resilience actions, while also directly informing State policies, plans, programs, and guidance, to promote effective and integrated action to safeguard California from climate change. This Assessment is presented as a web page with provides key findings, a statewide summary report, regional reports, technical reports and various tools.

The North Coast Region Summary Report is part of a series of 12 assessments to support climate action by providing an overview of climate-related risks and adaptation strategies tailored to specific regions and themes. Produced as part of California's Fourth Climate Change Assessment as part of a pro bono initiative by leading climate experts, these summary reports translate the state of climate science into useful information for decision-makers and practitioners to catalyze action that will benefit regions, the ocean and coast, frontline communities, and tribal and indigenous communities. The North Coast Region Summary Report presents an overview of climate science, specific strategies to adapt to climate impacts, and key research gaps needed to spur additional progress on safeguarding the North Coast Region from climate change. North Coast region in this report includes Del Norte, Siskiyou, Trinity, Humboldt, Lake, and Mendocino Counties

Water management in California has always been challenging. The state's variable climate is marked by long droughts and severe floods, with stark regional differences in water availability and demand. California has adapted by building a vast network of storage and conveyance facilities to deliver water from the wetter parts of the state to population and farming centers in the Bay Area, the San Joaquin Valley, and Southern California. Agricultural demand is becoming less flexible, as farmers are increasing tree crops (especially nuts), which must be watered every year. Conflicts are growing between human water use and water needed to support fish and other wildlife. And the latest cycle of droughts and floods provides a glimpse of an uncertain future under climate change. California's water management challenges are complex, but they can be addressed. Solutions will involve difficult and sometimes costly trade-offs, as well as contentious legal and political changes.

Managing water remains one of the great challenges for California. Population growth, a shifting climate, and declining ecosystem health are putting pressure on the state's water supply and flood management systems. New policies are needed to address these challenges. This briefing kit highlights some of the most pressing issues, including:

- Climate change and water
- The Colorado River
- Energy and water
- Managing droughts
- Paying for water
- Preparing for floods
- Protecting headwaters
- The Sacramento-San Joaquin Delta
- Storing water
- Water for cities
- Water for the environment
- Water for farms

California is the nation's largest farm state and a global market leader. Farms have steadily improved productivity per unit of water used, but the latest drought has exposed agriculture's growing vulnerability to water shortages. This brief describes a number of opportunities to strengthen agricultural water management for the long term.

River and wetland ecosystems in California—and the many birds, fish, and other species they support—are in serious decline. Major investments and novel approaches are needed to improve the health of our natural environment. This brief explains how water is used for environmental purposes and describes priority approaches that could improve its management.

The California Economic Summit, through its Elevate Rural CA initiative, has captured the gravity of the situation and urgent need for action in the report, "California's Wildfire Crisis: A Call to Action." As the report explains, the toll on both rural and urban communities has been enormous and will only grow without a swift and massive response. Expanding forest thinning and resiliency work, developing vibrant wood products industries, and creating thriving rural economies will be essential to the solution.

The Centers of Excellence (COE) collaborated with the University of California, Division of Agriculture and Natural Resources to study California's working landscape and the impact that industries associated with agriculture and natural resources have on the state's economy. This report represents an effort to quantify the role of the many peoplethroughout the state whose livelihoods depend upon the state's fertile valleys, forested mountains, and rich oceans.

Human activities have fundamentally altered many ecosystems. Recent successful restoration efforts have led to healthier ecosystems, but this has led to a disruption in economies dependent on the altered state of the system. One of the best-known trophic cascades is the sea otter–kelp forest system, wherein recovery of once extirpated sea otters is bringing back biodiverse and healthy kelp forests but reducing the abundance of harvested shellfish. Gregr et al. looked at the costs and benefits of this shift and found that for key trade-offs, the value of kelp forest–associated features such as tourism, fin fish fisheries, and carbon capture outweighed the losses to economies (see the Perspective by Estes and Carswell). Thus, ecosystem recovery can benefit both ecosystems and economies.

The mission of the Invasive Species Program is to reduce the negative effects of non-native invasive species on the wildlands and waterways of California. We are involved in efforts to prevent the introduction of these species into the state, detect and respond to introductions when they occur, and prevent the spread of invasive species that have become established. Our projects address problems with introduced animals and plants, both terrestrial and aquatic. More fundamentally, we try to identify and address the ways by which the species are introduced, typically inadvertently, by human activities. Studies show that preventing introductions is the most effective and cost-efficient way to manage invasive species. We conduct our work in coordination with other government agencies and non-governmental organizations.

THE ULTIMATE GOAL of the project is to develop a product option that can help fund forest management activities. A high-value product would support delivered timber costs sufficient to pay for harvesting and transportation costs for trees removed in forest restoration and hazardous fuel reduction operations.
OVERALL PROJECT GOALS
• Compare quality and particle characteristics for cellulose nanomaterials and cellulose micromaterials made directly from wood using six production methods
• Produce quantities of cellulose nano- and micromaterials sufficient to evaluate four applications
• Identify production site requirements (such as water use, water treatment) and evaluate these requirements relative to the Yreka location
• Determine production costs (capital and operating) for the cellulose nano- or microparticle intermediates
This Public–Private Partnership will evaluate cellulose nano- and microparticle production options provided by one university, three private-sector companies, and the Forest Products Laboratory (FPL). Engineering evaluation referred to as AACE Class 5 (–30% to +40% capital costs) will be performed on each option and used to select one option for further analysis.
This book chapter examines ecosystem services on public land through the lens of the Lassen and Modoc National Forests and nearby communities.

The State Water Resources Control Board (State Water Board) is proposing a State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures), for inclusion in the forthcoming Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California. The Procedures consist of four major elements: 1) a wetland definition; 2) a framework for determining if a feature that meets the wetland delineation is a water of the state; 3) wetland delineation Procedures; and 4) procedures for application submittal, and the review and approval of Water Quality Certifications and Waste Discharge Requirements for dredged or fill activities. This page contains links to official documents, historical documentation, and other relevant information.
An internet portal that focuses on climate communication and engagement resources

The objective of this Climate Change Analysis Guidance is to guide the California Department of Water Resources (DWR) in its decision-making and assist DWR managers as they incorporate climate change analyses into their planning for DWR activities, such as strategic planning documents, investment decisions, risk assessments, and infrastructure development.

This resource intends to enable your community to incorporate climate-informed decisions into your local comprehensive planning. Users should be able to find relevant local climate change information (including projections), formulate questions to help evaluate the implications of climate change on any element of community planning, and make climatesavvy goals, policies, and implementation decisions that will generate the best long-term outcomes for your community — its businesses, schools, services, recreation, ecosystems and individuals.

The rate at which climate is projected to change in coming decades is likely too fast for many species to genetically adapt or to migrate (through increasingly fragmented landscapes) to new suitable areas. Climate change underscores the need, apparent to many in the conservation community, to transform our perspective from a static and stable view of the natural world to one that is dynamic and accepting of uncertainty. While many of our conservation tools and approaches will stay the same, a new perspective will enable us to better apply these tools to meet future challenges. This fact sheet summarizes recommendations from four recent reviews of the literature on climate change "adaptation" (Glick et al. 2009, Heller and Zavaleta 2009, Lawler 2009, West et al. 2009).

As part of EcoAdapt's State of Adaptation Program, we partnered with the Strong, Prosperous, and Resilient Communities Challenge (SPARCC) to conducta survey to determine if and how people working to address displacement pressures are considering the effects of climate change. This survey is part of a broader project in collaboration with the Urban Displacement Project to better understand the intersections between climate change and displacement pressures. Our objectives were to identify: 1.To what degree anti-displacement practitioners are thinking about climate change in their work; 2.Emerging practices and policies that may address the dual goals of reducing climate risks and displacement pressures; and 3.Needs, opportunities, and barriers in reducing climate risks and displacement pressures in communities.

The U.S. Department of Transportation's (USDOT) policy statement on climate change affirmed that USDOT will address issues of inequality and environmental justice (EJ) associated with climate change impacts and adaptation. Transportation agencies at the Federal, State, and local levels can reduce negative impacts of climate change on low-income populations and minority populations (EJ communities), through stakeholder inclusion, proactive planning, risk mapping, and the careful consideration of community needs in emergency operations procedures.

This handbook considers both climate change adaptation (reduction of impacts) and mitigation [greenhouse gas (GHG) reduction]. Quantitative tools and techniques for addressing both are introduced and discussed in order to prepare comprehensive IRWMPs. A guide to assess the vulnerability of a watershed or region to climate change impacts is presented in this handbook, and guidelines to prioritize vulnerabilities are introduced. This handbook relies on approaches that have been developed and applied to regional watershed planning processes. This handbook also presents case studies that provide illustrative examples in which the latest science and methods on climate change, including uncertainty and adaptive management approaches, have been applied outside academia.

In this report, we use operation-level economic data coupled with finely scaled climate data to estimate how the local thermal environment affects U.S. dairies' effectiveness at producing outputs with a given level of inputs. We use this information to estimate the potential decline in milk production in 2030 resulting from climate change-induced heat stress. For four climate model scenarios, the results indicate modest heat stress-related production declines over the next 20 years, with the largest declines occurring in the South.

This analysis focuses on cropping allocations and shifts in irrigated and dryland crop area as two potential responses to climate change in U.S. fieldcrop production. Despite higher temperatures and much regional variation in production response, U.S. irrigated fieldcrop acreage and water used for irrigation tend to decline with long-term climate change. Driving the decline in water use are changes in crop growth due to temperature stress, changes in growing-season precipitation, and shifts in surface-water supply availability. Changes in the relative profitability of dryland and irrigated agriculture will increase irrigation demand in some major irrigated regions and reduce demand in others.

This guide will help you take interdisciplinary and cross-sector resilience concepts to the ground in your community by creating an actionable plan that is well supported by residents. You will learn how to approach specific tasks, address common obstacles, recognize when a "solution" might create more problems than it solves, and where to find assistance and information.

This policy brief provides recommendations for California's State Water Efficiency and Enhancement Program

In our report, Climate Threats, Abundant Solutions: Climate Change and Agriculture Recommendations to the New California Governor, we review the important progress made under Governor Jerry
Brown to advance agricultural solutions to climate change. We also put forward a comprehensive set of recommendations to the new Governor of California to advance this work. To be successful we must scale up, integrate, streamline and level the playing field.

This updated statewide guide is intended to support California's ongoing efforts to skillfully address our wildfire challenges. With input from leading experts, it offers science-based guidance for those working toward recovery of their land while reduc-ing risk going forward. It has been a community effort.

The Coalition's core mission is to promote the appropriate use of prescribed fire for enhancing public safety, managing resources, and sustaining environment quality. In addition, the Coalition encourages and facilitates the organization of prescribed fire councils in states that lack active councils. Partnering prescribed fire councils' efforts, which collectively represent twelve million acres of annual prescribed fire use, has created a forum to voice and address issues of national concern. The Coalition's work facilitates communication among interested parties in the field of prescribed fire, provides a focal point for sharing ideas and information, and creates opportunities for prescribed fire collaboration.

The Coastal Act includes provisions to protect and enhance coastal resources and land uses, including agriculture. Strong protection of agricultural lands and the agricultural economy in the coastal zone is mandated by the Coastal Act. These protections include requiring that prime agricultural lands be maintained in agricultural production, restricting the conversion of agricultural lands to other land uses, conserving agricultural soils, and promoting long-term agricultural productivity. The strong agricultural protections of the Coastal Act are also reflected by land use policies and regulations in coastal counties' and cities' Local Coastal Programs (LCPs). Commission staff have prepared informational documents that address permitting requirements for agricultural development, and several emerging issues in coastal agriculture. These include: Cannabis in the Coastal Zone and the Regulatory Requirements of the Coastal Act, Managing public access in agricultural areas, carbon storage using organic soil amendments on California's coastal rangelands, an information guide for permitting ag development, and flowcharts and presentations. Additionally, slide shows from a forum on adapting to sea level rise on Humboldt Bay's Ag Lands are available.

The Coastal Commission has adopted a Tribal Consultation Policy, after holding public hearings, and reviewing comments by California Native American Tribes and other interested persons or parties. This Policy is intended to strengthen its relationships with Native American Tribes, while encouraging further outreach and collaboration.

In 2016, the Governor signed AB 2616 (Burke), which amended the Coastal Act and gives the Commission new authority to specifically consider environmental justice when making permit decisions. This legislation also cross-references existing non-discrimination and civil rights law in the government code and requires the governor to appoint an environmental justice Commissioner to our board. Commission staff is developing an environmental justice policy to guide how the agency can implement this new authority and to help the Commission make even better, stronger decisions that protect coastal resources in ways that also benefit underserved communities.

This interactive mapping tool has a search function and movable map that allows the user to focus on geographies of interest. Users can choose to view areas at risk by year, water level, or elevation dataset.

The Coastal Watershed Planning and Assessment Program (CWPAP) is a California Department of Fish and Wildlife (CDFW) program conducting fishery-based watershed assessments along the length of the California coast. Assessment basins are chosen as study areas based upon the nature of the socio-economic and natural resource problems within them. The CDFW Coho Recovery Plan and Steelhead Recovery Plan are useful in selecting basins as well. CWPAP has developed assessment methods, protocols and report outlines.

The Draft Commercial & District ZNE Framework provides a refined comprehensive goal and outcome for ZNE, with six key drivers to move California to achieve that goal.

Global climate change creates critical challenges through increasing temperature, reducing snowpack, and changing precipitation for water, energy, and food, as well as for ecosystem processes at a regional scale. The water, energy, and food (WEF) nexus and related ecosystems have complex linkages with climate change implications.
The overall objectives of this white paper are to provide background on this important subject, and help local water managers and the public better understand:
*The ecosystem services for water, energy, and food in a changing climate.
*The water-energy nexus and related climate change mitigation actions in California.
*The energy used in California's water sector and estimates of the energy intensity of regional water supplies.

The Conservation Prospects for the North Coast: A Review and Analysis of Existing Conservation Plans, Land Use Trends and Strategies for Conservation on the North Coast of California report was prepared by The Conservation Fund in 2005 with project funding and support provided by the California State Coastal Conservancy. The purpose of this report is the synthesis of more than 150 recently developed natural resource and conservation plans for the North Coast region, presented in the following three sections: Part 1 — "Catalogue of Existing Plans" Part 2 — "Synthesis of Existing Plans" Part 3 — "Assessment of the Political, Economic and Social Factors Affecting the Region, and Recommendations for Action"

This report was written to provide an overview of considerations for managed breaching in California. It presents a synthesis of processes and phenomena related to mouth closure and breaching in general and uses this to identify potential impacts of breaching, without intending any judgment of which impacts are more or less desirable. Three specific systems are reviewed in detail: Los Peñasquitos Lagoon in San Diego County, Scott Creek Estuary in San Mateo County and Russian River Estuary in Sonoma County.

The primary objective of this study was to document carbon sequestration over time across a chronosequence of riparian revegetation projects in soil and plant biomass and to understand the recalcitrance of the sequestered carbon in soil. We also evaluated the capacity of these systems as nitrogen sinks.

Studies of the emissions from wildland fires are important for understanding the role of these events in the production, transport, and fate of emitted gases and particulate matter, and, consequently, their impact on atmospheric and ecological processes, and on human health and wellbeing. Wildland fire emission research provides the quantitative information needed for the understanding and management of wildland fire emissions impacts based on human needs. Recent work to characterize emissions from specific fuel types, or those from specific areas, has implicitly been driven by the recognition of the importance of those fuel types in the context of wildland fire science; however, the importance of specific fuels in driving investigations of biomass-burning emissions has not been made explicit thus far. Here, we make a first attempt to discuss the development and application of criteria to answer the question, "What are the most important fuels for biomass-burning emissions investigations to inform wildland fire science and management?" Four criteria for fuel selection are proposed: "(1) total emissions, (2) impacts, (3) availability and uncertainty, and (4) potential for future importance." Attempting to develop and apply these criteria, we propose a list of several such fuels, based on prior investigations and the body of wildland-fire emission research.

California's Critical Coastal Areas (CCA) program aims to foster collaboration among local stakeholders and government agencies, to better coordinate efforts to protect high resource-value coastal waters from polluted runoff. This non-regulatory program, which is part of the state's NPS Program, is coordinated by Coastal Commission staff.
This website contains links to descriptions of criteria used to identify CCAs, regional maps of CCAs, CCA factsheets, and Action Plans for Pilot CCAs

This website provides resources to help public water systems plan for and manage cyanotoxins in their drinking water. Key resources provide information on treating, monitoring and communicating the risks of cyanotoxins in drinking water.

This Community Wildfire Protection Plan (CWPP) provides a broad description of what is necessary for a fire to begin and how communities can defend themselves when faced with a wildfire. Fire requires fuel, oxygen, and heat. Minus one of these elements, fire cannot start. In a wildland situation these factors translate into fuel, weather, and topography. Clearly, fuel is the one factor that communities have some capacity to control. The Plan focuses on how fuel can be mitigated to enhance community safety. It outlines the steps necessary for ensuring that local fire suppression efforts are successful (e.g. residence addressing, adequate roads, proper turnarounds, secondary access, water supply, etc.).

Following the same planning process for information gathering as identified in Chapter 2 of Volume 1, templates were created to help the planning partners prepare their jurisdiction-specific annexes to include information specific to their respective area. The intent of the annex development was to establish an easier method for annual review and update. Each planning partner followed the plan development process identified in Chapter 2 of Volume 1, including the community meetings, identification of areas of concern, review of the critical facilities, assets and infrastructure at risk, and development of local-area strategies to reduce the impact from wildfires. Each of the planning units identified and prioritized their own respective strategies based on the process identified in Chapter 6 of Volume 1.

Legislation in the 1990s (SB 1082, Chapter 418, Statutes of 1993; AB 2711, Chapter 779, Statutes of 1994) required California State agencies to develop strategic plans, measurable performance objectives, and continuous improvement processes. Strategic planning is critical to making state government programs and operations more efficient and effective. The strategic planning process produces fundamental decisions and actions that shape and guide what an organization is, what it does, and why it does it. A key byproduct of this planning is the strategic plan – a blueprint for future programmatic direction. Strategic plans are revisited and revised periodically. This web page provides links to the 2018 Strategic Plan and associated documents and information.

One of seven geographic CDFG regions. Specific statewide projects deal with fisheries and habitat management, environmental review, and water quality monitoring. The Project Review/ Water Quality Unit staff reviews activities that impact marine habitat and resources, such as dredging, new construction, and wave energy. Includes monitoring of marine invasive species.

California may see a 54 percent increase in rainfall variability by the end of this century, according to new research from the lab of Assistant Professor Da Yang, a 2019 Packard Fellow and atmospheric scientist with the University of California, Davis. Writing in the journal Nature Climate Change, Yang and his co-authors predict the entire West Coast will experience greater month-to-month fluctuations in extremely dry and wet weather, especially in California. The study explores the Madden-Julian oscillation (MJO), an atmospheric phenomenon that influences rainfall in the tropics and can trigger everything from cyclones over the Indian Ocean to heatwaves, droughts and flooding in the United States. The team shows that as the Earth's climate warms, the dynamics controlling MJO will expand eastward and cause a huge uptick in extreme weather in California.

Assesses risks to public drinking water sources. Provides guidance and information to local communities to delineate the area around a drinking water source through which contaminants might move and reach that drinking water supply; to inventory possible contaminating activities that might lead to the release of microbiological or chemical contaminants within the delineated area; and to determine the possible contaminating activities to which the drinking water source is most vulnerable.

Droughts are among the costliest natural hazards in the U.S. and globally. The severityof the hazard is closely related to a region's ability to cope and recover from the event, an abilitythat depends on the region's sensitivity and adaptive capacity. Here, the vulnerability to drought ofeach state within the contiguous U.S. is assessed as a function of exposure, sensitivity, and adaptivecapacity, using socio-economic, climatic, and environmental indicators. The division of vulnerabilityinto three sub-indices allows for an assessment of the driver(s) of vulnerability of a state and assuch provides a foundation for drought mitigation and planning efforts. In addition, a probabilisticapproach is used to investigate the sensitivity of vulnerability to the weighting scheme of indicators.The resulting geographic distribution of relative vulnerability of the states is partially a reflection oftheir heterogeneous climates but also highlights the importance of sustainable adaptation of the localeconomy to water availability in order to reduce sensitivity and to limit the impact of drought. As such,the study at hand offers insights to local and regional planners on how to effectively distribute fundsand plan accordingly in order to reduce state-level drought vulnerability today and in the future.

The State Water Resources Control Board is proposing to amend the statewide Water Quality Control Plans for Inland Surface Waters, Enclosed Bays and Estuariesto include updated water quality objectives for toxicity consistent with the U.S. Environmental Protection Agency's Test of Significant Toxicity (TST). Under a contract with the United States Environmental Protection Agency, PG Environmental providedthe State Water Board with an analysis of economic factors related to the proposal, including compliance with the water quality objective options, available methods to achieve compliance with these options, and the costs of those methods.The proposed amendment establishes toxicity objectives applicable to all inland surface waters, enclosed bays, and estuaries to protect aquatic life.

Sudden oak death (SOD), a forest disease caused by the pathogen Phytophthora ramorum, is a good example of a recently introduced disease with unknown implications for forest health and future disturbances. In the dry tanoak forests of northern California, the potential relationships between SOD and fire are of particular concern.

A wildfire at Blacks Mountain Experimental Forest (BMEF) in northern California provided a rare opportunity to compare fire behavior and effects in treated and untreated ponderosa pine forests.

To restore ecocultural resources depleted from decades of fire exclusion and to reduce wildfire risks, the Karuk and the Yurok Tribes of Northwest California are leading regional collaborative efforts to expand broadcast fires and fuel reduction treatments on public, private, and Tribal lands in their ancestral territories. Through collaboration with Karuk and Yurok Tribal members and basketweavers, we evaluated the effects of broadcast fires and three fire proxy treatments on California hazelnut shrubs (Corylus cornuta var. californica) that produce highly valued ecocultural resources for basketry materials. Across a 10 ha Douglas-fir and mixed hardwood forest (500 m a.s.l.) in the Klamath mountains, we established 27 stratified blocks (16 m2) and within each block applied three fire proxy treatments designed and used by Tribal members with an untreated control. Our results demonstrate that these fire-proxy methods are an effective means to increase the production and quality of basketry materials. Expanding the area and frequency of targeted understory fire-based forest treatments on private, public and Tribal lands in California and the Pacific Northwest would substantially increase the availability of these fire-enhanced ecocultural resources that are currently limited in supply and in high demand.

The hedonic pricing method was applied to examine the effect of working forest conservation easements (WFCEs) on the value of surrounding land parcels in state of Georgia. Data were collected on attributes of WFCEs in 62 counties and 46,580 property sales occurring from 2001 to 2018. Results suggested that one size did not fill all and that the type of property (agricultural, commercial or residential) near a WFCE played a large role in determining potential price effects of land cover types and other attributes. Additionally, an increase in the age of the nearest WFCE had a negative price effect on surrounding properties. This research could be used in strategic management decisions to maximize both conservation and economic outcomes.

Pricing desalinated water in wetlands can be inefficient whenever positive and negative externalities are not integrated in final prices. Externalities values are usually related to non-market magnitudes, and great difficulties exist for their precise calculation. In order to provide efficient prices, a methodology is proposed in which automatic prices could be directly estimated with the use of the Travel Cost methodology. In this chapter a dynamic model reflecting eventual differences between optimal social prices for environmental uses of desalinated water and private water prices is proposed. This model is based on a short-run dynamic model, in which socially efficient prices are calculated. In order to apply this methodology to real desalinated water problems in wetlands it is suggested that the calculation of the travel cost, along with the value transfer method price for desalinated water should have to be centralized in one office of the park receiving all information from visitors. Direct links of this office with the technical services of the park should have to be established.

The Electronic Water Rights Information Management System (eWRIMS) is a computer database developed by the State Water Resources Control Board to track information on water rights in California. eWRIMS contains information on Statements of Water Diversion and Use that have been filed by water diverters, as well as registrations, certificates, and water right permits and licenses that have been issued by the State Water Resources Control Board and its predecessors.

As lead agency for the Environmental Protection Indicators for California (EPIC) project, the Office of Environmental Health Hazard Assessment (OEHHA) develops and maintains environmental indicators for the California Environmental Protection Agency (CalEPA). Environmental indicator reports are prepared by OEHHA based on input and contributions from CalEPA's boards and departments, other state and federal agencies, and research institutions. In an extension of the EPIC project, OEHHA is now the lead agency for the development of Indicators of Climate Change in California. this web page contains links to multiple resources, including: Indicators of Climate Change in CA, Children's Environmental Health Symposium, Environmental Protection Indicators for California Products, and Environmental Justice Impacts Report

CAL FIRE's mission includes protecting California's resources - not only from natural disaster, but from the direct and indirect impacts that may arise from the Department's actions. CAL FIRE's own activities, as well as those it approves, permits, funds or otherwise facilitates, may impact the environment, and are therefore subject to environmental review.

This website contains drinking water health advisory threshhold information, fact sheets, and other pertinent information

This SWRCB web page lists laboratories in the state that no longer have valied laboratory acceditation. Section 64415(a) of the California Code of Regulations (CCR) requires that analyses pursuant to Chapter 15 "Domestic Water Quality and Monitoring Regulations" be performed by environmental laboratories accredited by the California Environmental Laboratory Accreditation Program (ELAP). To maintain accreditation, a laboratory must comply with the application requirements as cited in the Environmental Laboratory Accreditation Act Sections 100825-100920 and California Code of Regulations, Title 22, Division 4, Chapter 19. ELAP accreditation is valid for only two years. If a laboratory does not apply for renewal at least 90 days prior to the expiration of its current accreditation, the certificate may expire, and the laboratory will no longer be accredited (CCR §64805(d)). Laboratories must also meet regulatory requirements implemented by ELAP to remain accredited for drinking water analyses. ELAP may rescind accreditation if a laboratory is unable to meet these requirements.

What is a water system's responsibility?

It is a water system's responsibility to ensure its laboratory is accredited to perform the analyses for its monitoring requirements. Failure to have compliance samples analyzed by an ELAP-accredited laboratory could result in a monitoring violation requiring public notification and a requirement to resample (California Code of Regulations Section 64415(a)). Note that use of an unaccredited laboratory for services other than drinking water quality compliance analyses is not affected by loss of accreditation.

This Explore the Coast Overnight assessment includes the following: 1. Description of the context, history, and goals of the Explore the Coast Overnight program. 2. Description of the existing supply of LCCAs on the California coast, including the supply relative to popu-lation within 150 miles of the coast, anticipated costs of new development, and the demand for enhancing and creating a variety of LCCAs.3. Analysis of relevant factors for identifying facility and programmatic opportunities for LCCA projects. This analysis includes, but is not limited to, factors such as rates, seasonality, the cost of land and construction, maintenance costs, permitting, environmental review, geography, community perspectives, transportation issues, Americans with Disabilities Act requirements, Fire Marshal requirements, and projected climate change issues.4. Identification of potential criteria that may be used to prioritize investment of program funds in LCCA projects, such as legal requirements applicable to funds, project proximity to the coast or within the coastal zone, vulnerability to sea level rise, availability of collaborating agencies or NGOs, adequacy of existing infrastructure, and financial feasibility.5. Identification of potential sources of funding and financing mechanisms for LCCA projects.6. Identification of potential opportunities and sites for improving existing and developing new LCCAs, both on public lands, and private lands owned or operated by NGOs.7. Description of anticipated measures needed to ensure projects supported by the Explore the Coast Overnight program are affordable and available to (1) low and middle-income families, and (2) to NGOs or agencies that provide young or under-resourced populations with educational and similar opportunities.

Indigenous populations are projected to face isproportionate impacts as a result of climate change in comparison to nonindigenous populations. For this reason, many American Indian and Alaska Native tribes are identifying and implementing cultur-ally appropriate strategies to assess climate impacts and adapt to projected changes. Traditional ecological knowledge (TEK), as the indigenous knowledge system is called, has the potential to play a central role in both indigenous and nonindigenous climate change initiatives. The detection of environmental changes, the develop-ment of strategies to adapt to these changes, and the implementation of sustainable land-management principles are all important climate action items that can be informed by TEK. Although there is a significant body of literature on traditional knowledge, this synthesis examines literature that specifically explores the relation-ship between TEK and climate change. The synthesis describes the potential role of TEK in climate change assessment and adaptation efforts. It also identifies some of the challenges and benefits associated with merging TEK with Western science, and reviews the way in which federal policies and administrative practices facilitate or challenge the incorporation of TEK in climate change initiatives. The synthesis highlights examples of how tribes and others are including TEK into climate research, education, and resource planning and explores strategies to incorporate TEK into climate change policy, assessments, and adaptation efforts at national, regional, and local levels.

The Farmland Mapping and Monitoring Program (FMMP) produces maps and statistical data used for analyzing impacts on California's agricultural resources. Agricultural land is rated according to soil quality and irrigation status; the best quality land is called Prime Farmland. The maps are updated every two years with the use of a computer mapping system, aerial imagery, public review, and field reconnaissance.

A key provision of this plan is a harvest control rule for CA lobster, which serves as the foundation for managing the fishery in the future as well as the primary mechanism to prevent, detect, and recover from overfishing. The plan also describes various management tools

This website strives to work with communities across the nation to create a more wildfire-resilient future. It provides resources about wildfire resilience.

The purpose of the Fire and Flow Forum Strategic Plan is to guide watershed recovery and resiliency building. Its intended use is to motivate new projects, support ongoing projects and assist in securing funding by communicating regionally significant priority actions to funders and decision makers. Its broad scope was designed to allow for application by public and private groups with wide-ranging missions, while its specificity provides for practical application. The mission to coordinate and develop environmentally minded priorities that address and prepare for rising climate hazards to take advantage of funding and restoration opportunities. Although developed in Southern California, goals and objectives chosen have universal applications.

The authors surveyed understory vegetation across a gradient of increasing canopy loss, ranging from unmanaged forest to fuel treatments, fuel treatments followed by low-moderate severity wildfire, and high-severity wildfire only.

This research brief for resource managers presentsfire behavior in masticated fuels and management implications.

FRAMES strives to provide a convenient, systematic exchange of information and technology within the wildland fire research and management community. FRAMES is located in the Department of Forest Rangeland, and Fire Sciences(link is external) in the University of Idaho College of Natural Resources(link is external) in Moscow, Idaho.
The FRAMES Program is funded by the Fire, Fuel, and Smoke Science Program(link is external) at the USFS Rocky Mountain Research Station(link is external).

This white paper explores “Flood-MAR”, an integrated and voluntary resource management strategy that uses flood water resulting from, or in anticipation of, rainfall or snowmelt for groundwater recharge on agricultural lands and working landscapes, including but not limited to refuges, floodplains, and flood bypasses. Large-scale implementation of Flood-MAR will fundamentally change how flood and groundwater management are managed. Flood-MAR can be implemented at multiple scales, from individual landowners diverting flood water with existing infrastructure, to using extensive detention/recharge areas and modernizing flood protection infrastructure/operations. Flood-MAR’s potential and value for California is achieved by integrating Flood-MAR with other regional recharge efforts, changing management of California’s water system to better integrate surface water and groundwater, upgrading conveyance, storage, and operations, and considering Flood-MAR’s opportunities as related to water transport and transfers are some of the system integration considerations. This white paper demonstrates the need for Flood-MAR to become an important part of California’s portfolio of water resource management strategies, now and in the future, to help significantly improve water resources sustainability and climate resiliency throughout the state.

This plan outlines the priority information needed by those making management decisions about the where, when, and how of capturing available flood water to replenish California’s depleted aquifers.

The intent of this publication is to help prepare you to make informed decisions about your land by giving you a better understanding of the role carbon plays within your forest, the impacts of various land-use options on forest carbon, and the trade-offs of these decisions.

Shrublands in Mediterranean-type ecosystems worldwide support important ecosystem services including high levels of biodiversity and are threatened by multiple factors in heavily used landscapes. Use, conservation, and management of these landscapes involve diverse stakeholders, making decision processes complex. To be effective, management and land use decisions should be informed by current information on ecosystem quality and resilience. However, obtaining this information is often a challenge due to the extent of landscapes involved. Here we present a conceptual integrity monitoring framework based on simple easily observable ecosystem components readily understood by nonspecialists. Community integrity is defined by plant functional group based on relative proportion of shrubs and nonnative annual grasses. The ability to use these straightforward metrics results from four factors: relatively
good alignment of characteristic bird, mammal, and insect communities with shrub cover, positive feedback between annual grasses and short fire intervals, the inhibitory effect of annual grasses on shrub seedling establishment, and similar functional group response to different disturbances. Two additional metrics, indicator species and shrub species diversity, capture subtle yet persistent signatures of disturbance on integrity not reflected in functional group composition. The framework is designed to: categorize habitats into ecosystem integrity classes, forecast likely integrity class changes caused by threats and environmental conditions, and provide a simple reporting mechanism
that can be overlain with data on conservation status and vulnerabilities. The proposed framework includes a pilot phase to validate empirical relationships, thresholds, and sampling efficiency. The accessibility of these metrics to nonspecialists is anticipated to enhance communication among stakeholders and thus facilitate problem solving. Leveraging monitoring and mapping programs driven by other needs (e.g., species conservation and fire management) affords meaningful opportunities to offset program costs.

Large wildfires (>50,000 ha) are becoming increasingly common in semiarid landscapes of the western United States. Although fuel reduction treatments are used to mitigate potential wildfire effects, they can be overwhelmed in wind-driven wildfire events with extreme fire behavior. We evaluated drivers of fire severity and fuel treatment effectiveness in the 2014 Carlton Complex, a record-setting complex of wildfires in north-central Washington State. Across varied topography, vegetation, and distinct fire progressions, we used a combination of simultaneous autoregression (SAR) and random forest (RF) approaches to model drivers of fire severity and evaluated how fuel treatments mitigated fire severity. Predictor variables included fuel treatment type, time since treatment, topographic indices, vegetation and fuels, and weather summarized by progression interval. We found that the two spatial regression methods are generally complementary and are instructive as a combined approach for landscape analyses of fire severity. Simultaneous autoregression improves upon traditional linear models by incorporating information about neighboring pixel burn severity, which avoids type I errors in coefficient estimates and incorrect inferences. Random forest modeling provides a flexible modeling environment capable of capturing complex interactions and nonlinearities while still accounting for spatial autocorrelation through the use of spatially explicit predictor variables. All treatment areas burned with higher proportions of moderate and high-severity fire during early fire progressions, but thin and underburn, underburn only, and past wildfires were more effective than thin-only and thin and pile burn treatments. Treatment units had much greater percentages of unburned and low severity area in later progressions that burned under milder fire weather conditions, and differences between treatments were less pronounced. Our results provide evidence that strategic placement of fuels reduction treatments can effectively reduce localized fire spread and severity even under severe fire weather. During wind-driven fire spread progressions, fuel treatments that were located on leeward slopes tended to have lower fire severity than treatments located on windward slopes. As fire and fuels managers evaluate options for increasing landscape resilience to future climate change and wildfires, strategic placement of fuel treatments may be guided by retrospective studies of past large wildfire events.

This website, Funding Navigation for California Communities offers the most prominent funding opportunities for local governments and communities. These resources are available to communities across California and are categorized into eight “Project Types” shown below or in the navigation menu above. Click the ‘Contact Us’ button on the navigation menu above to receive direct assistance on a first-come, first-served basis from our technical assistance team in pursuing these funding opportunities.

This is a new chapter to the state's general plan guidelines that introduces a new chapter requirement for an Environmental Justice Element. This is a public review draft released 11.19.18

This report is an assessment of negative emissions pathways—ones that physically remove CO2 from the atmosphere—that can help California achieve carbon neutrality by 2045, or sooner. It integrates original research findings with current published research on three main pillars of negative emissions: natural and working lands, carbon capture from biomass conversion to fuels, and direct air capture. The focus and scope of this report is unique: it only addresses practices and technologies for removing carbon dioxide from the air. It also encompasses the entire breadth of strategies, from land management to the latest technological options, and it evaluates the cost of every step of the solution, from waste biomass collection to carbon dioxide transport and geologic storage. The methods are intended to be transparent; details of the calculations and underlying data are included in the report body and appendices. This study intentionally avoids any discussion of policies and does not include current incentives; it provides a range of options, tradeoffs and costs that can be used to inform future policies. The key finding of this report is that carbon neutrality is achievable.

DPR's Ground Water Protection Program evaluates and samples for pesticides to determine if they may contaminate ground water, identifies areas sensitive to pesticide contamination and develops mitigation measures to prevent that movement. We also adopt regulations and do outreach to carry out those mitigation measures. The measures are designed to prevent continued movement to ground water in contaminated areas and to prevent problems before they occur in other areas.
This page contains links to program history, legalities, regulations, water sampling, and other relevant information.

This web page provides links to a USGS Water Quality Mapping Tool, fact sheets, opportunities to participate in groundwater quality sampling, and links to spatial information and relevant publications.

Since 2009, the California Statewide Groundwater Elevation Monitoring (CASGEM) Program has tracked seasonal and long-term groundwater elevation trends in groundwater basins statewide. The program's mission is to establish a permanent, locally-managed program of regular and systematic monitoring in all of California's alluvial groundwater basins. This early attempt to monitor groundwater continues to exist as a tool to help achieve the goals set out under the Sustainable Groundwater Management Act (SGMA).
The web page contains links to a Public Portal, Monitoring Entities, and Reports and Guidance.

the purpose of this handbook is two-fold: to help landowners and land managers better understand erosion processes, and to describe practices for repairing small-scale erosion problems common to northern coastal california.

This guide is based on the principle that existing legal frameworks (laws, regulations, court decisions, etc.) provide the clearest and most pertinent guidance on what constitutes undesirable result no. 6. This guide addresses only the explicit legal aspects of this statutory mandate. It does not address technical and scientific aspects of SGMA compliance and offers no advice on the steps GSAs must take to get an adequate technical understanding of the groundwater-surface water connections under their purview. GSAs may look to other sources for guidance on that front.

Provides detailed information for navigating the permitting process including practical tips, information regarding local state, federal and regional agencies, and resources and printed references. It also includes a section that allows you to analyze the strength of your project.

The project objective is to develop a guidebook for multi-agency collaboration, identifying factors that lead to success, that may be used by transportation agencies interested in collaborating with other agencies and nongovernmental organizations. We use the term “transportation agencies” broadly to include: state departments of transportation (state DOTs), metropolitan planning organizations (MPOs), and jurisdictionally-oriented organizations (cities, counties, regions,etc.).

This publication is meant to be an informational resource for tribes, agencies, and organizations across the United States with an interest in understanding Traditional Knowledges (TKs) in the context of climate change. It is meant to inspire dialogue and questions, and to foster opportunities for indigenous peoples and non-indigenous partners to braid TKs and western science in culturally-appropriate and tribally-led initiatives. The publication establishes firmly that in all possible cases it is tribes who should ultimately decide answers to specific questions about whether English-language words such as “traditional knowledges” are the best words to use, what knowledges should count as significant to their cultures and communities, and what the terms of sharing or declining to share should be. The information presented in these Guidelines is believed to be current as of the time of production. The Guidelines are a work in progress. The workgroup anticipates revising it over time.

This document provides guidelines for design of stream crossings to aid upstream and downstream passage of migrating salmonids. It is intended to facilitate the design of a new generation of stream crossings, and assist the recovery of threatened and endangered salmon species. These guidelines are offered by the National Marine Fisheries Service, Southwest Region (NMFS-SWR), as a result of its responsibility to prescribe fishways under the Endangered Species Act, the Magnuson-Stevens Act, the Federal Power Act, and the Fish and Wildlife Coordination Act. The guidelines apply to all public and private roads, trails, and railroads within the range of anadromous salmonids in California.

This is a website mapping service. The HAB Incident Reports Map is maintained by the State Water Resources Control Board. This map and corresponding table only show locations where harmful algal blooms (HABs) have been voluntarily reported.

A great deal of new information has been published in the 20 years since the original Handbook for Forest and Ranch Roads was published in 1994. This includes many general forest and rural road BMP handbooks that have been published by various states and organizations across the USA, as well as many technical guides and manuals from countries and international organizations around the world. Each focuses on the characteristic and universal road-related problems faced by landowners and road managers everywhere (e.g., how do you drain a road?), as well as potential users in those particular areas; including arid, tropical, frozen and temperate zones, among others.

The climate change and health toolkit is a one-stop resource containing key resources that address climate change and health issues. It is intended for planners, policy makers, and those working at the policy/practice interface. Climate Adaptation Knowledge Exchange (CAKE) will keep this resource updated with the latest publications.

This white paper makes recommendations for action to reduce the serious health impacts of wildfires in California’s increasingly hot climate. The recommendations include new or expanded programs, funding streams, regulations, and research. The recommendations were developed by academics and practitioners at a UC Berkeley workshop in Spring 2019, a statewide webinar in July 2019, and through interviews with selected health/wildfire stakeholders.

7-page document contains a table that provides name, scenario name, implementation guidelines and verification requirements for about 33 agricultural practices

Healthy Soils to Cool the Planet is a philanthropic and investment guide to scale up soil carbon sequestration. This guide includes basic information on the benefits of healthy soils, a list of regenerative agricultural practices and an extensive portfolio of recommended grantees.

During the past century, systematic wildfire suppression has decreased fire frequency and increased fire severity in the western United States of America. While this has resulted in large ecological changes aboveground such as altered tree species composition and increased forest density, little is known about the long-term, belowground implications of altered, ecologically novel, fire regimes, especially on soil biological processes. To better understand the long-term implications of ecologically novel, high-severity fire, we used a 44-yr high-severity fire chronosequence in the Sierra Nevada where forests were historically adapted to frequent, low-severity fire, but were fire suppressed for at least 70 yr. High-severity fire in the Sierra Nevada resulted in a long-term (44 +yr) decrease (>50%, $P < 0.05$) in soil extracellular enzyme activities, basal microbial respiration (56–72%, $P < 0.05$), and organic carbon (>50%, $P < 0.05$) in the upper 5 cm compared to sites that had not been burned for at least 115 yr. However, nitrogen (N) processes were only affected in the most recent fire site (4 yr post-fire). Net nitrification increased by over 600% in the most recent fire site ($P < 0.001$), but returned to similar levels as the unburned control in the 13-yr site. Contrary to previous studies, we did not find a consistent effect of plant cover type on soil biogeochemical processes in mid-successional (10–50 yr) forest soils. Rather, the 44-yr reduction in soil organic carbon (C) quantity correlated positively with dampened C cycling processes. Our results show the drastic and long-term implication of ecologically novel, high-severity fire on soil biogeochemistry and underscore the need for long-term fire ecological experiments.

This one minute video provides the basics about rainwater catchment.

We completed a novel analysis across the Pacific Northwest, USA, that identifies potential riparian corridors featuring characteristics expected to enhance their ability to facilitate range shifts and provide refugia. These features include large temperature gradients, high canopy cover, large relative width, low exposure to solar radiation, and low levels of human modification. These variables were used to calculate a riparian climate-corridor index using a multi-scale approach that incorporates results ranging in scale from local watersheds to the entire Pacific Northwest. Resulting index values for potential riparian corridors in the Pacific Northwest were highest within mountainous areas and lowest within relatively flat, lowland regions. We also calculated index values within ecoregions, to better identify high-value riparian climate corridors within the relatively flat, degraded areas where they may most contribute to climate adaptation. We found that high-value riparian climate-corridors are least protected in flat, lowland areas, suggesting that such corridors should be high priorities for future conservation effort. Our analysis provides critical information on valuable riparian climate-corridors to guide climate adaptation efforts (and riparian management and restoration efforts) in the Pacific Northwest, while offering a novel approach that may be applied to similar efforts in other geographies.

Listing a water body as impaired in California is governed by the Water Quality Control Policy for developing California's Clean Water Act Section 303(d) Listing Policy. The State and Regional Water Boards assess water quality data for California's waters every two years to determine if they contain pollutants at levels that exceed protective water quality criteria and standards. This biennial assessment is required under Section 303(d) of the Federal Clean Water Act.
The most current 303(d) List of Impaired Waterbodies for the North Coast Region California is the 2010 Section 303(d) List of Water Quality Limited Segments

Recommendations for implementing a public goods charge on water, as per the "Water Energy" section of the Assembly Bill 32 (AB 32) Scoping Plan.

8-page description of existing conditions, implications of unhealthy conditions, recommendations for improving forest and watershed management, recent budget augmentations, and key legislative oversight questions.

California's headwater forests are not thriving under current management practices, and changes are needed to make them more resilient to periodic drought and long-term climate change. More active management of these lands is needed to improve forest health, reduce the risk of major wildfires and pest infestations, and maintain the flow of benefits provided by this critical natural infrastructure. Management options exist—prescribed fire, managed wildfire, mechanical thinning, and forest pest treatments—that can help rebuild resilience in these forests and prepare them for a challenging future.

This Guide developed by the National Association for the Advancement of Colored People (NAACP) discusses how low-income, communities of color, and other frontline communities are disproportionately affected by the effects of climate change, extreme weather, and other natural and human-caused disasters (like industrial accidents or chemical contamination). To address these disproportionate risks, the Guide provides a framework for helping communities embed considerations of equity in all phases of emergency management: prevention, mitigation, preparedness, resilience building, recovery, and redevelopment. The Guide was developed for NAACP Units and their Environmental and Climate Justice Committees, but it may be more broadly useful for community-based organizations, state and local government officials, other emergency management professionals, and individuals affected by disasters.

This new synthesis report from the Pacific Institute and the Foundation Center provides a review of existing evidence about the use of incentive-based instruments worldwide. Based on case studies, evaluations, journal articles, and white papers, the authors provide a detailed review of three incentive-based instruments: water trading, payment for ecosystem services, and water quality trading. The report and interactive tool highlight the importance of finding the right fit between a community's water goals and the water management tool(s) it might choose and, perhaps most importantly, characterize the conditions required for their effective implementation.

This guidebook uses a "multi-benefit framework" to provide a modular, flexible approach for water managers interested in incorporating multiple benefits into water management decisions. It can be applied to a wide range of projects and programs, from designing water efficiency programs to prioritizing stormwater project funding and developing co-funding models for multi-benefit projects. A list of "Dos" and "Don'ts" is provided, covering everything from project vision to defining key metrics and communicating with decision-makers.

This document was prepared by the Science Institute to provide information to CDFW's Divisions and Regions as they incorporate adaptive management in their conservation and resource management decisions and planning documents. It highlights statutory definitions, statements of policy and requirements that are relevant to CDFW's activities, and summarizes descriptions and evaluations of adaptive management in the technical literature. This information is relevant to all CDFW activities involving the conservation and management of natural resources under the jurisdiction of CDFW. However, given the breadth of CDFW's Mission and the wide variety of regulatory, management and scientific roles CDFW plays, it should be emphasized that this information does not present a one-size-fits all approach to adaptive management. Rather, where adaptive management principles are appropriate and applicable in a given situation, the discussion and resources in this document should highlight issues for consideration under the specific circumstances at hand.

Instead of managing fresh water as one integrated resource, laws frequently treat groundwater separately from more visible, monitored, and managed surface waters. One under-recognized consequence of such legal fragmentation has been uncertainty about whether water rights for indigenous communities, which have been addressed in many countries to varying degrees for surface waters, apply to groundwater. In late 2017, the U.S. Supreme Court left standing a lower court ruling endorsing priority groundwater rights for Native American tribes by denying an appeal in Agua Caliente Band v. Coachella Valley Water District. This ruling establishes a new standard throughout nine western states within the lower court's jurisdiction and establishes persuasive, although nonbinding, legal precedent for the rest of the United States. To evaluate the ruling's broader potential impacts, we present new data cataloging existing Native American water rights and mapping unresolved tribal groundwater claims across the western United States. No court considered such a regional or national quantitative catalog or map. Drawing lessons from past U.S. experience, we then discuss how tribal rights may offer new opportunities to achieve sustainable groundwater management for society at large, with implications beyond the United States.

This report seeks to understand how such catastrophic levels of wildfires are occurring and what can be done going forward to protect communities, the environment, and lower the risk of cataclysmic wildfire destruction

This report explores how ecosystem services can be moved from concept into practice through connection to a decision framework—adaptive management—that accounts for inherent uncertainties. Simultaneously, the report examines the value of incorporating ecosystem services framing and concepts into adaptive management efforts.

This document provides an overview of key technical concepts and critical information needed to develop the content of an effective invasive plant management plan. It does not address the specifics of the planning process and environmental compliance requirements.

The Plan is a multi-agency joint collaboration by the California Natural Resources Agency, California Department of Food and Agriculture, California Environmental Protection Agency, California Air Resources Board (CARB), and Strategic Growth Council. This Plan aims to integrate management objectives wherever possible, coordinating all natural and working lands programs under a united approach that will move us toward our combined goal of maintaining a resilient carbon sink and improved air and water quality, water quantity, wildlife habitat, recreation, and other benefits. By moving toward an integrated multi-benefit approach that considers carbon, other critical ecosystem services, biodiversity, public health, and the economy, we can leverage efforts for maximum and sustained benefit.

This Fire Science Exchange Network provides information for the Northern California Region, including the North Coast Ranges. It provides listings of events, webinars, research and publications, and tools for interested entities. Current research is provided through a digests, briefs, syntheses, fact sheets, and research publications.

Wildfire safety information for homeowners provided in a magazine format.

The Local Action Framework: A Guide to Help Communities Achieve Energy and Environmental Goals is a step-by-step guide designed to help local and tribal governments plan, implement, and evaluate new or existing energy or environmental projects.

It is intended for small and medium-sized communities and tribes, although the information may also be helpful for larger jurisdictions or states embarking on similar projects. And while the guide is focused on the project level, much of the information is also relevant for programs or policies.

The guide covers six interrelated energy and environmental project implementation phases:

Engage and Communicate
Develop a Greenhouse Gas Inventory
Set Goals and Select Actions
Obtain Resources
Take Action
Track and Report

This guide is based on best practices identified by EPA through the Agency's extensive work with local and tribal governments and feedback from a range of state and local governments. EPA recognizes that each local and tribal government is an expert in its own community; however, given the Agency's experience working with many local and tribal governments, it is well-positioned to synthesize and share information and lessons from across the country

Local governments are required to develop LCPs, and may, amend or comprehensively update LCPs. These pages briefly highlight some Coastal Commission reports, decisions & memoranda on a variety of LCP planning related topics that may provide ideas & resources for local planners. This web page contains links to LCP update guides: Part 1 - Updating LCP Land Use Plan Procedures and Part 2 - Updating LCP Implementation Plan Procedures and some supplemental resources

This report presents the results of a year-long project based on ACT's investigation into LCR over the prior two years and the feedback from and priorities established by local, provincial and national professional sector representatives.

Primer of 2018 Legislation on Water Conservation and Drought Planning

The 2012–16 drought caused unprecedented stress to California's ecosystems and pushed many native species to the brink of extinction. It also tested the laws, policies, and institutions charged with protecting the environment. Eight case studies on environmental water management during the drought reveal both strengths and weaknesses in federal, state, and local response that can inform how California addresses future droughts. Three areas of reform hold promise for improving ecosystem conditions and reducing conflict: improve water accounting; prepare for drought; and develop ecosystem water budgets

The 2012–16 drought—the hottest in the state's recorded history and one of the driest—offered a window into the future under a warming climate and lessons for managing future droughts. Using these lessons as a starting point, this report offers a road map of essential reforms to prepare for and respond to droughts in California's changing climate. Key reforms include: planning ahead, upgrading the water grid, updating water allocation rules, and finding money to implement adaptation measures.

The fire regime is a central framing concept in wildfire science and ecology and describes how a range of wildfire characteristics vary geographically over time. Understanding and mapping fire regimes is important for guiding appropriate management and risk reduction strategies and for informing research on drivers of global change and altered fire patterns. Most efforts to spatially delineate fire regimes have been conducted by identifying natural groupings of fire parameters based on available historical fire data. This can result in classes with similar fire characteristics but wide differences in ecosystem types. We took a different approach and defined fire regime ecoregions for California to better align with ecosystem types, without using fire as part of the definition.Weused an unsupervised classification algorithm to segregate the state into spatial clusters based on distinctive biophysical and anthropogenic attributes that drive fire regimes – and then used historical fire data to evaluate the ecoregions. The fire regime ecoregion map corresponded well with the major land cover types of the state and provided clear separation of historical patterns in fire frequency and size, with lower variability in fire severity. This methodology could be used for mapping fire regimes in other regions with limited historical fire data or forecasting future fire regimes based on expected changes in biophysical characteristics.

This report provides a review of existing frameworks related to community vulnerability to climate impacts and identifies strengths and gaps in the field. Focus is resiliency in California.

This document, the Marin Ocean Coast Sea Level Rise Adaptation Report, presents potential actions to accommodate, protect against, or retreat from the threats of SLR and coastal hazards. The objective of this report is to present options for increasing resiliency in existing natural and built assets and systems in the face of increased SLR and coastal storms fpr Marin County, CA. It is not meant to facilitate new development in hazardous areas. Continuing discussions with stakeholders and technical experts will be required to identify the adaptation solutions that will be most appropriate in each location as part of an ongoing adaptive management approach. Strategies which maximize environmental benefits, social equity, and economic well-being will be prioritized.

The Environmental Management Branch manages the Marine Biotoxin Monitoring Program for bivalve shellfish in California. Other CDPH agencies participating in the program are the Food and Drug Branch, Division of Communicable Disease Control, the Microbial Diseases Laboratory, the Food and Drug Laboratory, and the Office of Public Affairs. This program draws on a wide range of participants as detailed for the shellfish sampling program. Phytoplankton monitoring participants are provided nets for collecting concentrated seawater samples, which are sent to the CDPH laboratory for examination under a microscope. This effort allows CDPH to focus additional attention on those coastal areas experiencing an increase in toxin-producing phytoplankton or an increase in toxins in shellfish.
This page provides link to general information, monitoring data, and relevant news.

This web site contains an interactive mapping application for climate impacts and other resources that allow the user to explore how climate will impact specific locations in the United States.

In this study, we propose a method for quantifying ecosystem services, that is, useful for the proper maintenance and management of artificial tidal flats, a type of environmental improvement project. With this method, a conceptual model of the relationship between each service and related environmental factors in natural and social systems was created, and the relationships between services and environmental factors were clarified. The state of the environmental factors affecting each service was quantified, and the state of those factors was reflected in the evaluation value of the service. As a result, the method can identify which environmental factors need to be improved and if the goal is to increase the value of the targeted tidal flat. The method demonstrates an effective approach in environmental conservation for the restoration and preservation of coastal areas.

Web page. This information is intended for recreational waterbody managers, which may include public health officials, lake managers, or other state, local or tribal officials, involved in monitoring water quality and protecting the health of people and animals that use waterbodies within their jurisdiction.

Researchers at the Pacific Institute and Professor Bob Wilkinson of the University of California, Santa Barbara launched an initiative to develop, build consensus around, and promote the uptake of a framework to embed the multiple benefits of water projects into decision-making processes. The framework seeks to outline a strategy for systematically identifying and incorporating the costs and benefits of water management strategies into decision making. The framework could be used by the public sector, for example, when evaluating which water supply/supplies or water quality interventions to pursue. Or, it could be used by the private sector, when assessing which projects to invest in within their value chains or as part of their philanthropic activities.

This report reflects the data disclosed by 38 regional governments that are members of the initiative. It demonstrates the awareness and huge potential of regional governments in adapting to a changing climate, their ability to integrate climate policies vertically and their ability to involve different sectors and stakeholders in adaptation planning.

MyPlan Internet Mapping Tool (IMT) enables city, county, special district, state and tribal user access in assembling and assessing GIS information on natural hazards in California.
The MyPlan tool provides an easy-to-use interface where emergency managers and planners can specify views, opacity, and layering order to create a map for their Local Hazard Mitigation Plan (LHMP). These maps can be used in applying for federal grants or in the development of mitigation plans. The tool is exportable for use by other website.

The National Cohesive Wildland Fire Management Strategy is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress towards the three goals: 1) Resilient Landscapes 2) Fire Adapted Communities 3) Safe and Effective Wildfire Response.
Vision: To safely and effectively extinguish fire when needed; use fire where allowable; manage our natural resources; and as a nation, to live with wildland fire.

This website provides tools and data for comparing watershed characteristics within user-selected geographic areas anywhere in the conterminous United States. The content in this site is technical and intended for scientific audiences.
The Watershed Index Online (WSIO) is a free, publicly available data library of watershed indicators and a decision-support tool, developed by EPA, to assist resource managers, citizens, and other users with evaluating, comparing, and prioritizing watersheds for a user-defined purpose.

This white paper does not directly address the role of hydrologic models themselves, but rather addresses how climate change information can be incorporated into hydrologic models as water managers seek to comply with the requirements of SGMA. The process of incorporating climate change into water management decisions has several steps, starting with running global climate models to produce future climate projections, which are then used as inputs to hydrologic models (Figure 1). We recognize that GSAs are likely to engage at different levels of technical sophistication with climate data and that the majority will seek out the services of technical experts. Ultimately, it is our intent that this white paper equip water managers with sufficient knowledge about climate change projections to understand, evaluate, and direct the work of the technical experts and consultants. Using appropriate climate change information is vital to ensuring that water managers capture potential future water resource conditions.

This website provides information about weather in real time. It tracks US hazards and droughts as well as El Nino/ La Nina events, ENSO diagnostics, and provides other climatology information

The purpose of the NPS Program Plan is to improve the State's ability to effectively manage NPS pollution and conform to the requirements of the Federal Clean Water Act and the Federal Coastal Zone Act Reauthorization Amendments of 1990. The most recent NPS Program Implementation Plan that was approved from USEPA covers state fiscal year 2014 through 2020.

The North American Waterfowl Management Plan stands strong on a contemporary and visionary foundation established with the 2012 Revision and Action Plan. The Revision fundamentally examined the underpinnings of NAWMP and set a new strategic direction for the future. Since 2012, those individuals and organizations committed to the goals, objectives, and recommendations of the 2012 Revision (hereafter, "waterfowl management community" or "NAWMP community") have built upon the legacy of effective, science-informed, and partner-based conservation by rising to the challenge to implement the new "people" goal and revised objectives for waterfowl populations and habitat. This effort meant significant adjustments in leadership, partnerships, and technical expertise to integrate work across goals and objectives and to apply an adaptive framework to it all. The waterfowl management community responded quickly and positively to what has required perhaps the biggest philosophical and strategic change in the history of NAWMP. Implementing the 2012 Revision entailed substantial foundational work to reassess technical and institutional tools. While laudable progress has been made in carrying out the Action Plan, much remains to be done. Consequently, the purpose of the 2018 Plan Update is to summarily document the achievements under the 2012 Revision, reaffirm and provide fresh focus on what remains to be accomplished in light of the lessons learned, and rekindle the professional passion and resilience needed to advance the NAWMP over the next five to ten years. This Update retains the same goals and objectives as stated in the 2012 Revision and its 2014 Addendum.

The North Coast Irrigation Water and Fertigation Management Plan tool is intended to help agricultural producers assess water and nutrient applications and crop demands on irrigated agricultural lands. Water and nutrient demands are seasonally dependent and based on multiple environmental site specific conditions which should be evaluated by a professional agronomist qualified to make recommendations. The IWFMP management tool is not intended as a substitute to recommendations from a qualified professional. Currently, the IWFMP model does not account for soil moisture or soil type, but it is envisioned that this will be added into a future version of the model.

The North Coast Regional Water Quality Control Board Regional Planning Chapter is a part of the State Water Resources Control Board's Watershed Management Initiative (WMI).In order to more effectively address point and nonpoint sources of pollution, a watershed management strategy has been implemented. To achieve this goal, the North Coast Region is divided into six major watershed management areas (WMAs): Russian River/Bodega Bay, Klamath River, North Coast Rivers, Humboldt Bay, Eel River Trinity River.

Farmers are continually trying to increase farm resiliency, stay ahead of the regulatory curve, save money, and enhance marketability. This network is working together toward these goals through identifying the co-benefits of improved soil health in soils and agriculture specific to the North Coast. Please join in to share, discuss, and question the specific needs, successes, and challenges in agriculture on the North Coast. The Hub is starting with the vineyard industry and will include other agricultural industries over time. This is a website with resources relevant to agriculture in the North Coast.

The North State Transportation for Economic Development Study (NSTEDS) presents the case for ongoing transportation investment in the 16-county North State Super Region. Transportation has the potential to enable economic activity in the North State through connecting people, goods, services, and resources. By proving the opportunity to link transportation improvements with regional economic development initiatives and demonstrating quantifiable performance indicators, this study makes the case for ongoing, strategic investment in transportation infrastructure in the North State.

This website presents NCRC, which has as its mission to help people. The NCRC provides Training and Education, Watershed Restoration, Bio-Assesssments, Riparian Restoration, Project Management, Forest Health & Fuels, Grant Writing Services, Business Resources, and Collaborative Development. This web site has information about several fire safety issues.

In 1994, the comprehensive Northwest Forest Plan ('the Plan') was initiated to end the impasse over management of federal forest land in the Pacific Northwest within the range of the northern spotted owl. The Plan Record of Decision and Standards and Guidelines used an innovative approach based on ecosystem and watershed management. The Plan transcended traditional administrative boundaries while addressing resource management, economic and social issues. Implementation of the Plan has required cooperation, coordination, and collaboration among the participating federal agencies and with the states, tribes, and local governments.
This web page provides links to an overview of the plan and related policy documents, maps and datasets. The monitoring section contains the latest reports and data about the plan.

This is a collection of state-level drought resources from a variety of sources for Alaska, Idaho, Oregon, and Washington. This is a living document that will be updated as new information becomes available. Oregon information may be relevant to northern CA, particularly Klamath WMA

CDFW's Office of Spill Prevention and Response (OSPR) is the state's lead for response to oil spills in its inland and marine waters. OSPR aims for best achievable protection of California's natural resources.

This publication is a compilation of bills pertaining to local and regional governance that the Governor signed in 2018. This publication is intended to be comprehensive, but it is not exhaustive of all bills that may be relevant to local and regional government.

The purpose of this toolkit is to put us on the path toward achieving our vision of a society built on regeneration and cooperation. Through the context of building equity and resilience into climate adaptation planning, we introduce strategies to transform our communities and, by extension, society. Our ultimate goal is to create lasting and systemic change. At the same time, we recognize the urgency of the issues our communities face and the need to take action now. That is why we pursue change at every scale—from policy changes to community-based projects—to institute the transformative change we need to uphold our vision of the beloved community

Outbreaks associated with fresh or marine (i.e., untreated) recreational water can be caused by pathogens or chemicals, including toxins. Voluntary reporting of these outbreaks to CDC's National Outbreak Reporting System (NORS) began in 2009. NORS data for 2009–2017 are finalized, and data for 2018–2019 are provisional. During 2009–2019 (as of May 13, 2020), public health officials from 31 states voluntarily reported 119 untreated recreational water–associated outbreaks, resulting at least 5,240 cases; 103 of the outbreaks (87%) started during June–August. Among the 119 outbreaks, 88 (74%) had confirmed etiologies. The leading etiologies were enteric pathogens: norovirus (19 [22%] outbreaks; 1,858 cases); Shiga toxin–producing Escherichia coli (STEC) (19 [22%]; 240), Cryptosporidium (17 [19%]; 237), and Shigella (14 [16%]; 713). This report highlights three examples of outbreaks that occurred during 2018–2019, were caused by leading etiologies (Shigella, norovirus, or STEC), and demonstrate the wide geographic distribution of such outbreaks across the United States. Detection and investigation of untreated recreational water–associated outbreaks are challenging, and the sources of these outbreaks often are not identified. Tools for controlling and preventing transmission of enteric pathogens through untreated recreational water include epidemiologic investigations, regular monitoring of water quality (i.e., testing for fecal indicator bacteria), microbial source tracking, and health policy and communications (e.g., observing beach closure signs and not swimming while ill with diarrhea).

The Pacific Coast Joint Venture facilitates and coordinates public and private partners in accomplishing activities that support the goals for the North American Waterfowl Management Plan along the Pacific Flyway, and includes member organizations from Alaska, Canada, Washington, Oregon, Hawaii and Northern California. The Northern California Component of the Strategic Plan provides recommended conservation actions for important bird habitat in Mendocino, Humboldt and Del Norte counties.

Forum for coordinating state, federal, and tribal aquatic habitat and salmonid monitoring programs. Includes watershed and project effectiveness monitoring techniques and related documents. Also lists current and completed projects, which may focus on examining an issue, the development of tools to aid in monitoring, or aiding the developing of mutual business practices for better monitoring.

The Passage Assessment Database (PAD) is an ongoing map-based inventory of known and potential barriers to anadromous fish in California. PAD compiles data from more than one hundred agencies, organizations and landowners throughout California, and allows past and future barrier assessments to be standardized and stored at one place.
The Passage Assessment Database (PAD) Map Viewer gives the user the ability to view maps that reflect statewide aggregated PAD data, and allows to analyze the passage barriers in relation to each other, in the context of a watershed.
The Passage Assessment Database (PAD) Query Tool gives the user the ability to define an "ad-hoc" query of a set of PAD Projects. The query results include the chosen columns and types of PAD data filtered by the user's selection criteria. Query results may be downloaded as an excel spreadsheet.

Over the course of several months in late 2019 and early 2020, our organizations set out to better understand the drinking water challenges facing different regions across the US and the ways in which stakeholders were driving solutions. At four regional roundtables, we convened community organizers, nonprofit leaders, public officials, utility managers, and funders who are leading the way to drive state and tribal policy change that promotes safe, affordable, and reliable drinking water. These roundtables aimed to foster a shared understanding of the broad drinking water threats facing American communities and to amplify innovative state policy solutions being advanced across the country. Through this work, we sought to lift up successes and recognize the continued struggle of some communities that remain without equal access to drinking water. One of the critical takeaways from these round-tables is that when resourced effectively, community-driven solutions advanced by diverse coalitions have the power to drive significant policy change. We hope this report will spark national dialogue within the water sector, among the philanthropic community, and with policymakers on accelerating the promising approaches to drinking water policy innovation that is taking root in communities across the country.

This report offers recommendations for expanding existing and launching new programs that help build human resilience so that within a few short years every adult and child residing in California, Oregon, Washington, Idaho, Montana, and Alaska has the opportunity to learn preventative transformational resilience information and skills. It is the outcome of an exploratory research project completed by the International Transformational Resilience Coalition (ITRC) in the summer of 2018 that inventoried and analyzed the human resilience building initiatives already underway in the west coast, how they could be expanded, and how new ones could be launched. Transformational resilience is a framework for building human resilience, not a specific model. The two key elements include helping people learn age, culturally, and demographically appropriat : a) Presencing--also called self-regulation--skills that enable them to calm their mind, body, and emotions when distressed; and b) Purposing--also called adversity - based growth--skills that enable them to use climate, and other adversities, as transformational catalysts to learn, grow, and find new positive sources of meaning, direction, and hope in their lives.

Research Brief/Management Consideration. One topic that is generating a great deal of interest among fire management professionals as California enters the fall prescribed fire season is whether we should be burning during this fourth year of drought. This brief discusses what managers should consider before doing a prescribed burn.

In this policy brief we outline issues that are front and center for managing California's water supply and natural environment. We also suggest priorities for actions that would improve California's water systems and better support the state's residents, businesses, and ecosystems.

This brief highlights top priorities for improving water management and preparing California's water systems and natural environment for a changing climate. Key elements include:•Modernizing the water grid: Addressing infrastructure weaknesses and gaps—coupled with more flexible management—is essential for reducing the costs offuture droughts and floods.•Preparing for changing supply and demand: Developing a portfolio of cost-effectivesupply and demand tools can help California weather droughts, accommodatepopulation growth, and bring groundwater basins into balance.•Providing safe drinking water: More stable funding has been secured to improvequality and reliability in small, mainly rural poor communities, but more work isneeded to tackle this challenge. •Reducing fire risk in headwater forests: The state's mountain forests—a majorsource of water—are in poor health. Active management can reduce the risk ofextreme wildfires and maintain the benefits that forests provide.•Improving the health of freshwater ecosystems: A new approach to managing waterfor freshwater ecosystems and species can help them adapt to a warming climate.

This reportoutlines the PACT strategyand lists a wide range of proposals to promote the recovery of Coho Salmon populations in CCC ESU coastal watersheds. These proposals weremade as part of the PACT initiative by six technical working groups(TWGs), comprising agency staff and representatives from other stakeholder groups. The implementation of the recommendations included in this reportwillinvolve the coordination of State, Federal, and local agency representatives and diverse private sector stakeholders involved in Coho Salmon recovery. The PACT strategy builds onboth State and Federal Coho Salmon recovery plans and provides a combined focused approach to implementing priority recovery actions common to both plans.

To provide insight into the design and use of metrics as guides to decision-making, this report draws upon the experiences of four special act districts that had authority to manage groundwater prior to SGMA. These include two primarily urban water agencies, Santa Clara Valley Water District (SCVWD) and Zone 7 Water Agency (Zone 7) and two agencies with significant pumping for agricultural use, Fox Canyon Groundwater Management Agency (FCGMA) and Pajaro Valley Water Management Agency (PVWMA). This report analyzes how these agencies used quantitative metrics in their groundwater management plans prior to SGMA and identifies institutional factors that constrained or enabled the adjustment of management actions in response to changing conditions during the 2012-2016 drought. Although the metrics employed by these agencies differ from those required under GSP regulations, these agencies' experiences still offer important insights for GSAs seeking to develop metrics and integrate them into decision-making.

This Guide starts by describing, in Part One, the multiple benefits of energy efficiency and renewable energy and explaining the value of quantifying these benefits so that they are considered along with costs. In Part Two, the Guide shows policy makers and analysts how they can quantify the direct electricity, electricity system, emissions, health, and economic benefits of energy efficiency and renewable energy. It provides detailed information about a range of basic-to-sophisticated methods analysts can use to quantify each of these benefits, with key considerations and helpful tips for choosing and using the methods. Part Two includes case studies and examples of how analysts have quantified the benefits of state or local energy efficiency and renewable energy policies, programs, and investments. The chapters in Part Two also describe tools and resources available for quantifying each type of benefit.

This web page contains information related to Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin.

This publication discusses issues that forest landowners should consider following a wildfire in their forest, including how to assess fire impacts, protect valuable property from damage due to erosion, where to go for help and financial assistance, how to salvage dead trees or replant on your land, and how to claim a casualty loss on your tax return.

The primary objective of the Recovery Strategy is to return Coho Salmon to a level of sustained viability while protecting the genetic integrity of both the SONCC and CCC ESUs with the goals of delisting, thus making regulations or other protections under the CESA and ESA no longer necessary. A second objective of this Recovery Strategy is to achieve harvestable populations of Coho Salmon for tribal, recreational, and commercial fisheries (CDFG 2004).

RePlan integrates natural resources and planning datasets with analytical and reporting tools on a web-based technology platform to help inform and advance regional planning objectives. This tool synthesizes up-to-date biological and ecological information to identify areas best suited to implement defined conservation and development goals. The regional scale approach provides the appropriate analytical context to inform conservation and development planning and siting activities. This application was primarily developed to support conservation and development planning activities of state agencies, although it is available for broader use.
The IRCAD program is advanced through a partnership between SGC and the California Biodiversity Council (CBC). The IRCAD approach and methodology are developed through an interagency team consisting of the California Energy Commission, California Department of Fish and Wildlife, California Wildlife Conservation Board, California Department of Water Resources, Caltrans, California Department of Conservation, California Strategic Growth Council, US Fish and Wildlife Service, UC Davis and The Nature Conservancy. Support for the development of this application has come from the California High Speed Rail Authority and the Wildlife Conservation Board. The RePlan platform was developed by the Conservation Biology Institute.

A recent review by North et al. (2019) examines reforestation in western US forests and concludes that a new approach to planting may be warranted. In light of climatic trends, historic fire suppression, increasing incidence of largewildfires, and shrinking budgets, the authors propose a planting strategy that prioritizes accessibility, while reducing efforts within the dispersal range of seed trees and in areas with a high cost to probability-of-success ratio.
Management Implications:
•Reforestation efforts that emphasize planting arrays with a combination of scattered individuals, clusters, and open spaces may increase stand resilience to drought and fire.
•A 3-zone strategy for replanting burn areas may reduce costs and foster spatial heterogeneity by prioritizing core areas that are outside the dispersal range of seed trees but are still accessible and have favorable site conditions.

Management Implications:
•Many of California's research natural areas exhibit high to moderate departure from their natural fire regime.
•Without restoration or maintenance of the natural fire regime, the ecological integrity of some natural areas could be lost.
•Scientific research and monitoring play a crucial role in informing and developing effective natural area management strategies.
•Wildfire management in natural areas requires site-specific planning, so that wildfires can occur at an ecologically appropriate frequency, scale, and intensity.
•In some places, proactive restoration (e.g., prescribed fire or thinning of small trees) may be needed to increase resilience to future wildfire.

Locating forest treatments in the right places can make them as or more effective than treating everywhere, shows new research out by Krofcheck et al. 2018. The authors found that restoring less acres strategically can have the same impacts as treating more area indiscriminately in terms of reducing high severity wildfire risk and carbon instability.

A warming atmosphere is giving extra energy to storms, making the hurricanes, tornadoes, and thunderstorms of today more intense than those of the past. This trend is projected to accelerate in the years to come. These stronger storms are more likely to cause power outages, and the loss of power can be costly in terms of lives lost, economic impact, and public health. This fact sheet outlines strategies that local governments could implement to reduce the frequency and duration of power outages and help communities better withstand them when they do occur. For each resilience strategy, the paper discusses costs and co-benefits, both of which are important considerations for implementing strategies. A case study of New Orleans looks at the different strategies put in place since Hurricane Katrina caused widespread destruction in 2005 and the performance of those strategies to the hurricanes that have made landfall since. The paper also includes a list of tools for quantifying the co-benefits of the resilience strategies discussed.

Interactive Mapping Website. The Restoration Atlas is an interactive way to explore NOAA habitat restoration projects around the country - from wetlands and salt marsh projects to oyster and coral reef projects. Use the map filters and query tool to search approximatley 3,000 projects by habitat type, location, congressional district, and more.

North American tribes have traditional knowledge about fire effects on ecosystems, habitats, and resources. Formillennia, tribes have used fire to promote valued resources. Sharing our collective understanding of fire, derivedfrom traditional and western knowledge systems, can benefit landscapes and people. We organized two workshops to investigate how traditional and western knowledge can be used to enhance wildland fire and fuel smanagement and research. We engaged tribal members, managers, and researchers to formulate solutions regarding the main topics identified as important to tribal and other land managers: cross-jurisdictional work,fuels reduction strategies, and wildland fire management and research involving traditional knowledge. A key conclusion from the workshops is that successful management of wildland fire and fuels requires collaborative partnerships that share traditional and western fire knowledge through culturally sensitive consultation, coordination, and communication for building trust. We present a framework for developing these partnerships based on workshop discussions.

This report provides key findings from recent research about sea level rise. They include: direction of sea level change is clear; rate of ice loss from greenland and antactic ice sheets is increasing, there is new evidence for extreme sea-level rise, and that the probabilities of specific sea-level increases can inform decisions.

Although groundwater sustainability agencies and fishery stakeholders recognize that the groundwater-surface water connection needs to be addressed in SGMA Groundwater Plans, at present there is limited guidance on how to do this. That is, what are the specific types of information, modeling, monitoring, and pumping provisions that should be included in SGMA Groundwater Plans to ensure that groundwater extraction does not cause significant adverse impacts on fisheries? The purpose of this guidebook is to provide such guidance.

The Safeguarding California Plan: 2018 Update – California's Climate Adaptation Strategy builds on nearly a decade of adaptation strategies to communicate current and needed actions state government should take to build climate change resiliency. It identifies hundreds of ongoing actions and next steps state agencies are taking to safeguard Californians from climate impacts within a framework of 81 policy principles and recommendations. With over 300 revisions made to reflect hundreds of comments received during the public comment period, the 2018 update also has two new chapters and incorporates a feature showcasing the many linkages among policy areas. A new "Climate Justice" chapter highlights how equity is woven throughout the entire plan.

The SDS has been integrated with other SFC data systems within the Sanitation Tracking and Reporting System (STARS), a comprehensive tool for the identification, prioritization, tracking, and reporting of sanitation facility needs nationwide. The use of SDS and STARS provides an efficient platform for the SFC Programto carry out its mission to provide technical assistance and sanitation facilities services to American Indian Tribes and Alaska Native Villages for the cooperative development and continued operation of safe water, sewer, and solid waste systems. The previous version of this guidance document was published in May 2003. Since then, the statutory requirements for entering data into SDS have not changed, and the eligibility requirements for receiving service fromIHS have also not changed. However, the SFC Program has identified a need to clarify the guidance to ensure consistency with these requirements, and the appearance and data entry methodology of the SDS continue to be enhanced. As the SDS and STARS data systems continue toevolve and improve, this document will periodically be revised to ensure consistent implementation of SDS and IHS policies.

The Sea Level Rise Policy Guidance document was unanimously adopted for use by the Coastal Commission on Wednesday, August 12, 2015. It provides an overview of the best available science on sea level rise for California and recommended methodology for addressing sea level rise in Coastal Commission planning and regulatory actions. It is intended to serve as a multi-purpose resource for a variety of audiences and includes a high level of detail on many subjects. Since the document is not specific to a particular geographic location or development intensity, readers should view the content as a menu of options to use only if relevant, rather than a checklist of required actions. Draft update under review in 2018

The objective of this study was to investigate the influence of thinning treatments on fuel moisture and determine whether or not moisture patterns differ by treatment in mixed conifer stands in northern California.

The California Coastal Sediment Management Master Plan ("Sediment Master Plan" or "SMP") is an ongoing, collaborative effort by CSMW to evaluate California's coastal sediment management needs and promote regional, system-wide solutions. This integrated approach to sediment management enables agencies to work together to leverage financial and intellectual resources. By developing computer-based tools, informational documents, RSM strategies and outreach, the Sediment Master Plan will provide coastal managers with information needed to address coastal erosion and excess sediment problems through beneficial reuse of sediment. The web page provides an overview of the plan and links to related reports, computer based tools, and public outreach.

The Sediment TMDL Implementation Policy states that Regional Water Board staff shall control sediment pollution by using existing permitting and enforcement tools. The goals of the Policy are to control sediment waste discharges to impaired water bodies so that the TMDLs are met, sediment water quality objectives are attained, and beneficial uses are no longer adversely affected by sediment.

In 2013, the Douglas Complex burned over 19,000 ha of Oregon & Cali-fornia Railroad (O&C) lands in Southwestern Oregon, USA. O&C lands are composed of acheckerboard of private industrial and federal forestland (Bureau of Land Management, BLM) withcontrasting management objectives, providing a unique experimental landscape to understand howdifferent management practices influence wildfire severity. Leveraging Landsat based estimates of fireseverity (Relative differenced Normalized Burn Ratio, RdNBR) and geospatial data on fire progres-sion, weather, topography, pre-fire forest conditions, and land ownership, we asked (1) what is the rela-tive importance of different variables driving fire severity, and (2) is intensive plantation forestryassociated with higher fire severity? Using Random Forest ensemble machine learning, we found dailyfire weather was the most important predictor of fire severity, followed by stand age and ownership,followed by topographic features. Estimates of pre-fire forest biomass were not an important predictorof fire severity. Adjusting for all other predictor variables in a general least squares model incorporat-ing spatial autocorrelation, mean predicted RdNBR was higher on private industrial forests (RdNBR521.85 18.67 [mean SE]) vs. BLM forests (398.87 18.23) with a much greater proportion ofolder forests. Our findings suggest intensive plantation forestry characterized by young forests andspatially homogenized fuels, rather than pre-fire biomass, were significant drivers of wildfire severity.This has implications for perceptions of wildfire risk, shared fire management responsibilities, anddeveloping fire resilience for multiple objectives in multi-owner landscapes.

Chapter 7 of the Sustainable Groundwater Management Act (SGMA), in Water Code Section 10729(d), states that, “By January 1, 2017, the department shall publish on its internet Web site best management practices for the sustainable management of groundwater.” Prior to the completion of a best management practices (BMPs) document, the Department of Water Resources (DWR) was required to adopt regulations for evaluating groundwater sustainability plans (GSPs), the implementation of GSPs, and coordination agreements by June 1, 2016 (GSP Regulations), and Alternatives.

SimCLIM is a software tool designed to facilitate the assessment of risks from climate change for sustainability officers, consultants, policy makers, academics, non-governmental and governmental organizations and students. SimCLIM uses the latest CMIP5 climate data. Maps, graphs and charts of various aspects of climate change can be generated spatially and for sites, for cities, provinces/states, nations, and the world. The flexibility of SimCLIM is limitless. Now the power to model past and future climate can be in your hands!

This article develops a framework to guide holistic social justice evaluation of CCD initiatives across levels and scales. Underpinning this framework is a social justice approach that embraces particularism, pluralism and procedural justice. Drawing on existing research, the framework is used to explore the implications of the Clean Development Mechanism for recognition, participation and distribution in the Least Developed Countries. Findings show that achieving social justice through CCD is not a given; rather, the social justice implications of CCD differ within and between levels and scales. We conclude by suggesting ways in which our framework can be applied to augment knowledge on CCD. Understanding the processes through which social justices and injustices are created is integral to considerations of whether and how CCD should be used to underpin a new development landscape.

Spatial statistical models for streams provide a new set of analytical tools that can be used to improve predictions of physical, chemical, and biological characteristics on stream networks. These models are unique because they account for patterns of spatial autocorrelation among locations based on both Euclidean and in-stream distances. They also have practical applications for the design of monitoring strategies and the derivation of information from databases with non-random sample locations. Generating the spatial data needed to fit these statistical models requires practical skills in multiple disciplines including ecology, geospatial science, and statistics. This is the home page for two sets of tools that have been developed to make the methodology more accessible to users: the STARS ArcGIS toolset and the SSN package for R statistical software. These models were developed by researchers at NOAA and CSIRO.

This is the second State of the Salmonids report, the first of which was published in 2008. This second edition is timely. During the writing of the first edition of the State of the Salmonids report in 2008, the commercial salmon fishery was closed due to low adult returns. Each year since then, the fishery has been restricted or constrained in some way. At the writing of the 2017 report, the commercial salmon fishery is again closed for the season. The northern part of the state is emerging from historic drought (2012-2016), which saw significant negative impacts on salmonid populations and juvenile survival. Further, new information, especially in the form of federal and state agency reports, and genetic and life history research that was not available before have been published, helping to paint a clearer picture of the true plight of California's salmonid populations. While California's climate, precipitation patterns, and trends in salmonids has changed, monitoring efforts, especially for species not listed under the Endangered Species Act, remain insufficient.

SWAMP is a statewide monitoring effort designed to assess the conditions of surface waters throughout the state of California. The program is administered by the State Water Resources Control Board (SWRCB). Responsibility for implementation of monitoring activities resides with the nine Regional Water Quality Control Boards (RWQCB's) that have jurisdiction over their specific geographical areas of the state. Monitoring is conducted in SWAMP through the Department of Fish and Game and US Geological Survey master contracts and local RWQCBs monitoring contracts.
This web page contains links to general and historical information about SWAMP, monitoring and assessment programs, data management, data access and maps, citizen monitoring and other relevant information.

The State Wildlife Action Plan examines the health of wildlife and prescribes actions to conserve wildlife and vital habitat before they become more rare and more costly to protect. The plan also promotes wildlife conservation while furthering responsible development and addressing the needs of a growing human population. This website contains links to companion plans developed in 2015 that include Transportation, agriculture, consumptive and recreational uses, energy, forest and rangelands, land use planning, marine, Tribal lands, and water management.

This report incorporates the CWC's §10608.42 (SB X7-7 of 2009) requirement for DWR to report progress towards achieving a 20% reduction in per capita urban water use by December 31, 2020. The statute requires DWR to include recommendations on changes to water use efficiency standards on urban water use targets needed to achieve the 20% reduction, and to reflect updated efficiency information and technology changes.

This report presents the development of stormwater targets required by water conservation legislation enacted in 2009 (Senate Bill X7-7, California Water Code [CWC] Section 10608.50 (b)). This report addresses the development of targets for "infiltration and direct use of urban stormwater runoff." For the purposes of this study, the term "infiltration" in the legislation was taken to mean "groundwater recharge." While the legislation requires the development of targets for urban stormwater runoff, targets are also presented for non-urban sources of stormwater because they also benefit urban areas and the survey data were available. A database and a web application were created to store and display data associated with the stormwater projects discovered by the survey.

STORMS' mission is to lead the evolution of storm water management in California by advancing the perspective that storm water is a valuable resource, supporting policies for collaborative watershed-level storm water management and pollution prevention, removing obstacles to funding, developing resources, and integrating regulatory and non-regulatory interests. This web page provides links to projcts, a Final Report: Enhancing Urban Runoff Capture and Use, and a Staff Report: Eliminate Barriers to Funding Stormwater Programs and Identify Funding for Stormwater Capture and Use

The Department of Pesticide Regulation's (DPR) Surface Water Protection Program protects human health and the environment by preventing pesticides from adversely affecting our surface waters, by addressing both agricultural and nonagricultural sources of pesticide residues in surface waters. It has preventive and response components that reduce the presence of pesticides in surface waters.
This web page contains links to publications, management agency agreements regulatory issues, surface water models, and asurface water database.

This interactive mapping web site allows users to query coastal locations in the US to view summary information for that location. The interactive platform provides spatial information, predictions for the queried location, and three PDF downloads that summarize key information from the tool: a local fact sheet, a local report, and a state report.

The Institute for Local Government is committed to helping local government leaders navigate the complexity of their important roles. In response to the unprecedented impacts local governments are facing due to the COVID-19 crisis, ILG developed a curated list of practical actions local governments can pursue immediately to continue their commitment to sustainability and build resilience to future disasters and public health crises. These best practices illustrate ways in which local governments can address and balance economic development, climate action and equity with the health and safety concerns of their communities.
We will continue to update this page as new practices emerge.

Through planning and permanent protection of farm and ranch lands via agricultural easements, the SALC program will prevent increases in GHG emissions by limiting opportunities for expansive, vehicle dependent forms of development in favor of more focused, compact, and transit oriented development within discrete growth boundaries.

There is a need to critically examine diverse climate change risks for indigenous peoples in the United States and the many structural barriers that limit their ability to adapt to climate change. This paper uses a sustainable climate adaptation framework to outline the context and the relationships of power and authority, along with different ways of knowing and meaning, to illustrate the underpinnings of some tribes' barriers to sustainable climate adaptation. The background of those structural barriers for tribes is traced, and then the case of water rights and management at the Wind River Reservation in Wyoming is used to illustrate the interplay of policy, culture, climate, justice, and limits to adaptation. Included is a discussion about how the rulings of the Big Horn general stream adjudication have hindered tribal climate change adaptation by limiting the quantity of tribal reserved water rights, tying those rights to the sole purposes of agriculture, which undermines social and cultural connections to the land and water, and failing to recognizing tribal rights to groundwater. Future climate projections suggest increasing temperatures, and changes in the amount and timing of snowpack, along with receding glaciers, all of which impact water availability downstream. Therefore, building capacity to take control of land and water resources and preparing for climate change and drought at Wind River Reservation is of critical importance.

This report describes the background, process, and results of the Sustainable Groundwater Management Act (SGMA) 2019 Basin Prioritization. The California Department of Water Resources (DWR) is required to update California's groundwater basin prioritization in accordance with the requirements of SGMA and related laws.

In January 2018, the Marine Protected Areas Federal Advisory Committee (MPA FAC) was chargedby the United States Department of Commerce (DOC) and Department of the Interior (DOI) with identifying benefits of U.S. marine protected areas (MPAs) to marine ecosystems, economies and communities.

This web page provides a broad context for water-related actions to prepare for and respond to climate change. It provides links to water board actions, responses to impacts, emission reductions, and other relevant links.

Storm water is defined by US EPA as the runoff generated when precipitation from rain and snowmelt events flows over land or impervious surfaces without percolating into the ground. Storm water is often considered a nuisance because it mobilizes pollutants such as motor oil and trash. In most cases, storm water flows directly to water bodies through sewer systems, contributing a major source of pollution to rivers, lakes, and the ocean. Storm water discharges in California are regulated through National Pollutant Discharge Elimination System (NPDES) permits. However, storm water may also act as a resource and recharge to groundwater when properly managed. The Water Boards are actively involved in initiatives to improve the management of storm water as a resource.
This web page provides links to storm water permitting, storm water planning, storm water funding, and storm water initiatives.

Our changing climate requires Californians to move beyond temporary emergency drought measures and adopt permanent changes to use water more wisely and prepare for more frequent and persistent periods of limited water supply. Conservation and efficiency also reduce the energy needed to pump, transport, treat and deliver water. Your small changes make a big impact. Only by working together can we improve and sustain the state's water future for generations to come. This web page provides links to water conservation measures, policies and laws, assistance and resources, and results of implementation efforts. New information is provided monthly and meetings and listening session information is also provided.

The purpose of this technical advisory is to provide guidance to lead agencies regarding recent changes to CEQA requiring consultation with California Native American tribes and consideration of tribal cultural resources. It summarizes the reasons for the legislative changes and explains the substantive and procedural requirements that went into effect on July 1, 2015. Finally, it summarizes relevant case law and provides a list of additional resources related to tribal cultural resources and CEQA.

This dissertation from the U of Georgia examines conservation easements in the context of working forests. Over the past four decades, conservation easements have become an increasingly popular method of land conservation. Their rise in popularity is largely due to generous tax benefits and the ability of landownersto maintain ownership of theirproperty. Working forest conservation easements are a particularlyeffective method to reduce property tax pressure on forestland owners and allowed continued forest managementon site. The first portion of the dissertation reviews the literature on theeffects of conservation easements on surrounding property value. Results from this study show key factors such as development potential, proximity, and forest type characteristics all impact the effect of easements on surrounding property value. The second part investigates the effects of working forest conservation easements and their characteristics on surrounding property value in Georgia. Results showed the property type examined and land use characteristics of nearby easements significantly impact property value. The third part examines the contents of working forest conservation easements in Georgia. Results demonstrate working forest conservation easements generally have forest management plans in place, allow forest management with mild restrictions, and protect areas of important ecological function.

This guidebook provides a practical synthesis of the best available science for using beaver to improve ecosystem functions. If you are a restoration practitioner, land manager, landowner, restoration funder, project developer, regulator, or other interested cooperator, this guidebook is for you.

The California Heat Assessment Tool (CHAT) is based on new research that establishes local, health-based thresholds for extreme heat that help public officials, health professionals and residents understand what changing conditions mean for them. CHAT is part of California's Fourth Climate Change Assessment.

Washington State receives timber contributions from 34 out of its 39 counties, making it a top producer of timber in the United States. Because of the widespread and abundant number of harvests, many foreststhatsociety values are affected via diminished aesthetic appeal. Of theseaffected areas areWashington State Parks and the areas around them. This study seeks to estimate the economic impact that forest harvest practices haveon the visitation of Washington State Parks. Through the use of GIS and fixed effect regression analysis, I estimate the impact that over 100,000 permitted forest cuts haveon the visitation of 142 Washington State Parks andfind statisticallysignificant negative impacts of both even and uneven timber cutting methods. This study willbenefit forest and park managers by evaluatingforest harvest techniques with respect to recreation andhopes to inform the policy makers workingtoensure the sustainability and prosperity of our Washington State Park System.

To better understand the relationship between coastal tourism economies and marine debris, the NOAA Marine Debris Program funded a study to look at how the amount of marine debris on beaches can affect the behaviors of beachgoers and as a result, the economies of coastal communities that depend on tourism. Most notably this study reveals that doubling the amount of marine debris on beaches within these coastal areas would decrease the number of days visitors spend on those beaches. This decline in beach visitor days would result in fewer tourism dollars spent, and translate into a decrease in local jobs. This study evaluated two types of economic impacts that result from the effects of doubling and the near elimination of marine debris on beach recreation: the loss or gain of recreational value to beach visitors, and the economic impact from reduced or increased spending on beach visits in four selected coastal areas across the contiguous United States. The study areas were the Gulf of Mexico beaches in Alabama, Atlantic Ocean beaches in Delaware and Maryland, Lake Erie beaches in Ohio, and Pacific Ocean beaches in Orange County, California.

The goal of this study was to better understand the economic effects of changes in the amount of debris on beaches. The results may help federal, state, and local agencies structure future debris abatement and mitigation projects to maximize social benefits provided by coastal resources. To address these goals, we collected data from four coastal areas in the United States: Gulf Coast beaches in Alabama, Atlantic Ocean beaches in Delaware and Maryland, Lake Erie beaches in Ohio, and Pacific Ocean beaches in Orange County, California.

Provides a variety of products including the Forest and Range Assessment, a detailed report on California's forests and rangelands. FRAP provides extensive technical and public information for statewide fire threat, fire hazard, watersheds, socio-economic conditions, environmental indicators, and forest-related climate change.

Fire is one of the most important natural disturbance processes in the western United Statesand ecosystems differ markedly with respect to their ecological and evolutionary relationships with fire.Reference fire regimes in forested ecosystems can be categorized along a gradient ranging from‘‘fuel-limited’’to‘‘climate-limited’’where the former types are often characterized by frequent, lower-severitywildfires and the latter by infrequent, more severe wildfires. Using spatial data on fire severity from 1984–2011 and metrics related to fire frequency, we tested how divergence from historic (pre-Euroamericansettlement) fire frequencies due to a century of fire suppression influences rates of high-severity fire in fiveforest types in California. With some variation among bioregions, our results suggest that fires in foresttypes characterized by fuel-limited fire regimes (e.g., yellow pine and mixed conifer forest) tend to burnwith greater proportions of high-severity fire as either time since last fire or the mean modern fire returninterval (FRI) increases. Two intermediate fire regime types (mixed evergreen and bigcone Douglas-fir)showed a similar relationship between fire frequency and fire severity. However, red fir and redwoodforests, which are characterized by more climate-limited fire regimes, did not show significant positiverelationships between FRI and fire severity. This analysis provides strong evidence that for fuel-limited fireregimes, lack of fire leads to increasing rates of high-severity burning. Our study also substantiates thegeneral validity of‘‘fuel-limited’’vs.‘‘climate-limited’’explanations of differing patterns of fire effects andresponse in forest types of the western US.

In October 2010, CA Natural Resources hosted a policy summit titled: "The Future of Natural Resource Management." The purpose of the summit was to facilitate discussion and debate within the natural resource management and environmental community regarding policy, legislation and finance strategies that would lead to better integration of resource management activities. Local, state and federal government agencies, conservation organizations, industry representatives and other interested stakeholders attended the summit. This document is a report on the outcome of the event and presents a series of near-term and long-term policy recommendations for consideration. These recommendations aim to improve natural resource management in California.

While ecosystems have concrete benefits for human society, these benefits are typically overlooked in decision-making. This is problematic because ecosystems – and thus the benefits that ecosystems provide – are under increasing pressure from human actions. The ecosystem services concept aims to better reflect the benefits of ecosystems for human wellbeing. As a tool to quantify ecosystem services, their value is often estimated in monetary terms. This thesis investigates whether this approach is valid in ecological terms: do monetary value estimates adequately reflect the ecological status of the ecosystem? Two sets of water-related services in two different types of regions have been investigated: water quantity-related services in global drylands (chapters 2 and 3) and water quality-related services in the Scheldt river basin (chapters 4 and 5). The results show that the selected methodological approach has a dominant impact on value estimates for water-related services, while the ecological status of the ecosystem is of minor importance. This finding casts doubts upon the validity of monetary valuation as a means to take the ecological status of ecosystems into account in public decision-making. Future research should explore how the ecosystem's ecological status can be better integrated in the valuation of ecosystem services.

The Natural Resource Projects Inventory (NRPI) began as a collaborative effort between UC Davis Information Center for the Environment (ICE) and the California Biodiversity Council (CBC) in 1997. In response to a growing need for more project related data on California's natural resources, existing inventories* were synthesized into one database and thousands of new projects have been added through individual online entries and electronic database transfers. Today, NRPI is the most comprehensive statewide database of its kind in California with over 8,000 natural resource projects searchable on the Internet. These projects include watershed conservation and acquisition, restoration and noxious weed eradication, assessment, planning, and scientific studies. Projects are linked to the CERES California Environmental Information Clearinghouse (CEIC), GeoFinder, the California Digital Atlas, the California Watershed Portal, and Google Maps.

This policy brief proposes an action plan for how the state can rapidly invest more resources into infrastructure so there is immediate economic impact. By integrating these investments with workforce training, the state can ensure a steady pipeline of skilled workers while creating good, well-paid jobs to help bridge the gap for those who have not shared in California's prosperity.

This report evaluates the extent to which farms facing higher levels of drought risk are more likely to participate in conservation programs, and finds a strong link between drought risk and program participation. Prior research has shown that climate-related risk exposure influences production decisions such as crop choice; our research shows that adaptation also includes program participation decisions. Programs like the Conservation Reserve Program and Environmental Quality Incentives Program play a role in drought preparedness and climate adaptation even if they do not directly target such behavior. Conservation program outcomes are influenced by regional differences in production risk, so participation choices due to drought risk can be an important consideration in designing such programs.

This website presents the problems salmon are facing and their population trends in the state's major rivers and streams, as well as the transformative solutions that could bring these species back from the edge. It provides statewide status information, restoration solutions and rivers that support salmonids (55) along with the status of samonid populations therein.

This study used tree data from field plots in urban areas to describe forest structure in urban areas throughout California. The annual value of ecosystem services was estimated at $8.3 billion and the urban forests asset value was $181 billion. Assuming an average annual per tree management cost of $19 and benefit of $47.83, $2.52 in benefit was returned for every dollar spent. Strategies to reduce the risk of catastrophic loss by increasing the resilience of California's urban forests are discussed.

Globally, environmental disasters impact billions of people and cost trillions of dollars in damage, and their impacts are often felt most acutely by minority and poor communities. Wildfires in the U.S. have similarly outsized impacts on vulnerable communities, though the ethnic and geographic distribution of those communities may be different than for other hazards. Here, we develop a social-ecological approach for characterizing fire vulnerability and apply it to >70,000 census tracts across the United States. Our approach incorporates both the wildfire potential of a landscape and socioeconomic attributes of overlying communities. We find that over 29 million Americans live with significant potential for extreme wildfires, a majority of whom are white and socioeconomically secure. Within this segment, however, are 12 million socially vulnerable Americans for whom a wildfire event could be devastating. Additionally, wildfire vulnerability is spread unequally across race and ethnicity, with census tracts that were majority Black, Hispanic or Native American experiencing ca. 50% greater vulnerability to wildfire compared to other census tracts. Embracing a social-ecological perspective of fire-prone landscapes allows for the identification of areas that are poorly equipped to respond to wildfires.

The economic valuation of environmental resources is of great interest to society in general and to public managers in particular. It can promote more sustainable environmental policies, as it clearly shows the high economic value of natural resources. Thus, these valuation tools can provide useful evidence to support such policies by quantifying the economic value associated with the protection of such resources. However, there is an inherent difficulty in the implementation of methods to assess the economic valuation of environmental resources, mainly as a result of the absence of a market and hence a price that explains its social demand. However, both the travel cost method and the contingent valuation method used in this paper offer an approach to the economic values of the recreational services for wetlands. The aim is to analyze whether these values have been influenced by the economic crisis, so two time periods are compared separated for a decade. Results do not show an unequivocal influence between values in both periods, with different behaviors among natural areas, although with a certain tendency to increase in the decade being analyzed.

Website. This tool is intended to help local government officials screen tools and resources designed to measure the emissions, energy, and economic impacts of current and prospective initiatives at both the government operations and community-wide scales.

Trash Taxonomy is a database for tables that relate various litter and marine cleanup survey sheets. It includes five tables and a tool that can be used to compare how your survey sheet compares to others. This tool was developed by compiling data from over 50 commonly used survey sheets and using various relational tables to compare them.

A study published in Ecology Letters suggests that the effects of drought and fire work in combination, such that forests experiencing drought will see more dead trees in the aftermath of wildfires.

The Tribal Climate Adaptation Guidebook, published as a pdf in 2018 (attached below) and adapted to a website in 2022, supports Tribes in their efforts to prepare for climate change. The Guidebook provides a comprehensive framework for climate change adaptation planning that explicitly recognizes the distinct circumstances of Tribal governments, culture, and knowledge systems while highlighting exemplary efforts by Tribes to adapt to climate change.

The 2005 Supplement (also known as Tribal Consultation Guidelines) provides advisory guidance to cities and counties on the process for consulting with Native American Indian tribes during the adoption or amendment of local general plans or specific plans, in accordance with the statutory requirements of Senate Bill 18 (Chapter 905, Statutes of 2004). It reflects recent changes to the California Public Records Act which will facilitate this consultation process.

This TED-Net Strategic Plan has been informed by the IECD's work with northern California Tribes since fall 2008, including a Tribal Needs Assessment Survey (Exhibit 1) and individual consultations with representatives of ten northern California Tribes between September 2010 and February 2011. As a Tribally-driven Plan, it is intended to promote Tribal sovereignty and self-determination while facilitating inter-agency responsiveness to Tribal needs and forming a basis for accountability and improvement. Ultimately, it will support new Tribal training, technical assistance, and work force development initiatives, as well as inter-Tribal and inter-agency collaborations that afford opportunities to leverage resources for mutually beneficial impacts.

This web page provides links to Climate Change and Renewable Energy information relevant to Tribes and other communities.

The link between sea level rise and increased nuisance floods, with local water level exceedance thresholds defined by the National Weather Service based on historically observed minor impacts, is straightforward and well established (Sweet and Park 2014; Ezer and Atkinson 2014; Moftakhari et al. 2015). However, we are aware of no research to date that has isolated the effect of human-caused sea level rise on flooding. That is the objective of this analysis.

Since the late 1990s the U.S Geological Survey has been working to characterize the regional groundwater hydrology of the Klamath Basin above Iron Gate Dam (referred to here as the upper Klamath Basin) by collecting data to help understand the state of the groundwater system and its response to external stresses, and to develop computer models to provide insights useful for water management. These efforts build on earlier USGS studies in the basin going back to the 1950s. Most of these studies have been conducted in cooperation with the Oregon Water Resources Department, the Bureau of Reclamation, and most recently the Klamath Water and Power Agency. This USGS web page provides short discussions on the major elements of recent work, including overviews of Groundwater Hydrology, Groundwater Model Development, Groundwater Management Modeling, and Present Activities. This work has resulted in several scientific reports and papers that describe the regional groundwater hydrology, groundwater simulation and management model development, and the application of the groundwater management modeling to inform groundwater management in the area of the Klamath Reclamation Project. Links to these reports can be found in the Publications section on the web page.

We provide this overview of the current literature to describe what we do know; which, taken as a whole, offers a compelling case for maintaining and expanding nature-based outdoor environments in cities and bringing people closer to nature. We describe limitations of this research, and we maintain that there are many opportunities to use this scientific knowledge to help improve individual and community health. The pace of nature-health research is expanding dramatically, and increased funding is support-ing further study and new approaches to experimental design that will provide even more tangible evidence for the connection between the natural environment and human well-being.

Since 1985, the Urban Streams Restoration Program provided more than 270 grants in accordance with California Water Code Section 7048, ranging from $1,000 to $1 million to communities throughout California. This USRP table (PDF) lists all projects funded partially or completely by our program from 1986 to 2016.
The projects have included:
Stream cleanups
Bank stabilization projects
Revegetation efforts
Recontouring of channels to improve floodplain function
Occasional acquisition of strategic floodplain properties or easements. We continue to actively manage projects from the 2008 and 2014 grant cycles. Completed projects, project summaries, and links to upcoming grants and grant information are provided on this web page.

Web page. This page contains a statewide streamflow table. Current data typically are recorded at 15- to 60-minute intervals, stored onsite, and then transmitted to USGS offices every 1 to 4 hours, depending on the data relay technique used. Recording and transmission times may be more frequent during critical events. Data from current sites are relayed to USGS offices via satellite, telephone, and/or radio telemetry and are available for viewing within minutes of arrival. Users can build a current conditions summary table for one or more stations or show custom graphs or tables for a series of recent data for one or more stations.

The purpose of this site is to help you find scientific information organized on a watershed basis. This information, coupled with observations and measurements made by the watershed groups, provides a powerful foundation for characterizing, assessing, analyzing, and maintaining the status and health of a watershed. Discussions with watershed groups across the country resulted in this web site. This web site provides access to:
Locate Your Watershed - use the mapping interface to locate your watershed and link to additional information from your watershed.
Information Discovery - find projects, publications, and databases related to your watershed.
Data Integration - learn more about how you can use scientific data to understand your watershed.
This web site provides a decision-support process by making accessible recent case studies of projects that have occurred, publications that have been produced, developing databases, information assembled, and provides access to free and nearly free software and tools for manipulating spatial information.

Web site. The USGS Groundwater and Streamflow Information Program supports the collection and (or) delivery of both streamflow and water-level information for more than 8,500 sites and water-level information alone for more than 1,700 additional sites. The data are served online—most in near realtime—to meet many diverse needs.

The State Water Resources Control Board (State Water Board) has conducted a new survey of sewer rates and connection (capacity) fees. The report is presented in PDF and Excel formats. The PDF format includes a cover letter, a copy of the original survey form, a statistical summary of the sewer rates and connection fees, and data pre-sorted by agency, population, county, and treatment level. The Excel format includes the raw data submitted by the agencies. The statistical summary includes only information from agencies charging a flat rate. Variable rate information was not included in the summary because the rates may change from month-to-month. Variable rate information has been included in the raw data submitted by the agencies. A total of 963 questionnaires were distributed to various wastewater agencies, and 591 questionnaires were completed for the SFY 2016-17 survey. The data was collected from November 30, 2016 to March 11, 2017, but the fees represent charges for SFY 2016-17. The raw data is presented as reported by the agencies; care should be exercised in using this report because the data has not been independently verified by State Water Board staff.

The California Water Boards completed the process to update their Strategic Plan in September 2008. A series of forums were conducted to receive input from stakeholders and staff throughout the state. The input identified key areas of focus for the Water Boards to consider in their planning for the next five years. Following input received from four successive versions of the draft Strategic Plan Update: 2008-2012, the State Water Board adopted the plan at its September 2, 2008 meeting.

This interactive mapping web site provides groundwater level, water quality, and continuous data for monitoring stations throughout the state.

This document describes rangeland water development and how to enhance wildlife safety and access to these sites. It also provides guidelines for improving wildlife escape structures and increasing wildlife access.

The goal of the Water Quality Control Plan is to “provide a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses of water in the North Coast Region (NCRWQCB 1993).” The Plan describes water quality and quantity problems in the two natural drainage basins in the North Coast – the Klamath River Basin and the North Coastal Basin. The Plan describes present and potential beneficial uses of surface and ground waters.

The goal of this Water Quality Enforcement Policy (Policy) is to protect and enhance the quality of the waters of the State by defining an enforcement process that addresses water quality problems in the most fair, efficient, effective, and consistent manner. In adopting this Policy, the State Water Board intends to provide guidance that will enable Water Board staff to expend its limited resources in ways that openly address the greatest needs, deter harmful conduct, protect the public, and achieve maximum water quality benefits. Toward that end, it is the intent of the State Water Board that the Regional Water Boards’ decisions be consistent with this Policy.

In the coastal zone, certified Local Coastal Programs (LCPs) are a key mechanism for achieving a high standard for coastal water resource protection. LCPs provide an important planning and regulatory framework for enhancing coastal NPS pollution control, and minimizing changes in watershed hydrology that may adversely impact coastal resources. LCPs should be updated to include policies, standards, and ordinances that establish coastal water resource protection strategies and priorities for development, both during construction and over the life of a project.

This web page contains model LCP water quality policies and standards, examples of LCP Updates, and additional resources for local governments.

This Clean Water Act (CWA) section 401 Water Quality Certification action and Order(Order) is issued at the request of the California Department of Fish and Wildlife(hereinafter Permittee) for the Project. The order covers 2019 Fisheries Habitat Restoration Projects funded by CDFW for the purpose of ecological aquatic/stream/habitat restoration

This EPA web page contains links to proposed federal rules, and state standards in effect for Clean Water Act purposes. It also contains links to statewide plans, including:
Water Quality Control Plan for Enclosed Bays and Estuaries
Water Quality Control Plan for the Ocean Waters of California

The report is organized in the following manner:The Urban Flooding Bootcamp—Highlights nine cities that have experienced flooding and describes their participation in the Bootcamp.Key Urban Flooding Challenges—Summarizes the complexities and challenges surrounding urban flood management within the context of climate change.Flooding Inequities—Describes why the effects of urban flooding hit some communities harder and offers key considerations for developing solutions.Priority Actions for Equitable Resilience—Lays out five priority actions that cities, utilities, and communities can take together to address urban flooding.

This guide is designed to help North Coast residents take an active stewardship role in caring for their land and the common resources that are the wellspring of our communities. The guide outlines best management practices, or BMPs, for rural farming with an emphasis on cannabis cultivation. BMPs have a proven track record of protecting water, soil, land value, sensitive habitats and endangered species.

Habitat alteration and species exploitation are fundamental issues in conservation, yet their interacting effects on food webs are rarely considered. We used a foraging model based on the Wood River basin (Alaska, USA) to explore how watershed development and commercial fisheries affect energy flow from sockeye salmon to brown bears. We found that, where salmon are abundant, fisheries can harvest large fractions of runs without substantially reducing bear consumption of salmon, but that watershed development could strongly reduce bear consumption if it shortens the duration of foragingopportunities by reducing population-level variation in salmon spawn timing. Habitats with the lowest resource abundance (small streams) were particularly profitablefor bear foraging because they offer salmon at unique times of the season. This resultchallenges environmental impact assessments that assume ecological effects respond solely to changes in resource abundance.

The WMI is designed to integrate various surface and ground water regulatory programs while promoting cooperative and collaborative efforts within watersheds. It is also designed to focus limited resources on key issues.

This Guide is intended to provide state, tribal, and local publichealth officials with information they need to be prepared for smoke events and, when wildfire smoke is present, to communicate health risks and take measures to protect the public. Although developed for public health officials, the information in this document could be useful to many other groups including health professionals, air quality officials, and members of the public. The document is divided into five Chapters and five Appendices. Guide authors and contributors will post up-to-date guidance, documents, and other new evidence-based information between revisions for use by public health officials.

The authors used spatial analyses to describe major wildfire patterns across a 5.8 million acre area of northwestern California.

The Fire Lab is among the most well-equipped fire research facility in any university in the US. We are interested in collaboration and welcome visitors.
Current projects include:

Long-term vegetation response to mechanical mastication in Whiskeytown National Recreation Area

Effectiveness of variable density thinning and prescribed fire for promoting resistance to drought-induced bark beetle-caused tree mortality

Spatial variability of surface fuel loading in an Oregon white oak white oak woodland along a conifer encroachment gradient

Longer-term effectiveness of prescribed fire in different seasons to promote sugar pine resilience in the Sierra Nevada

Potential impacts of biomass harvesting treatments on fuel hazard and greenhouse gas emissions

Litter flammability of American chestnut and associate species

Post-fire regeneration and fuel loading in Baker cypress of northern California

The Shoreline Management Tool consists of two parts, a graphical user interface for use with Esri™ ArcMap™ GIS software to interact with the user to define scenarios and map results, and a spreadsheet in Microsoft® Excel® developed to display tables and graphs of the results. The graphical user interface allows the user to define a scenario consisting of an inundation level (stage), land areas (parcels), and habitats (areas meeting user-specified conditions) based on water depth, slope, and aspect criteria. The tool uses data consisting of land-surface elevation, tables of stage/volume and stage/area, and delineated parcel boundaries to produce maps (data layers) of inundated areas and areas that meet the habitat criteria. The tool can be run in a Single-Time Scenario mode or in a Time-Series Scenario mode, which uses an input file of dates and associated stages. The spreadsheet part of the tool uses a macro to process the results from the graphical user interface to create tables and graphs of inundated water volume, inundated area, dry area, and mean water depth for each land parcel based on the user-specified stage. The macro also creates tables and graphs of the area, perimeter, and number of polygons comprising the user-specified habitat areas within each parcel.
The Shoreline Management Tool is highly transferable, using easily generated or readily available data. The capabilities of the tool are demonstrated using data from the lower Wood River Valley adjacent to Upper Klamath and Agency Lakes in southern Oregon.

Two page overview of the latest scientific findings on HABs. Contains description, causes, efforts to address, and research gaps

This report explores these issues as they pertain to HABs in freshwater systems. Specifically, it addresses the conditions and activities that contribute to the occurrence of freshwater HABs; steps that Congress, federal agencies—particularly EPA—and their partners are taking to address and mitigate their occurrence; and the current knowledge gaps on this issue. This report is focused on freshwater HABs, not marine or coastal HABs or issues associated with HABs in drinking water supplies.5However, some of the discussion is applicable to marine HABs,as many issues and efforts to address them are cross-cutting.

This toolkit highlights best and emerging practice examples of how cities are addressing disproportionate socioeconomic risk to climate impacts and engaging overburdened communities. This toolkit will further explore how cities are moving beyond equitable adaptation planning and implementing policies that address both social equity and climate resilience. The toolkit is intended to aid local governments and community-based organizations nationwide that are centering equity in their adaptation initiatives. In comparing promising practices and case studies across cities, the toolkit draws lessons from different approaches and provides frameworks to help practitioners craft similar legal and policy options for their own jurisdictions in ways that will help them advance equitable responses to the impacts of climate change.

This review is a summary of the work California Trout is doing currently on behalf of native fish and healthy rivers.

This YouTube site belonging to USDA NRCS contains short (<2 minute) videos about the benefits of conservation practices featuring farmers, ranchers, and forestland owners who use them.

Carbon Farm Planning provides a customized guide for producers to maximize the capacity of their land to be healthy, productive and resilient, while achieving quantifiable benefits toward greenhouse gas sequestration and climate change mitigation. What are some of the critical partnerships, funding opportunities and market-based incentives supporting and expanding this work in Northern California? In this webinar we will hear how fiber producers at various scales are planning and implementing carbon farm practices on their land. Learn about models and resources helping to establish a growing network of carbon farming practitioners on our landscape. YouTube video.

John Wick, co-founder of the Marin Carbon Project, was just trying to find a way to get rid of weeds on his ranch when he stumbled upon a powerful climate change solution. He learned about an approach to farming that helps sequester carbon in the soil. YouTube video.

Ranchers, farmers, scientists, and food system activists share solutions, practices and the latest research on how carbon farming can play a preeminent role in addressing climate change and ensure food security by stewarding working landscapes to sequester carbon. YouTube video.
Learn more at http://www.bioneers.org/carbonfarming

In this report, we examine the accuracy of long-range demand forecasts for California's 10 largest urban water suppliers using data and information provided by each water supplier in their Urban Water Management Plans (UWMPs).

This guide provides land trust staff and other land acquisition practitioners with information about key aspects of water rights. It presents a suite of important tools to protect environmental water assets in order to maximize the ecological outcomes of lands acquired and/or managed for conservation purposes.

The "Handbook for Water Budget Development: With or Without Models"(Water Budget Handbook) provides a catalog of methods that a wateragency may consider based on their basin setting, needs, availability ofdata and tools, and expertise. It is not prescriptive in what methods anagency should apply and does not impose requirements as to how awater budget should be developed for any compliance purposes. It servesas a technical resource that provides information on a suite of methodsand data sources and is provided as technical assistance to partiesinterested in developing water budgets.

There is a wide range of within pond/lake system management and mitigation products, methods and tools available for controlling cyanoHABs blooms. However, it is often difficult to determine which products and approaches may be most effective for a particular waterbody. This provides an overview of the products and and physical, chemical and biological solutions available for control of cyanoHABs, and some detail on their benefits and relative costs. It also points to other publications with more detailed information.

The guide provides an introduction to cyanobacteria including an outline of the health effects of toxins and description of the tastes and odours associated with cyanobacteria. The current guidelines and standards that relate to toxic cyanobacteria are described.Source water management is covered including a description of the life cycle of cyanobacteria and factors affecting growth to help the water supplier understand the effect of management strategies for the control of cyanobacteria. Sampling and monitoring programs and their rationale are also described. An overview ofthe best procedure for assessing the risk of toxic algal outbreaks in a water supply and a description of the monitoring aid known as the „Alert Levels Framework" are covered. An evaluation of nutrient control, mixing strategies and algicides is included in the review of source water management practices.Treatment strategies are described including advice on conventional treatment, oxidation by chlorine and ozone and adsorption by granular activated carbon (GAC) and powdered activated carbon (PAC), biological filtration, UV and membranes and multiple barrier options. Finally recommendations are made regarding the most cost-effective treatment strategies for given particular conditions.

This table provides a summary of the common physical and chemical measures for cyanobacterial blooms in surface waters and their respective effectiveness and limitations.

This flow diagram offers a schematic for determining optimal methods to control cyanobacteria and harmful algal blooms. It cautions that selection of mitigation measures should be based on at least one year of monitoring data.

Preventative measures are the preferred approach to managing the occurrence of cyanobacterial blooms. The most effective preventative measures are those that seek to control anthropogenic influences that promote blooms such as the leaching and runoff of excess nutrients. Management practices for nutrients, specifically nitrogen and phosphorus, should have the goal of reducing loadings from both point and nonpoint sources, including water treatment discharges, agricultural runoff, and stormwater runoff. Devices that result in the mixing of lakes (for example, by air bubbling) enhance vertical mixing of the phytoplankton, which minimizes the formation of surface blooms of buoyant cyanobacteria. Also, increasing the water flow through lakes or estuaries reduces water residence time and inhibits cyanobacteria blooms; however, these efforts can be expensive and are best suited to small affected water bodies. Information is provided in a tabular format with links to more information for each measure.

This web resource, offered by Small Business Environmental Assistance Program (SBEAP), is intended for privately held water features in urban and suburban areas, especially those managed by homeowners associations (HOAs). Managers of other private water bodies, such as those found on golf courses, campgrounds, clubs, and private estates, may also benefit from this web resource.

The web page is for those experiencing water shortages to enter their information into the state drought emergency information portal. From the web page:
This form is for use by individuals not served by a public water system experiencing problems with their water supply and agencies receiving calls from those individuals.

How is this information going to be used?

This information is intended to inform and coordinate state response to mitigate drought impacts on household water supplies. Data collected is considered confidential and access to it is restricted. As part of our emergency response efforts to the drought, we are gathering information relating to private well water availability. Given the public safety, security, and privacy concerns pertaining to this information, we will treat this information as confidential to the extent permitted under California law. Collection of data is not to be construed as application for local, state or federal assistance. Individuals interested in financial assistance will be directed towards appropriate resources.
Data Collection Entails:

- Contact information for Household experiencing water shortage
- Water Shortage Problem Information and Location
- Financial Resources Available
- Well Log Data (optional)
- Reporting Agency or Local Government Information

The Restoration Resource Center is an interactive platform for knowledge exchange and learning in the field of ecological restoration. In 2017, SER launched the Restoration Resource Center to overcome knowledge silos and serve as a principle clearinghouse for information sharing on ecological restoration. Through its searchable databases, the RRC provides practitioners, researchers, educators, students, policy makers, and the public with access to resources, publications, webinars, projects, conference presentations, and information on leaders in the restoration field.

Better understanding of the connection between above-ground plant communities and below-ground soil organisms and processes has led to an explosion in recent research on the applications of this link to the field of ecological restoration. Research is only beginning to have the capacity to link soil organisms and specific ecosystem functions. Establishing general ecological principles of the role microbial communities have during ecological restoration is also still in its infancy. As such, the literature is at a critical point to generate a Special Feature that brings together novel approaches of linking soil and restoration to promote more regular inclusion and consideration of soil organisms and soil-based processes in ecological restoration. In this special feature, we bring together nine research articles from different ecosystems that study the relationship between restoration activities, soil microbial communities, and soil properties. From these research articles, we describe two primary themes: 1) research on the impacts of ecosystem specific restoration activities on soil organisms and processes, and 2) research testing methods of soil manipulation to improve restoration outcomes. We hope to inspire readers and restoration practitioners to consider soil microbes and soil processes in their research, restoration projects, and world views.

This web page contains technical resources to assist Sustainable Conservation's business, government, farming and non-profit partners to meet their sustainability goals, mandates, and missions. Specific topics include: wildlife conservation (permitting guidance, permits, reports), water sustainability (groundwater recharge, water efficiency, reports), dairy industry sustainability (water quality, GHG reductions, reports), non-invasive plants for CA, policy, and eliminating copper from brake pads.

This report describes available research on how rising seas threaten California's coast in seven categories: public infrastructure, private property, vulnerable communities, natural resources, drinking and agricultural water supplies, toxic contamination, and economic disruption. Some key findings from existing research include:

- Between $8 billion and $10 billion of existing property in California is likely to be underwater by 2050, with an additional $6 billion to $10 billion at risk during high tides.
- Four feet of higher water levels would cause daily flooding for nearly 28,000 socially vulnerable residents in the San Francisco Bay Area region.
- Under scenarios of three feet to six feet of SLR, up to two-thirds of Southern California beaches may become completely eroded by 2100.

This handbook offers useful background as well as advice from people and agencies that have been engaged in seeking out members of disadvantaged communities and Native American Tribes and have helped them have their voices heard and their needs addressed, whether for access to clean drinking water, sanitation or flood protection.

In this handbook, you will find:

Background on the diversity of water challenges faced by disadvantaged communities throughout California.

An overview of efforts to better engage and collaborate with members of those communities to learn what they want and need in order to improve their water quality, supply, sanitation and other water resource needs.

Profiles on specific areas across the state — urban, rural and mountain among them — and advice distilled from the experiences of those involved in engagement efforts, which readers can apply to their specific circumstances.

This is a web page. The Water Education Foundation has put together a list of resources and background information to keep you informed about issues of water equity in California and the West.

Using state-of-the-art economic techniques, this report estimates the value of ecosystem services provided by 56 conserved ranches and calculates the return on investment of the Rangeland Trust's conservation easements.

Water and wastewater infrastructure worldwide faces unprecedented demand and supply conflicts that require unconventional solutions. In this study, we develop a novel modelling framework to assess the environmental and economic implications of a hybrid water supply system that supplements a centralized surface water supply with distributed direct potable reuse (DPR) of municipal wastewater, as a strategy to address such challenges. The model is tested with real water and wastewater systems data from the City of Houston, Texas. Results show that supplementing the conventional centralized water supply with distributed DPR would reduce water age in the drinking-water distribution network and hence improve water quality; properly designed system configurations attain system-wide net energy savings even with the high energy consumption of existing technologies used for advanced treatment of the wastewater. A target energy efficiency for future advanced treatment technologies is identified to achieve net energy saving with all hybrid system configurations. Furthermore, distributed DPR remains financially competitive compared with other unconventional water supply solutions. The modelling framework and associated databases developed in this study serve an important research need for quantitatively characterizing distributed and hybrid water systems, laying the necessary foundation for rational design of integrated urban water systems.

Soil loss due to water runoff could increase greatly around the world over the next 50 years due to climate change and intensive land cultivation. We use the latest projections of climate and land use change to assess potential global soil erosion rates by water to address policy questions; working toward the goals of the United Nations working groups under the Inter-Governmental Technical Panel on Soils of the Global Soil Partnership. This effort will enable policy makers to explore erosion extent, identify possible hotspots, and work with stakeholders to mitigate impacts. In addition, we provide insight into the potential mitigating effects attributable to conservation agriculture and the need for more effective policy instruments for soil protection. Scientifically, the modeling framework presented adopts a series of methodological advances and standardized data to communicate with adjacent disciplines and move toward robust, reproducible, and open data science.

Human-induced climate change impacts the hydrological cycle and thus the availability of water resources. However, previous assessments of observed warming-induced changes in dryness have not excluded natural climate variability and show conflicting results due to uncertainties in our understanding of the response of evapotranspiration. Here we employ data-driven and land-surface models to produce observation-based global reconstructions of water availability from 1902 to 2014, a period during which our planet experienced a global warming of approximately 1 °C. Our analysis reveals a spatial pattern of changes in average water availability during the driest month of the year over the past three decades compared with the first half of the twentieth century, with some regions experiencing increased and some decreased water availability. The global pattern is consistent with climate model estimates that account for anthropogenic effects, and it is not expected from natural climate variability, supporting human-induced climate change as the cause. There is regional evidence of drier dry seasons predominantly in extratropical latitudes and including Europe, western North America, northern Asia, southern South America, Australia and eastern Africa. We also find that the intensification of the dry season is generally a consequence of increasing evapotranspiration rather than decreasing precipitation.

Web page with links to data and documentation. BEA, in partnership with the National Oceanic and Atmospheric Administration (NOAA), is measuring the economic force of the nation's oceans. This project seeks to calculate the contribution to gross domestic product from commercial fishing, shipbuilding, seaports, beachfront hotels, and other economic activity dependent on the oceans. For these statistics, the "ocean economy" also includes marine activity in the Great Lakes, the Chesapeake Bay, and Puget Sound, as well as international seaports such those in Portland, Ore., and Baton Rouge, La., located miles from the coast. Statistics that capture ocean economic activity in new detail will help businesses make investment and hiring decisions and aid U.S., state, and local policymakers.

Many rural communities in the western United States are surrounded by public lands and are dependent on these landscapes for their livelihoods. Climate change threatens to affect land-based livelihoods through both direct impacts and public land agency decision-making in response to impacts. This project was designed to understand how Bureau of Land Management (BLM) permittees, including ranching and recreation-based businesses in Colorado, are vulnerable to both climate change and management responses and how permittees and the BLM are adapting and could adapt to these changes. We conducted 60 interviews in two BLM field offices to gather permittee and agency employees' observations of change, impacts, responses, and suggestions for adaptive actions. Data suggested that permittees are dependent on BLM lands and are sensitive to ecological and management changes and that current management policies and structures are often a constraint to adaptation. Managers and permittees are already seeing synergistic impacts, and the BLM has capacity to facilitate or constrain adaptation actions. Participants suggested increased flexibility at all scales, timelier within-season adjustments, and extension of current collaborative efforts to assist adaptation efforts and reduce impacts to these livelihoods.

Declines in animal body sizes are widely reported and likely impact ecological interactions and ecosystem services. For harvested species subject to multiple stressors, limited understanding of the causes and consequences of size declines impedes prediction, prevention, and mitigation. We highlight widespread declines in Pacific salmon size based on 60 years of measurements from 12.5 million fish across Alaska, the last largely pristine North American salmon-producing region. Declines in salmon size, primarily resulting from shifting age structure, are associated with climate and competition at sea. Compared to salmon maturing before 1990, the reduced size of adult salmon after 2010 has potentially resulted in substantial losses to ecosystems and people; for Chinook salmon we estimated average per-fish reductions in egg production (−16%), nutrient transport (−28%), fisheries value (−21%), and meals for rural people (−26%). Downsizing of organisms is a global concern, and current trends may pose substantial risks for nature and people.

The American West exemplifies drought-sensitive regions with growing populations. Paleoclimate investigations have documented severe droughts in this region before European settling, with major implications for water management and planning. Here, we leverage paleoclimate data assimilation to reconstruct past climate states, enabling a large-scale multivariate investigation of U.S. drought dynamics over the last millennium. These results confirm that La Niña conditions significantly influence southwest U.S. drought over the past millennium but only account for, by one metric, ~13% of interannual drought variability in that region. Atlantic sea surface temperatures may also contribute a small influence, but unexplained variability suggests a substantial role for internal atmospheric variability. This conclusion is buttressed by analysis of simulations from the Community Earth System Model Last Millennium Ensemble. While greenhouse gases will increase future drought risk, as shown in other work, interannual U.S. drought variations will also be widely influenced by processes internal to the atmosphere.

California's rivers, streams and the creatures that depend on them are in trouble. Pollution, degraded habitat, and dwindling riverside forests have caused native fish and bird populations to plummet – some to near extinction. Many landowners and restoration advocates across the state want to help, but regulatory approval of environmental restoration projects can be slow, complex and expensive. Sustainable Conservation works with state and federal agencies in California to simplify the permitting process, while maintaining strict environmental standards, so more restoration can be done now, not years from now, to help our wildlife and communities thrive. Website, contains technical resources and case studies

By making adoption decisions on soil conservation practices, agricultural producers play a key role in reversing unintended consequences caused by soil degradation. This paper studies two soil conservation practices—diversified crop rotation (DCR) and integrated cropping and livestock system (ICLS)—using survey data collected from Nebraska, South Dakota, and North Dakota producers. We estimate a bivariate probit model to identify factors affecting adoption decisions. Farmers' requirements for monetary incentives and values on soil health were found to be important determinants of adoption behavior. Geographic location matters, as North Dakota had the highest DCR adoption rate yet the lowest ICLS adoption rate.

This report details the cost to the nation's economy if current investment trends in the nation's water infrastructure continue, and it explores the massive economic benefits people would realize from fully funding the nation's water infrastructure needs.
WaterNow's Tap into Resilience Toolkit includes a team of experts to answer water leaders' questions on tax, accounting, financing, municipal bond, and other water infrastructure topics. Through the TiR Toolkit "Ask an expert" portal decision-makers can connect with these experts for pro bono assistance with community-specific questions about localized water infrastructure investments.

Website and document. Integration with the Adaptation Clearinghouse will ensure that the APG is not only a plan or document, but also an online toolkit. The State of California's Adaptation Clearinghouse is a centralized collection of adaptation and resilience resources. By the end of the 2020, the APG will have its own section on the Clearinghouse, merging live and updated links to resources, case studies, and best practices. Resources already on the Clearinghouse will be tagged to reference the specific APG phase they fit into where applicable, thus integrating the APG's methodology and framework for adaptation planning process across the Clearinghouse.
The California Adaptation Planning Guide, or APG, is designed to support local government, regional organizations, and climate collaborative groups to integrate best practices and current science into their adaptation planning efforts.
Individual communities may choose to follow this framework, or they may organize their adaptation efforts differently. All topics may not be relevant to all communities. Regardless of the preferred organizing structure, this APG recommends an approach that integrates climate adaptation and resilience across sectors.
The APG provides helpful resources to local governments as they comply with state requirements for local adaptation planning, and provides recommendations and advice on community-level climate change adaptation planning.

The Enacted Budget for the State of California for Fiscal Year 2020-21 reflects the goals and objectives for addressing the state's greatest needs in the face of the ongoing economic crisis and COVID-19 pandemic. Because of the enormity of the need, the ability to leverage federal funding opportunities will be crucial. This report identifies the federal grant opportunities available to meet the following key priorities identified in the enacted budget.

A common refrain in the environmental economics literature is the need for additional estimates of environmental and natural resource values. Yet economists have paid little formal attention to the value of information (VOI) provided by non-market valuation studies, and whether this value justifies the cost. We develop a novel VOI model to quantify the benefit of non-market valuation studies conducted to expand the body of value estimates in the literature, and hence available for use in policy analyses. The approach is designed to capitalize on information available through preexisting valuation metadata, and can be applied to any valuation meta-regression that is suitable to inform policy decisions. We illustrate the approach for a prototype nationwide water-quality improvement policy in the United States, assuming that policy benefits are evaluated using benefit transfer based on a meta-regression model of willingness-to-pay. Our results suggest that, when evaluating nationwide water quality regulations with uncertain net benefits, the VOI from a typical water quality valuation study will almost certainly exceed the cost. We also examine how VOI varies with study design features and information gaps in the literature, thereby illustrating how the approach can inform research priorities.

This is a YouTube site. The Soil Health Connection is a collection of videos on soil health and related topics. Liz Harper from Colusa County RCD and Sarah Light, a UC Farm Advisor, have put together a series of interviews with individuals who are actively involved in improving soil in the Sacramento Valley. Videos range in length from nine to 23 minutes.

This recorded Zoom meeting discusses CEQA streamlining

This video describes a new approach to river management that would restore seasonal components of river flow to sustain physical and biological processes necessary for ecosystem health.
Restoring specific “functional flows” would better support fish migration and spawning, water quality, dry-season base flows, and physical conditions that support aquatic species. “By preserving these functions, we believe this is a more efficient and effective approach to environmental water management,” said Grantham, the lead author of a new PPIC report on the topic.

Building on previous PPIC work in this area, we recommend a “functional flows” approach for managing water for the environment. Functional flows refer to components of a river’s flow that sustain the biological, chemical, and physical processes upon which native freshwater species depend. A functional flows approach does not mandate the restoration of natural flows or the maintenance of historical ecosystem conditions, but rather focuses on preserving key functions—such as sediment movement, water quality maintenance, and environmental cues for species migration and reproduction—that maintain ecosystem health. This approach also recognizes that suitable physical habitat is necessary to support the functions of flowing water. By coupling physical habitat improvements with key aspects of flow variability, functional flows offer a more effective means of improving ecosystem health than conventional approaches. Managing environmental water as functional flows can also benefit people. A consistent, transparent, and science-based approach gives greater assurances to the public that investments in environmental water are justified. Resulting improvements in ecosystem health would also enhance fishing and recreational opportunities, as well as limit the risk of new Endangered Species Act listings and further regulatory restrictions on water users.

This report analyzes 41 Groundwater Sustainability Plans in 19 critical priority subbasins in California (in the San Joaquin Valley, Central California, and the Central Coast) to assess monitoring network coverage and the vulnerability of domestic wells to minimum thresholds (MTs), or the lowest groundwater level considered sustainable. We find that GSPs range in lateral spatial coverage (33 - 100 %) and coverage of domestic wells (43 - 100%) within their boundaries. Overall, estimated domestic well failure rates are on par with a management regime of “business as usual” or status quo groundwater extraction (Pauloo et al. 2020). Results suggest that 1,000 - 6,000 wells are at risk of failure in critical priority basins under proposed MTs. In what follows we present the research methodology, key results, and a set of policy recommendations to assist the achievement of sustainable groundwater management in California that is compatible with the state's efforts to achieve the human right to water.

The theme of this year’s conference is 2020 Vision for California’s Salmonscapewith a focus on preserving California’s wild salmon population with the acuity required for 2020 and beyond. In this surreal moment where we must indefinitely postpone the conference, perhap s we will have the time and space to cultivate a keener vision about viable recovery actions, and the delicate act of balancing human actions with community and watershed needs.
This proceedings contains abstracts of presentations, workshops, and tours.

The Toolkit is an interactive resource for utility decision makers, management, and staff.
Onsite, localized water infrastructure has tremendous potential to address our communities water needs – from drinking water to wastewater to stormwater management. But scaling up investment in and implementation of these solutions and strategies can be challenging.
You're in the right place. The Tap into Resilience Toolkit is a resource with answers to your financing, tax, accounting, and legal questions that arise when scaling investment in decentralized solutions. The Toolkit includes interactive financing and implementing modules, videos, a resource library, a portal to receive pro-bono support, and much much more.
The Toolkit is here to help you explore, plan for, finance and adopt localized infrastructure solutions like water use efficiency programs, green infrastructure, and onsite reuse.

This study used tree data from field plots in urban areas to describe forest structure in urban areas throughout California. The annual value of ecosystem services was estimated at $8.3 billion and the urban forests asset value was $181 billion. Assuming an average annual per tree management cost of $19 and benefit of $47.83, $2.52 in benefit was returned for every dollar spent. Strategies to reduce the risk of catastrophic loss by increasing the resilience of California's urban forests are discussed.

Eight compelling and easy-to-read two-page soil health economic case studies were developed by American Farmland Trust (AFT) through a 2018 USDA Natural Resources Conservation Service (NRCS) Conservation Innovation Grant (CIG). AFT's project is called, "Accelerating Soil Health Adoption by Quantifying Economic and Environmental Outcomes & Overcoming Barriers on Rented Lands." The case studies feature almond farmers in California, corn-soybean farmers in Illinois and Ohio, and diversified crop farmers in New York.

Video presentation of online workshop July 22 2020.

Steeped in on the ground experience, the speakers dive into the role that traditional knowledge and collaborative management can and should play in decision-making on public lands. This includes lessons learned from Bears Ears National Monument, specific recommendations about integrating collaborative management between tribes and federal agencies on public lands, and the ways traditional knowledge can enrich our understanding of the natural world.

Video. Decades of water and land management practices have altered California's rivers and substantially changed their flow patterns, with devastating effects on native fish and wildlife. Current river management practices have failed to reverse this decline. At a virtual event, Ted Grantham—the first PPIC CalTrout Ecosystem Fellow and a cooperative extension specialist at UC Berkeley—described a new approach to river management that would restore seasonal components of river flow to sustain physical and biological processes necessary for ecosystem health.
Restoring specific "functional flows" would better support fish migration and spawning, water quality, dry-season base flows, and physical conditions that support aquatic species. "By preserving these functions, we believe this is a more efficient and effective approach to environmental water management," said Grantham.

Forests in California are increasingly vulnerable to major wildfires and droughts that threaten the benefits they provide. Improving the health of headwater forests in the Sierra, in particular—where most of the state's surface water supplies originate—will provide an array of social, economic, and environmental benefits across multiple sectors and geographies. Research by forest ecologists and wildfire behavior experts finds that the best way to realize these benefits is to reestablish and maintain lower densities of trees, which will help make these forests more resilient to fire, drought, and pests.
Healthier forests can support rural communities, reduce air quality impacts from wildfires, securely store carbon and reduce greenhouse gas emissions, protect water quality from post-fire erosion, and increase water supply. The broad base of beneficiaries of headwater forest management includes rural communities in the headwater region, regions that are vulnerable to smoke impacts from major wildfires, and major urban areas and agricultural regions that receive water and hydropower from headwater forests.
Improving forest health will require a substantial lift from an array of private and public entities—along with new policies and sources of funding to facilitate complex, collaborative management. Clarifying the benefits and beneficiaries of forest management is a critical step in motivating long-term stewardship, and will inform efforts to craft financial tools, policies, and other governance solutions needed to make this heavy lift. By assessing what is known about the benefits of forest management, this report provides crucial information for ongoing policy discussions on long-term stewardship of California's headwater forests.

You Tube channel. Visual Physical Habitat Assessments are great exercises for citizen science, volunteer monitoring, STEM and other stream monitoring programs. The assessments require little or no equipment purchases. Training and facilitation can be provided by an expert knowledgeable about stream and riparian science. As presented here, these assessments rely on an EPA methodology, Bioassessment Protocols for Use in Wadeable Streams and Rivers EPA 841-B-99-002. At the conclusion of each assessment a condition score is produced.

The Clean Water Team has produced an enhanced Excel file for assisting and conducting Visual Habitat Assessments. This Excel spreadsheet contains embedded instructions and reference material (pdf), video tips (small tablet or smartphone) and web-links to YouTube video tips. It was designed with is for touchscreens.
www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/vph2015.xlsx

This contains an excel worksheet with links to YouTube videos embedded for each habitat parameter. Meant for citizen scientists

Habitat assessment field data two page sheet.

Habitat assessment field data two page sheet.

Power point presentation about the 1999 EPA Bioassessment Protocols for Use in Wadeable Streams and Rivers, which is the recommended procedure in use by SWRCB SWAMP program

The enclosed California Department of Fish and Game (DFG) Physical/Habitat Quality Form(DFG Water Pollution Control Laboratory, California Stream Bioassessment Procedure, May 1999) is now used widely around the State on high gradient streams as an integral component of citizen bioassessment monitoring. Physical habitat assessments are designed to give an overall rating to the condition of the stream habitat. Such assessments are semi-quantitative in that they are designed to produce a numeric product that is used to rate the stream. This rating system does not rely heavily on empirical measurements but instead relies on the observers' interpretation of the visual appearance of the environment and converting that observation into a numeric rating. This procedure therefore does allow a certain amount of subjectivity; hence, such physical habitat assessments are only semi-quantitative at best. Still they are useful in providing consistent comparisons between streams.

The Stream and Shore Walk Visual Assessment protocol and data sheets are intended to provide a template for volunteer monitoring groups throughout California to collect baseline data for gross problem identification within a watershed. The protocol is designed for use by volunteers with limited equipment and training. Two to three volunteers should be able to survey a reach of stream or shore within 2-3 hours, depending on terrain and accessibility.

An Introduction to the California Rapid Assessment Method (CRAM) for California Wetlands
September 21, 2010

This web page contains links to field books (SOPs), CRAM support and guidance, and assessments in CA using CRAM. Also the CRAM development process, CRAM training materials, CRAM validation and peer review, as well as other resources, including field equipment, interactive mapping and aerial imagery, plant identification and online training videos.

This monitoring plan for aquatic and riparian resources was developed in response to monitoring needsaddressed in the Biological Opinions for bull trout (U.S. Department of the Interior, Fish and Wildlife Service 1998)and steelhead (U.S. Department of Commerce, National Marine Fisheries Service). It provides a consistentframework for implementing the effectiveness monitoring of aquatic and riparian resources within the range of thePacific Anadromous Fish Strategy (PACFISH) and the Inland Fish Strategy (INFISH). The primary objective isto evaluate the effect of land management activities on aquatic and riparian communities at multiple scales andto determine whether PACFISH/INFISH management practices are effective in maintaining or improving thestructure and function of riparian and aquatic conditions at both the landscape and watershed scales on Federallands throughout the upper Columbia River Basin.A list of attributes thought to be important in defining aquatic and riparian habitat conditions and theirrelationship with listed species were identified. The list of attributes was then translated into measurable criteriaand compiled to form sampling protocols for both stream channel parameters (Part II) and vegetation parameters(Part III). These sampling methods were tested for variability, and the results are documented in two otherpublications "Testing Common Stream Sampling Methods for Broad-Scale, Long-Term Monitoring." (Archer andothers 2004) and "The Repeatability of Riparian Vegetation Sampling Methods: How Useful Are TheseTechniques for Broad-Scale Monitoring?" (Coles-Ritchie and others, in preparation).

This document describes the Standard Operating Procedures (SOP) for bioassessment of wadeable streams for the California State Water Resources Control Board's Surface Water Ambient Monitoring Program (SWAM). These procedures are recognized by the US Environmental Protection Agency (EPA) as California's standard bioassessment procedures and are designed to support general assessment of the ecological condition of wadeable streams and rivers based on the composition of the benthic macroinvertebrate and benthic algal assemblages. The procedures also produce standardized measurements of instream and riparian habitat and ambient water chemistry to support interpretation of the biological data.

Web page. Freshwater habitats are comprised of flowing (i.e., streams and rivers) and standing (i.e., lakes, ponds and wetlands) waters. Habitat extent and quality are directly related to landscape condition and hydrologic and geomorphic processes. Habitat quality is also affected by the physical and chemical characteristics of the water (e.g., water temperature). The number and distribution of different habitat types and their connectivity influence species population health.
On this page:
National
Regional
State

This report provides the results of a literature review on the effects of active forest management (harvest, forest roads, and reforestation) on drinking water quality. In addition to the literature review, community water suppliers who rely on surface water as their primary source were surveyed to better understand their operations and priorities, and three case studies were conducted.This Final Report is best characterized as "Working Papers" and will be formally published as a book by OSU's Extension and Experiment Station Communications after further review and editing. As such, the information provided here is subject to change and revision prior to publication. This report is provided as an interim product to support initiatives of the Oregon Forest Resources Institute (OFRI).

River damming alters nutrient fluxes along the land-ocean aquatic continuum as a result of biogeochemical processes in reservoirs. Both the changes in riverine nutrient fluxes and nutrient ratios impact ecosystem functioning of receiving water bodies. We utilize spatially distributed mechanistic models of nitrogen (N), phosphorus (P), and silicon (Si) cycling in reservoirs to quantify changes in nutrient stoichiometry of river discharge to coastal waters. The results demonstrate that the growing number of dams decouples the riverine fluxes of N, P, and Si. Worldwide, preferential removal of P over N in reservoirs increases N:P ratios delivered to the ocean, raising the potential for P limitation of coastal productivity. By midcentury, more than half of the rivers discharging to the coastal zone will experience a higher removal of reactive Si relative to reactive P and total N, in response to the rapid pace at which new hydroelectric dams are being built.

The Resilient Rural America Project (RRAP) increases rural resilience to extreme weather with training to identify local risks and take action with local solutions.
Resilient Rural America Project empowers rural leaders by sharing practical resilience action strategies and strengthening the capacity of rural communities and experts to work together.
A series of self-guided Training Modules are produced to guide rural leaders and consultants through a process of risk assessment, identification of resilience strategies, and taking action

Soil carbon is important for carbon sequestration.
The fraction of fixed carbon allocated belowground in terrestrial ecosystems is the most uncertain component of global carbon cycle assessments. Here we present a novel approach to determining global quantification of belowground productivity, which is estimated at 24.7 Pg y−1 and accounts for 46% of terrestrial carbon fixation. Carbon allocated belowground has a longer residence than its aboveground counterpart, playing a key role in long-term carbon storage. Total belowground productivity increases with precipitation, but the rate of increase decreases from arid to humid ecosystems. The fraction of total fixed carbon entering the soil decreases with precipitation and varies significantly among biomes. These results are indicative of the possible impacts of climate and land use changes on the global carbon cycle. Carbon allocated underground through belowground net primary production represents the main input to soil organic carbon. This is of significant importance, because soil organic carbon is the third-largest carbon stock after oceanic and geological pools. However, drivers and controls of belowground productivity and the fraction of total carbon fixation allocated belowground remain uncertain. Here we estimate global belowground net primary productivity as the difference between satellite-based total net primary productivity and field observations of aboveground net primary production and assess climatic controls among biomes. On average, belowground carbon productivity is estimated as 24.7 Pg y−1, accounting for 46% of total terrestrial carbon fixation. Across biomes, belowground productivity increases with mean annual precipitation, although the rate of increase diminishes with increasing precipitation. The fraction of total net productivity allocated belowground exceeds 50% in a large fraction of terrestrial ecosystems and decreases from arid to humid ecosystems. This work adds to our understanding of the belowground carbon productivity response to climate change and provides a comprehensive global quantification of root/belowground productivity that will aid the budgeting and modeling of the global carbon cycle.

In May 2020, the Association of State Drinking Water Administrators(ASDWA)RegulatoryCommittee conducted a comprehensive survey on distribution systemswith its members.5The purpose of thesurvey wasto determine what distribution system issues are most commonly faced by state water programs, gather management practices and policies to share amongst the states, and collect additional information that could be used to inform future regulations.The survey was completed by drinking water program representatives from 41states and territories. The results of this survey make up the substance of this white paper.

The Public Safety Power Shutoff (PSPS) Standard Operating Procedure (SOP) template was developed to help water utilities prepare, respond and recover from power shutoffs to reduce fire risks. Although there are some actions that are unique to such circumstances, most of the information is relevant to any power outages. The SOPs cover the following topics over a range of time steps spanning blue sky planning to no power to power restored.

- Generators and Backup Power
- Fuel
- Communications
- Partnerships
- SCADA
- Staffing
- Access
- Safety

The PSPS SOP is available in two formats, PDF and docx. Utilities can customize the docx version.

The geographic information system tool, Social Values for Ecosystem Services (SolVES), was developed to incorporate quantified and spatially explicit measures of social values into ecosystem service assessments. SolVES 4.0 provides an open-source version of SolVES, which was designed to assess, map, and quantify the social values of ecosystem services. Social values—the perceived, nonmarket values the public ascribes to ecosystem services, particularly cultural services, such as aesthetics and recreation—can be evaluated for various stakeholder groups. These groups are distinguishable by factors such as their attitudes and preferences regarding public uses (for example, motorized recreation and logging). As with previous versions, SolVES 4.0 derives a quantitative 10-point, social-values metric—the value index—from a combination of spatial and nonspatial responses to public value and preference surveys. The tool also calculates metrics characterizing the underlying environment, such as average distance to water and dominant landcover. SolVES 4.0 has been developed with Python using a QGIS user interface and a PostgreSQL database for required data. SolVES is integrated with Maxent maximum entropy modeling software to generate more complete social-value maps and offer robust statistical models describing the relation between the value index and explanatory environmental variables. A model's goodness of fit to a primary study area and its potential performance in transferring social values to similar areas using value-transfer methods can be evaluated. SolVES 4.0 provides an improved open-source, public-domain tool for decision makers and researchers to evaluate the social values of ecosystem services and to facilitate discussions among diverse stakeholders regarding the tradeoffs among ecosystem services in a variety of biophysical and social contexts including mountain, forest, coastal, riparian, agricultural, and urban environments around the globe.

The Saving Species Together video series and educational campaign highlights collaboration between private land managers, resource agencies, non-profits, and the public to protect threatened and endangered species. By building conservation communities that include all stakeholders, we can come together to address the challenges facing listed species, making recovery more possible.
While this project focuses on stories of four threatened and endangered species at risk - Western snowy plover, San Joaquin kit fox, California tiger salamander, and Coho salmon – the information here can be applied to many species and habitats.
The project is a partnership between the California Department of Fish and Wildlife, link opens in new windowU.S. Fish and Wildlife Service, and link opens in new windowU.S. National Oceanic and Atmospheric Administration. Community service funds paid by the defendant in a federal securities fraud and wildlife violations case, link opens in new windowUnited States of America v. Wildlife Management, LLC (N.D. Cal.) funded the project. The project was funded by the link opens in new windowNational Fish and Wildlife Foundation.

Worldwide, agricultural irrigation currently accounts for 69% of freshwater withdrawal. Countries with a temperate climate, such as the Netherlands, experience periodic freshwater shortages in agriculture. The pressure on available freshwater will increase due to climate change and a growing demand for freshwater by e.g. industrial activities. Possible alternative water resources are considered in order to meet the current and future water demand. In this study we explore where, and how much, sewage treatment plant (STP) effluent can directly be reused in agricultural sub-surface irrigation (SSI) during an average and a dry season scenario, for all active (335) Dutch STPs. SSI systems may have a higher water demand as part of the STP effluent is transported with groundwater flow, although aboveground irrigation has a loss of water due to interception. Furthermore, such aboveground irrigation systems provide direct contact of crops with irrigation water. SSI systems provide a soil barrier which may function as a filter and buffer zone. In the Dutch situation, direct intentional reuse of STP effluent can fulfill up to 25% of croplands SSI water demand present within a five-kilometer transport buffer from the STPs during an average season and 17% during a dry season. Hereto, respectively, 78% and 84% of the total available Dutch STP effluent would be used. Thus, the intentional direct STP effluent reuse in agricultural SSI has the potential to satisfy a significant amount of the agricultural water demand at a national scale, presuming responsible reuse: safe applications for humans and environment and no limiting effects on water availability for other actors.

This web page contains a description of the state data strategy, a link to the full data strategy, the state's open data policy, CalData Communities, and a link to the Statewide data portal, which was designed to host open data from multiple state agencies and is intended to eventually house all of the state's open data sets.

The purposeof this Policy is to partner with California tribes to facilitate tribal access, use,and co-managementof State-owned or controlled natural lands and to work cooperatively with California tribes that are interested in acquiring natural lands in excess of State needs in order to, among other things:
•Support tribal self-determinationand self-government;
•Facilitate the accessof California NativeAmericansto sacred sites and cultural resources;
•Improve the ability of California Native Americans to engage in traditional and sustenance gathering, hunting and fishing;
•Partner with California tribes on land management and stewardship utilizing Traditional Ecological Knowledges;
•Reduce fractionation of tribal lands; and
•Provide opportunitiesfor education, community development, economic diversification, and investment in public health, information technologyand infrastructure, renewable energy, water conservation,and cultural preservation or awareness.

Conservation efforts for Pacific salmon (Oncorhynchus spp.) increasingly prioritize maintenance of cool water temperatures that protect all freshwater life stages. However, development of appropriate temperature standards requires a robust understanding of the interactions among water temperature, ecosystem productivity, and fish performance. We used a series of in situ enclosures to examine how natural spatiotemporal gradients in thermal conditions and prey availability affected the summer growth and survival of age-0+ coho salmon (Oncorhynchus kisutch). Coho salmon absolute growth rates peaked at a mean daily average water temperature (mean T) of 16.6 °C and an associated maximum weekly maximum temperature (MWMT) of 21.1 °C. Juvenile growth under these thermal conditions was sixfold greater than the growth rates observed for conspecifics rearing in the coolest study reach (mean T = 13.0 °C; MWMT = 16.0 °C). Even at the highest rearing temperature (mean T = 18.1 °C; MWMT = 24.0 °C), growth rates remained positive and above the study-wide average, although overall survival was reduced. Among the predictor variables examined, invertebrate prey abundance was the predominant factor influencing age-0+ coho salmon growth. These results suggest that abundant prey resources may mitigate the negative effects of elevated water temperature on fish growth in riverine environments. Given the likelihood of increasing stream temperatures with climate change, productive ecosystems may provide critical refuges for juvenile salmonids.

This webpage contains a map that is updated each Thursday. A weekly summary is provided that by US Region and data and maps are available for download. Maps can be downloaded for selected areas, to compare between different weeks, and custom maps can be requested. Data are available in tabular, time series, datasets, and GIS formats. Current conditions and outlooks are also provided.

This web page contains data for download in comma separated values (.csv) files. Data are provided in table format, which is sortable. Multiple North Coast sampling sites are included.

On July 28, 2020, Governor Gavin Newsom released a final version of the Water Resilience Portfolio, the Administration's blueprint for equipping California to cope with more extreme droughts and floods, rising temperatures, declining fish populations, over-reliance on groundwater and other challenges.

The agencies released a draft version of the portfolio for public feedback in January 2020. Input from more than 200 separate individuals and organizations helped shape revisions, including the addition of 14 new actions. The revisions give greater emphasis to tribal interests and leadership, upper watershed health and cross-border water issues.

State agencies intend to track and share progress on portfolio implementation with an annual report and stakeholder gathering.

The order directs state agencies to deploy a number of strategies to store carbon in the state's natural and working lands and remove it from the atmosphere. The order also sets a first-in-the-nation goal to conserve 30 percent of the state's land and coastal water by 2030 to fight species loss and ecosystem destruction.

Specifically, state agencies are directed to pursue innovative actions, strategies and partnerships to maximize the full climate benefits of our natural and working land, through:

Healthy soils management, including planting cover crops, hedgerows and compost applications;
Wetlands restoration to protect coastal areas;
Active forest management to reduce catastrophic risk and restore forest health; and
Boosting green infrastructure in urban areas like trees and parks.

A challenging aspect of Habitat Equivalency Analysis (HEA) concerns adequately accounting for the relative value of the injured and restored or replaced resources. This issue is particularly relevant in the case of applying HEA to injured tribal trust (reservation) lands which enjoy special legal and cultural status. NOAA guidelines for HEA application state when choosing a metric to evaluate the quantity and quality of services provided by a unit of habitat, in addition to bio-physical characteristics, trustees should examine landscape, land ownership, and substitute resource characteristics. The analysis presents a theoretical framework and application of augmenting a traditional HEA analysis with discrete choice survey modeling results to ensure all key characteristics of the injured and restored or replaced resources are considered within the equivalency analysis. The example used is for the Spokane Tribe of Indians in Washington State and contamination of their tribal waterway, the Upper Columbia River/Lake Roosevelt. The addition of a discrete choice model of respondent preferences for site characteristics improves the standard HEA analysis by providing an empirical basis for unit equivalencies.

Webcast about How's My Waterway. An updated version of How's My Waterway (HMW) was released publicly in June 2020. HMW provides a comprehensive overview of water quality data and information in the United States on three different scales: community, state and national. HMW pulls in data from eight databases across EPA through web services with the goal of answering questions about aquatic life, eating fish, swimming, drinking water, restoration and protection. This demo is meant to help users:

Explore information about their drinking water, local stream conditions, and whether their waterways are suitable for swimming or eating fish and if they support aquatic life.

Discover if their waterways are being monitored and the location of local monitoring stations.

Learn what issues might be affecting their waterways.

Participants will feel empowered to communicate water quality information to their community in order to restore and protect their waters.

Many urban areas suffer from water scarcity although paradoxically, a local source such as rainwater is mostly treated as a risk rather than a valuable resource. This change of paradigm is included in the 'integrated water resources management' and 'demand management' approach. The aim of this research is to identify and analyse studies that explore subject matters concerning rainwater in the integrated management systems of water resources into developed countries. The research methodology consisted in a literature review (from the 1980s to 2017) of territorial studies that examine rainwater harvesting in urban areas of the developed countries. To this end, a bibliometric analysis has been carried out in different databases according to the definition of keywords. The results reveal five thematic areas were identified and temporal and spatial differences between some subject matters.

Provides a summary of temperature and precipitation, reservoir and groundwater storage, water year outcomes, and prospects for water year 2020. Water year 2020 encompasses October 1 2019 through September 30, 2020.

A number of influential assessments of the economic cost of climate change rely on just a small number of coupled climate–economy models. A central feature of these assessments is their accounting of the economic cost of epistemic uncertainty—that part of our uncertainty stemming from our inability to precisely estimate key model parameters, such as the Equilibrium Climate Sensitivity. However, these models fail to account for the cost of aleatory uncertainty—the irreducible uncertainty that remains even when the true parameter values are known. We show how to account for this second source of uncertainty in a physically well-founded and tractable way, and we demonstrate that even modest variability implies trillions of dollars of previously unaccounted for economic damages.

This web page provides links to resources. SRF urges our constituency to join us in educating ourselves on systemic racism and the ways that it manifests in higher education and the sciences. We have curated this list of anti-racism resources that specifically address racism in the environmental sciences, and will continue to add to it.

Water utilities across the countrywill experience new and enhancedvulnerabilities due to future increases in extreme heat events stemming from climatewarming. The Water Utility Climate Alliance (WUCA) and the Association of Metropolitan Water Agencies (AMWA) recognized these threats and sponsored a study to analyze the impact of such extreme temperature events on critical water utilityphysical infrastructure assets and personnel. The methodology focuses on examining the effects of extreme temperatures on personnel and facilities in the years 2030, 2050 and 2070, compared to a 1990 to 2009 baseline.Climate Summary: The climate data used to project future climate conditions in the analysis are the Localized Constructed Analogs (LOCA) climate projections for North America1.In total 32 models and two representative concentration pathways (RCPs) were used in this analysis (RCP 4.5 and RCP 8.5 represent intermediate and high future greenhouse gas emissions scenarios, respectively).The historicaldata used in this analysis is the Livneh et al. (2015) data set2. This data setwas chosen to remain consistent with the observed dataset used in the downscaling process. The historicalperiod used is 1990 to 2009. The projection data used is set over the period 2021 to 2080. For brevity, results are presented for three future time periods averaged over a 20-year time span for each RCP.The time frames used are 2030 which averages 2021-2040, 2050 (averages 2041 to 2060), and 2070 (averages 2061 to 2080).Each of the five water utility locations see an increase in average maximum summer temperature from the historical model to the averageof the 32 projected models. This increase ranges from 2.0°F to 4.1°F across the utility locations in2030 for RCP 4.5. In 2070 the increase ranges from 4.5°F to 7.7°F across the utility locations for RCP 8.5. Figure 1illustrates this data for each utility location, projection year, and RCP. It is important to note that these values are maximum summer temperatures averaged over the 20-yearprojection periods andaveragedover the 32 projection climate models. Therefore, higher values can be expected in some years and models, and daily high temperatures will also exceed these values. Therefore, study results area lower boundary of future impacts because average seasonalvaluesare evaluated.Personnel Summary:According to data compiled from the Bureau of Labor Statistics (BLS), exposure to excessive environmental heat stress killed 783 U.S. workers and seriously injured 69,374 workers from 1992 through 2016across all industries3. Increases in daily heat index, heatwaves,and daily maximum temperatures will put additional stress on outdoor workers.In this analysis, the impact on personnel from temperatures is based on the HeatIndex, which isa heat indicator that factors in both air

The California State Water Resources Control Board (State Water Board) is developing Risk Assessment methodologies for identifying “at-risk” public water systems (3,300 or less service connections), tribal water systems, state small water systems, and domestic wells in order to assist with prioritization of Safe and Affordable Drinking Water Fund allocations in the State Water Board’s annual Fund Expenditure Plan. The purpose of this white paper is to provide (1) an overview of the results of the evaluation of 129 potential risk indicators and (2) recommendations on the final risk indicators for Risk Assessment 2.0 for public water systems.This effort, the first of its kind by the State Water Board, assessed the Applicability and Data Fitness of 129 potential risk indicators. The evaluation was conducted following the July 22, 2020 webinar workshop and relied on input from internal and external stakeholders. The results of the analysis recommended 51 of the 129 potential risk indicators should be considered for inclusion in Risk Assessment 2.0 (Appendix C), whereas 33 did not meet the Applicability criteria and 45 met the Applicability criteria, but did not meet the Data Fitness criteria.To facilitate the selection of the final indicators for Risk Assessment 2.0, the State Water Board, in partnership with the University of California, Los Angeles (UCLA), incorporated the results of the potential risk indicator evaluation with internal and external feedback to further refine the list of 51 potential risk indicators to generate a list of 22 recommended risk indicators for Risk Assessment 2.0. A concerted effort was made to:·Limit the number of risk indicators to a reasonable number in order to simplify the analytical burden while still providing a full picture of risk.·Avoid duplicative risk indicators.·Ensure a diversity of risk indicator types.·Identify the appropriate balance between risk indicators that may be influenced by water system management and risk indicators that are outside a water system’s sphere of influence. The State Water Board is seeking stakeholder feedback on the 22 recommended risk indicators identified through the evaluation process detailed in this white paper.

This document informs readers about stakeholder recommendations on actions needed to sustain and strengthen the practice of integrated regional water management (IRWM) with the goal of achieving regional sustainability.

This web application (web app) displays a collection of map layers related to the history and cultural heritage of Native Americans in California. The map layers include:

Cultural Base Map: the 60 traditional cultural regions of California, with links to a directory of affiliated Tribes and Tribal Atlas pages

Historical Lakes & Wetlands: California's lakes and wetlands as depicted in an 1866 survey, prior to major water control and diversion projects

Natural Resources: Natural resources traditionally used in different regions of the state

Estimated Population in 1769: Estimated population by region before colonization

Trails: Approximate routes of trails used before colonization

Trade Relations: Trade relationships that existed before colonization

Missions: Locations of missions established during Spanish colonization

Spanish & Mexican Land Grants: Land appropriated and privatized during Spanish and Mexican colonization

Treaty Lands: Reservations and cessions as negotiated between Tribes and federal agents in early days of U.S. colonization

An American Genocide: Incidents of genocide as documented by historian Benjamin Madley in his 2016 book An American Genocide

Bounty Lands: Lands granted by the U.S. government to militiamen who participated in campaigns against Native Americans

Reservations & Allotments: Reservations and public domain allotments (PDA) in the 21st century

Tribal Connections is an interactive map that shows the connection between national forests and grasslands, tribal trust lands and tribal lands ceded as part of a treaty. The map is used by the Forest Service as one tool of many to better inform land management decisions.

The Disadvantaged Community and Tribal Involvement "Lessons Learned" Summit provided an opportunity for representatives of the twelve Grantees of the Department of Water Resources' (DWR) Proposition 1 Integrated Regional Water Management (IRWM) Disadvantaged Community Involvement Program (DACIP) to come together to share lessons learned, coordinate strategies and approaches, discuss accomplishments, and address issues specific to disadvantaged and Tribal communities.

This document presents recommendations formed during more than three years of grantproject work. These projects culminated in a three-day workshop convened in December 2014that included representatives of the DWR and the State Water Resources Control Board.The recommendations distilled from the workshop cover the following topics:Disadvantaged Community Identification, Coordination, Agency Alignment, Capacity Building andTechnical Assistance, Education, Disproportionate Impacts, Governance and Representation, andFunding. These recommendations are inter-related and ultimately present a vision for a moreeffective, equitable and accessible roadmap to meeting the water needs of disadvantagedcommunities.While each can be treated as a "stand-alone" recommendation, the document is organized ina way that recommendations build on each other (e.g. "Funding" describes needs for allprevious recommendations). Throughout this document, the term "disadvantaged communities"includes "chosen/trusted representatives ofcommunities."

The Integrated Regional Water Management (IRWM) Tribal Collaborative Effectiveness Study evaluates Tribal participation in the Department of Water Resources' (DWR) Integrated Regional Water Management (IRWM) grant program. The Department administers the overall IRWM program, and individual regions form Regional Water Management Groups (RWMG) develop IRWM plans and submit specific water management projects for funding consideration by DWR.
Following indigenous collaborative research protocols, we conducted surveys, interviews and focus-group meetings with Tribal representatives throughout the state. While we collected data from Tribes statewide, our efforts were focused in five specific IRWM regions. The aim of our research is to identify strengths, weaknesses, and opportunities for Tribal participation in the IRWM program.

This 9-page document chronicles the history, current status and provides an outlook for the futureof CEQA through the lens of environmental justice.

EPA's State Inventory and Projection Tool is an interactive spreadsheet model designed to help states develop greenhouse gas (GHG) emissions inventories and was developed to lessen the time it takes to develop an inventory (collecting data, identifying emission factors, etc.). The tool has two components: the state inventory tool and the projection tool.

California Trout's Top 5 California DAMS OUT Report highlights five dams that are ripe for removal and that must, for the health of the ecosystem and communities around them, come out. The five dams were selected by analyzing information found in several studies to assess the overall benefits that removing the dam would present to native fish, water, and people.Dams were selected based on the following criteria:• The dam blocks access to habitat for salmon and steelhead species listed as critical or high concern in the State of Salmonids II Report (written by UC Davis and California Trout scientists).• The dam no longer serves its original purpose, whether generating hydroelectric power, increasing water supply, or managing flood control, and may now pose a public safety threat. • A dam removal opportunity is present.• The primary purpose of the dam is not flood control or water supply for people.*

This 10-part educational series provides steps, tools, templates, case studies, and other resources that seek to streamline the adaptation planning process and make it easier for tribal-serving health and environmental professionals to understand and address human health exposures and impacts within tribal communities. This training summarizes the latest data and literature on the exposures and impacts of climate change that may impact the health of tribal community members. It also describes how to identify and select appropriate strategies to address these exposures and impacts.

Tracking California is a program of the Public Health Institute, in partnership with the California Department of Public Health and the Centers for Disease Control's (CDC) National Environmental Public Health Tracking Program. The program works to make environmental health data and information publicly available through the development of a web-based data query system, data displays, and other web tools and services. The program includes data on air quality, asthma, climate change, drinking water, housing, and more.

ITHIM stands for Integrated Transport and Health Impact Model (ITHIM). The California version of ITHIM is a planning tool that answers the question of "How much benefit or harm to human health can we expect by changing the mix of active and motorized travel across a county, region, or the entire State of California?" ITHIM contrasts one travel pattern that serves as a reference with an alternative that has a different profile of fine particulate air pollution from vehicle exhaust, physical activity from walking and cycling, and injuries from traffic collisions. ITHIM calculates the change in deaths, years of life shortening and disability, and costs due to these changes in air pollution, physical activity, and traffic injuries. California ITHIM has been used by governmental agencies and advocates to assess the health impacts of updates to regional transportation plans under SB 375, Sustainable Communities Strategies; Goals of state and local health and transportation agencies; City and regional transportation projects and programs such as high speed rail and bike-sharing; and more. ITHIM is currently being used across the United States by state and local health departments, state and regional transportation planning agencies, and academic researchers.

This document is an appendix to the Technical Assistance Guidelines for State Agencies, which are intended to serve as a resource for State agency staff who are designing a new TA program for under-resourced communities, or who aim to expand or improve their current TA services.Unique considerations, including California Native American Tribes' sovereign statusand the historicalrelationship between the State ofCalifornia and Tribes,necessitate a separate discussionto help inform the design and effective implementation of technical assistance (TA). This appendix provides information and resources to support agency staff seeking to provide TA to Tribes or organizations that serve Tribes. SGC staff worked in partnership with Tribal liaisons from a number of State agencies to inform the content of this document. Their partnership has been indispensable in the development of this document and SGC is profoundly grateful for their support. SGC would also like to thank in advance the individuals who provide public comment to continue to improve the utility of this document.

Global water use for food production needs to be reduced to remain within planetaryboundaries, yet the financial feasibility of crucial measures to reduce water use is poorly quantified.Here, we introduce a novel method to compare the costs of water conservation measures with theadded value that reallocation of water savings might generate if used for expansion of irrigation.Based on detailed water accounting through the use of a high-resolution hydrology-crop model, wemodify the traditional cost curve approach with an improved estimation of demand, increasingmarginal cost per water conservation measure combination and add a correction to control forimpacts on downstream water availability. We apply the method to three major river basins in theIndo-Gangetic plain (Indus, Ganges and Brahmaputra), a major global food producing region butincreasingly water stressed. Our analysis shows that at basin level only about 10% (Brahmaputra) tojust over 20% (Indus and Ganges) of potential water savings would be realised; the equilibrium pricefor water is too low to make the majority of water conservation measures cost effective. Theassociated expansion of irrigated area is moderate, about 7% in the Indus basin, 5% in the Gangesand negligible in the Brahmaputra, but farmers' gross profit increases more substantially, by 11%.Increasing the volumetric cost of irrigation water influences supply and demand in a similar way andhas little influence on water reallocation. Controlling for the impact on return flows is important andmore than halves the amount of water available for reallocation. Key points:

- A novel method compares the costs of water conservation measures with the added value that reallocation of water in agriculture generates
- Only 10%-20% of potential water savings would be realised in the Indo-Gangetic plain iffinancial feasibility is taken into account
- Despite the modest expansion of irrigation it accommodates, investing in water conservation can add significant profit to agriculture

The Plastic Pollution Prevention and Collection Technology Inventory was created to aid local governments, nongovernmental organizations, and other stakeholders in identifying technologies that may help to remediate hotspots of marine plastic pollution.

The inventory contains 52 technologies that were developed as of July 20, 2020 to either 1) prevent plastic pollution from entering the environment or 2) collect existing marine plastic pollution. Technologies in the inventory can be searched based on the remediation strategy (i.e., prevention or collection), plastic type (i.e., macroplastics, microplastics or both macroplastics and microplastics), or inventory category (e.g., laundry balls; boats and wheels). Additional metadata available include a brief description of the technology, use status, location invented, and relevant sources. This inventory can be updated using our systematic search methodology. We hope that this inventory can serve as a tool for interested stakeholders to search, identify, and evaluate the technologies available to prevent plastic pollution from leaking into the marine environment or collect existing plastic pollution.

It is impossible to overstate the importance of freshwater in our daily lives – for proof, try going without it for any length of time. Surface waterbodies (lakes, ponds, rivers, creeks, estuaries… it doesn't matter what name they go under) are particularly important because they come into direct contact with us and our biophysical environment. But our knowledge concerning where and when waterbodies might be found was, until recently, surprisingly sparse. The paucity of information was because trying to map a moving target is actually very difficult – and waterbodies undeniably move, in both geographical space and time. By 2013 the U.S. Geological Survey and NASA were making petabyte scale archives of satellite imagery freely available, archives that covered the entire planet's surface and stretched back decades. Other's such as the European Commission / European Space Agency Copernicus programme were also putting full free and open data access policies into place, and Google's Earth Engine had become a mature, powerful cloud-based platform for processing very large geospatial datasets. Back in 2013 a small team working at the European Commission's Joint Research Centre were looking at ways satellite imagery could be used to capture surface waterbody dynamics, and create new maps that accurately incorporated time dimensions. Concurrently the Google Earth Engine team were focussing their massive computational capabilities on major issues facing humanity, such as deforestation, food security, climate change - and water management. The two teams came together in a partnership based not on financial transactions but on a mutual exchange of complementary capabilities, and devoted thousands of person hours and thousands of CPU years into turning petabytes of Landsat satellite imagery into unique, validated surface water maps, first published in 2016, and made available to everyone through a dedicated web portal, the Global Surface Water Explorer. Since then satellites have continued to image the Earth, surface water has continued to change and the JRC Goole Earth Engine partnership has continued to work on improving our knowledge of surface water dynamics and making sure this knowledge benefits as many people as possible. This Atlas is part of the outreach; it is not a guide to the Global Surface Water Explorer, it is not a Google Earth Engine tutorial (though if it inspires you to visit either of these resources then it has achieved one of its objectives), but it is a stand-alone window into how people and nature affect, and are affected by the 4.46 million km2 of the Earth's landmass that have been under water at some time over the past 35 years.

A website the is designed for "sharing ideas and resources for successful implementation of the Sustainable Groundwater Management Act."

This summit was to celebrate accomplishments to date and outline a path forward for integrated regional water planning. It was held October 8, 13, and 14, 2020 and presentations and video recordings are available on the website.

While a large body of literature exists on the ability of biochar to retain water and nutrients, little research exists connecting these benefits to biochar qualities, water retention mechanisms, and optimal locations for agricultural use. More information is needed for biochar stakeholders to make informed decisions about where deployment should occur. Specifically, we need to know the biochar characteristics that drive changes in soil water properties, how these effects vary geographically, and what financial benefits farmers can expect in their specific region to identify where biochar can be deployed for optimal results. We conducted a meta-analysis of the relationship between biochar properties, application rates and observed change in water holding capacity (WHC) as a function of soil texture. Then we mapped our results across US counties to determine where biochar application could yield the largest improvements in soil water properties and added an economic model designed to predict how biochar-driven changes in soil WHC drive irrigation expenses. Limited data drove our focus to sandy soils, and among these locations, our results suggest that biochar application will be especially effective in the southeast, far north and northeast, and western United States. In a prototype application of our model we predict a 37% reduction in irrigated water use for an instrumented site in Nebraska. Our combined statistical and economic models will be useful for future field experiment proposals, farmers purchasing biochar, and decision makers working to incentivize agricultural advances.

RISE is a Bureau of Reclamation open data system for viewing, accessing, and downloading Reclamation's water and water-related data.
With RISE you can:
Find Reclamation data by searching the catalog or browsing the map.
Query time series data for specific dates, parameters, and locations, then plot or download the data
Obtain machine-readable data through an Application Programming Interface (API) for integration into tools and analyses.
View geospatial data on a map, download it for offline analysis, or get a web service connection to add to your own map.

Our mission is to help California land users (farmers, ranchers, forest landowners, and tribes) and land managers maintain sustainable communities and ecosystems by adapting to climate variability and change.
This view shows provisional real-time water data collected at the US Geological Survey observation stations in context with weather-related data from other public sources

Climate change will have a significant effect on the built environment-physically, financiallyand socially. The impacts of climate change willvary acrosslocations butwillinclude changes to the frequency and intensity of extreme weather events (rainfall,droughtand bushfires), and will result inphysical impacts such assea level rise and coastal erosion.This willplace a substantial burden on economies,havinga detrimental impact onreal estate(property) across short and long timeframes. Despite well documentedscientific knowledgeabout climate changeimpacts,there has been limited researchinthe real estatesector–notwithstanding its major role in the provision ofshelter, and the economiesof many countries. In this chapter weexplore how climate change will affect real estate, andthe implications of this. We identify five key challenges that climate change poses for the sector, and from these we identify a critical research agenda.

What are key California water priorities for the coming year, in light of ongoing disruptions from the pandemic, the recession, lingering drought, and a record-breaking fire season? The PPIC Water Policy Center brought together three panels of experts to discuss possibilities at our annual water priorities conference.
The panels covered urgent challenges: providing safe, affordable drinking water for all while maintaining water suppliers' fiscal health; managing groundwater sustainably to support water users, the economy, and the environment; and supporting these priorities with policies and funding adequate to the tasks at hand.

This website tool provides:
A step-by-step process that communities can use to plan for climate change
Designed to be flexible and responsive to community needs
A summary of statewide guidance, resources and tools
Updated from the 2012 original to reflect 2020 best practices, best available science, and the latest updates to state plans, policies, programs and regulations
Equity and community engagement integrated throughout all planning phases
It also contains supporting resources including adaptation planning resources, adaptation pathways, and other adaptation clearinghouse resources

This manual aims to support Open Rivers Fund projects and the broader field by building capacity in local communities for monitoring the impacts of dam removal and river restoration, while also supporting ongoing stewardship and learning. As we learn from communities, we will adapt and update this resource.

This free, interactive spreadsheet tool calculates GHG emissions for many sectors, including residential, commercial, transportation, and waste and water management. The tool is comprised of two separate modules: one for community-wide inventories, the other for inventories of local government operations only. You may choose to use one or both modules.
The tool is pre-programmed with default emission factors and system assumptions needed to calculate emissions or you may enter municipality-specific information. The tool is scalable to accommodate different levels of activity data (ranging from city-wide to individual meters) to meet the needs and constraints of different local governments.

This free, interactive spreadsheet tool calculates GHG emissions for many sectors, including residential, commercial, transportation, and waste and water management. The tool is comprised of two separate modules: one for community-wide inventories, the other for inventories of tribal government operations only. You may choose to use one or both modules.

The tool is pre-programmed with default emission factors and system assumptions needed to calculate emissions or you may enter community-specific information. The tool is scalable to accommodate different levels of activity data to meet the needs and constraints of different tribal governments.

Although natural resource managers are concerned about climate change, many are unable toadequately incorporate climate change science into their adaptation strategies or management plans, and arenot always aware of or do not always employ the most current scientific knowledge. One of the most prominent natural resource management agencies in the United States is the Bureau of Land Management (BLM),which is tasked with managing over 248 million acres (>1millionkm2) of public lands for multiple, often con-flicting, uses. Climate change will affect the sustainability of many of these land uses and could furtherincrease conflicts between them. As such, the purpose of our study was to determine the extent to which cli-mate change will affect public land uses, and whether the BLM is managing for such predicted effects. To doso, wefirst conducted a systematic review of peer-reviewed literature that discussed potential impacts of cli-mate change on the multiple land uses the BLM manages in the Intermountain West, USA, and then expandedthese results with a synthesis of projected vegetation changes. Finally, we conducted a content analysis ofBLM Resource Management Plans in order to determine how climate change is explicitly addressed by BLMmanagers, and whether such plans reflect changes predicted by the scientific literature. We found that activeresource use generally threatens intrinsic values such as conservation and ecosystem services on BLM land,and climate change is expected to exacerbate these threats in numerous ways. Additionally, our synthesis ofvegetation modeling suggests substantial changes in vegetation due to climate change. However, BLM plansrarely referred to climate change explicitly and did not reflect the results of the literature review or vegetationmodel synthesis. Our results suggest there is a disconnect between management of BLM lands and the bestavailable science on climate change. We recommend that the BLM actively integrates such research into on-the-ground management plans and activities, and that researchers studying the effects of climate change makea more robust effort to understand the practices and policies of public land management in order to effectivelycommunicate the management significance of theirfindings.

DWR drafted this guidebook to assist with preparation of UWMPs.

Heavy rainfall is increasing globally due to human-caused global warming. However, it is still unclear how these increases in heavy rainfall might affect flood risk. In this paper, we investigate how global warming and population changes together may be affecting the number of people at risk from floods in the United States. We combine simulations from a climate model and flood model—allowing us to consider a wide range of heavy rainfall events. We report a ~20% increase in the size and a >200% increase in the frequency of very heavy and rare rainfall events, which leads to a ~30–127% increase in the number of people at risk from floods. Finally, we find that the heaviest rainfall events increase by the widest margin—suggesting the possibility of major increases in damage and disruption caused by severe floods in the 21st century.

This brief highlights how events this past year have shifted the state's water landscape and lays out priorities for local, state, and federal action. Key elements include:
• Ensure safe and affordable water. Some California communities did not have safe drinking water before the pandemic, and the recession has made affordability of water and wastewater an urgent crisis. Solutions must ensure access for the most vulnerable, while maintaining the financial health—and safety—of our water systems.
• Collaborate to reduce uncertainties in agricultural water supplies. Broad-based partnerships to bring groundwater basins into balance and address environmental water needs can improve the outlook for farm water supplies. The agricultural sector can also do more—in partnership with others—to support workforce communities hit hard by the pandemic.4PRIORITIES FOR CALIFORNIA'S WATER 20205
• Invest in forest health as a vehicle for economic recovery. Wildfire risk is growing in California, threatening lives, property, and the quality of our air and water. Expanding forest management can help reduce extreme wildfire risk and safeguard the many benefits forests provide, while creating good jobs for rural, forest-based communities.
• Make the most of limited resources for the environment. Increasing the efficiency and effectiveness of ecosystem investments can help, as can efforts to reduce conflict over water dedicated to the environment. California also needs robust funding and reliable water supplies to improve the health of freshwater ecosystems, which are especially vulnerable to drought.

Online books and education materials free of charge

The Basin Plan Portal is home to the California Basin Plan Mapping Project (BPMP), a GIS dataset that contains information about beneficial use designations and waterbody segments identified in regional water quality control plans (Basin Plans).
Beneficial uses are the resources, services, and qualities of California's aquatic systems. The Water Board's mission is to preserve, enhance, and restore water quality for the protection of all uses. Swimming, fishing, spawning habitat, protected species habitat, agricultural use, tribal and cultural use, and municipal and domestic supply are all examples of beneficial uses. Each use represents a different type of benefit provided by California's watersheds, and each Regional Water Board has defined and designated beneficial uses unique to their waters.

This website has as its mission to "provide 21st Century water cycle science, technology and outreach to support effective policies and practices that address the impacts of extreme weather and water events on the environment, people and the economy of Western North America."
It contains observations (stream flow, precipitation, satellite, etc.), research, forecasts, reservoir operations (including Lake Mendocino), and news & publications.

Irrigated agriculture has grown rapidly over the last 50 years, helping food production keep pace with population growth, but also leading to significant habitat and biodiversity loss globally. Now, in some regions, land degradation and overtaxed water resources mean historical production levels may need to be reduced. We demonstrate how analytically supported planning for habitat restoration in stressed agricultural landscapes can recover biodiversity and create co-benefits during transitions to sustainability. We apply our approach in California's San Joaquin Valley where groundwater regulations are driving significant land use change. We link agricultural-economic and land use change models to generate plausible landscapes with different cropping patterns, including temporary fallowing and permanent retirement. We find that a large fraction of the reduced cultivation is met through temporary fallowing, but still estimate over 86,000 hectares of permanent retirement. We then apply systematic conservation planning to identify optimized restoration solutions that secure at least 10,000 hectares of high quality habitat for each of five representative endangered species, accounting for spatially varying opportunity costs specific to each plausible future landscape. The analyses identified consolidated areas common to all land use scenarios where restoration could be targeted to enhance habitat by utilizing land likely to be retired anyway, and by shifting some retirement from regions with low habitat value to regions with high habitat value. We also show potential co-benefits of retirement (derived from avoided nitrogen loadings and soil carbon sequestration), though these require careful consideration of additionality. Our approach provides a generalizable means to inform multi-benefit adaptation planning in response to agricultural stressors.

This document describes steps in calculating three different ecological indices used to quantify stream conditions in California based on biological and physical data. The instructions herein are provided as support for analysts requiring scores for the California Stream Condition Index (CSCI), Algal Stream Condition Index (ASCI), and Index of Physical Integrity (IPI). Each index uses predictive modeling to compare the conditions observed at bioassessment sampling locations with those expected under natural (reference) conditions.

Spillover impacts pose challenges for the management of protected areas (PAs).The issue of external threats encroaching on PAs has long been recognized, buta corollary—that PA conservation can increase costs borne by neighboring gov-ernments or landowners—is less well appreciated. In some contexts, basic prin-ciples of fairness and cooperation suggest that PA users should help pay thesecosts. Several countries have developed mechanisms for distributing the costs ofspillover impacts to PA users, but not the United States. Here, we investigatewhether and how US park visitors could help address one type of spillover, theneed for wildlife conservation efforts beyond park boundaries, using a casestudy of the Greater Yellowstone Ecosystem (GYE). We examine a“conserva-tion fee”recently proposed in the Wyoming legislature, along with tax-basedalternatives. After exploring some costs of wildlife conservation in GYE, we esti-mate that a fee of up to $10 per vehicle could generate up to $13 million annu-ally, and tax-based approaches considerably more. We consider legal, political,and governance challenges, and ways to mitigate them. The GYE could serve asa demonstration site for visitor funding of cooperative, large-landscapeconservation, for potential future expansion in the US and beyond.

This web page contains several minutes-long videos about different aspects of soil health and practices.

International efforts to restore degraded ecosystems will continue to expand over the coming decades, yet the factors contributing to the effectiveness of long-term restoration across large areas remain largely unexplored. At large scales, outcomes are more complex and synergistic than the additive impacts of individual restoration projects. Here, we propose a cumulative-effects conceptual framework to inform restoration design and implementation and to comprehensively measure ecological outcomes. To evaluate and illustrate this approach, we reviewed long-term restoration in several large coastal and riverine areas across the US: the greater Florida Everglades; Gulf of Mexico coast; lower Columbia River and estuary; Puget Sound; San Francisco Bay and Sacramento–San Joaquin Delta; Missouri River; and northeastern coastal states. Evidence supported eight modes of cumulative effects of interacting restoration projects, which improved outcomes for species and ecosystems at landscape and regional scales. We conclude that cumulative effects, usually measured for ecosystem degradation, are also measurable for ecosystem restoration. The consideration of evidence-based cumulative effects will help managers of large-scale restoration capitalize on positive feedback and reduce countervailing effects.

The Water Hub is a pro bono communications program of Climate Nexus that uses story-based strategies to advance water justice and resilience in the West. We work to make water communications more accessible and activism more effective, so the people most impacted by water challenges — largely people of color and tribes — have greater power to set the solutions.

The California Natural Resources Agency has identified Cutting Green Tape as a signature initiative to increase the pace and scale of ecological restoration and stewardship.
This web page is focused on improving interagency coordination, partnerships and agency processes and policies to allow ecological restoration and stewardship to occur more quickly, simply, and cost-effectively.
Though anchored in the Natural Resources Agency, Cutting Green Tape is an interagency effort with support from Secretary for Environmental Protection Jared Blumenfeld, Secretary for Food and Agriculture Karen Ross and State Water Resources Control Board Chair Joaquin Esquivel.
CNRA's Deputy Secretary for Biodiversity and Habitat Jennifer Norris is responsible for advancing the CGT Initiative across the Resources Agency and in coordinating with other agencies and partners.
On November 30, 2020 the California Landscape Stewardship Network released Cutting Green Tape: Regulatory Efficiencies for a Resilient Environment which provides an important set of recommendations for improving regulatory processes for projects that benefit the environment.

Coastal wetlands restoration is an emerging field which aims to recover the ecological characteristics of degraded ecosystems to natural ones. The recent UN declaration of 2021–2030 as the "Decade on Ecosystem Restoration" will hopefully encourage global implementation of these projects. However, a lack of common indicators of restoration success hinders our knowledge on the ecological outcomes of restoration projects. We conducted a literature review to determine trends in monitoring indicators. We classified indicators following the Society for Ecological Restoration template, adapting it to coastal wetlands. We found that indicators on structural diversity (e.g., tree height, fish size) were the mostly commonly used. Indicators on ecosystem function were the second most investigated, with half of the assessed studies including them, especially those focusing on carbon, nutrient and sediment dynamics. We propose a recovery wheel framework adapted to coastal wetlands. Structural diversity indicators are generally easier to measure and often the traits that recover the fastest. However, ecosystem function indicators could be more important to assess the recovery of ecosystem services, which is a primary objective of restoration. Restoration objectives and goals are variable for each project, and we encourage future restoration projects on coastal wetlands to select the most appropriate indicators on the basis of the recovery wheel proposed in this study to plan a monitoring framework. Future studies assessing coastal wetlands restoration ecological outcomes should include ecosystem function indicators and monitor the sites over periods adequate to their recovery.

This YouTube channel contains bilingual videos made for underrepresented growers about SGMA. Its purpose is to inform, empower and encourage underrepresented growers to become involved in the SGMA conversation.

Early Detection Rapid Response (EDRR) is a strategic approach to stopping the spread of invasive plants. Though not complicated conceptually, implementing it effectively at the landscape level is challenging. It requires a high degree of coordination, steady funding over time, and detailed tracking. While California has many important pieces in place, our response to invasive plants is not as strong as it needs to be to protect the state's biodiversity, agriculture, recreation, water supply and fire safety. This white paper provides background, a description of existing efforts, and recommendations for strengthening the state's EDRR capacity.

This Ranch Water Quality Planning Instructor's Guide and Lesson Plan (RWQP Guide) is an updated version of an original curriculum developed in 1995 by UC Cooperative Extension (UCCE) and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), with financial support from the California State Water Resources Control Board. Like the former curriculum, this updated guide and lesson plan provides a scientific overview of water quality, specifically for livestock operations, but with a wealth of new information discovered since the curriculum was first written. Another update is the provision of materials in an electronic format, including embedded video presentations on pertinent ranch water quality topics and step-by-step instructions on how to complete a ranch water quality plan (RWQP) by utilizing the RWQP Template worksheets.
This RWQP Guide is intended for extension professionals, watershed organization staff or volunteers, and the livestock ranching community. The goal is to provide an objective, adaptive framework and blueprint for organizing short course–type education programs that enable ranchers to complete RWQPs.

Electricity and water systems are inextricably linked through water demands for energy generation, and through energy demands for using, moving, and treating water and wastewater. Climate change may stress these interdependencies, together referred to as the energy-water nexus, by reducing water availability for hydropower generation and by increasing irrigation and electricity demand for groundwater pumping, among other feedbacks. Further, many climate adaptation measures to augment water supplies—such as water recycling and desalination—are energy-intensive. However, water and electricity system climate vulnerabilities and adaptations are often studied in isolation, without considering how multiple interactive risks may compound. This paper reviews the fragmented literature and develops a generalized framework for understanding these implications of climate change on the energy-water nexus. We apply this framework in a case study to quantify end-century direct climate impacts on California's water and electricity resources and estimate the magnitude of the indirect cross-sectoral feedback of electricity demand from various water adaptation strategies. Our results show that increased space cooling demand and decreased hydropower generation are the most significant direct climate change impacts on California's electricity sector by end-century. In California's water sector, climate change impacts directly on surface water availability exceed demand changes, but have considerable uncertainty, both in direction and magnitude. Additionally, we find that the energy demands of water sector climate adaptations could significantly affect California's future electricity system needs. If the worst-case water shortage occurs under climate change, water-conserving adaptation measures can provide large energy savings co-benefits, but other energy-intensive water adaptations may double the direct impacts of climate change on the state's electricity resource requirement. These results highlight the value of coordinated adaptation planning between the energy and water sectors to achieve mutually beneficial solutions for climate resilience.

This website documents the amphibians and reptiles (herps) found in the state of California with information including:

• Taxonomic Lists, Photo Indexes, Range Maps, and Species Accounts of all native and non-native amphibians and reptiles established in California

• Sound Recordings, including the Calls of California's Frogs and Toads

• Short Videos of most species

• Lists of Species that Might Occur in California and of Established Non-native Species in California

• Tips on Identifying Amphibians and Reptiles found in the wild in California

• California Collecting Regulations,

• Conservation Status information

This site provides information and links about California's freshwater and anadromous fish, current aquatic management issues, and research that is being done to improve the conservation of native fish species.

This report introduces a new framework to help ocean planners, managers,and stakeholders envision the full three-dimensionalspace requirements of different ocean uses, and to understand how their spatial footprints can create conflicts with other ocean uses in the same area. This methodology, and the insights it generates can benefit many forms of place-based ocean planning, including permitting specific activities, zoning marine protected areas, or comprehensive marine spatial planning of multiple ocean uses. This report is a guide to understanding, creating,and applying space use profiles in real-world oceanplanning situations.

This document provides an introduction to ecological connectivity in MPAs while highlighting information needed to fully capitalize on this important ecological process for more effective and resilient MPAs.

This document offers a high-level regional analysis of existing efforts to monitor and forecast HABs and identifies gaps in observing capabilities that can best be addressed with a national network. The regional context of this network aligns with the IOOS structure that comprises 11 distinct regions, each with a corresponding Regional Association (RA). All the IOOS regions have significant HAB-related issues, but some RAs are further advanced in their monitoring efforts and their ability to detect and/or forecast HAB events is more mature. In addition, each region faces a unique set of HAB-related threats in terms of species presence, environmental conditions, and type and scale of impacts, which necessitates customized, region-specific approaches that are outlined in this document. Herein, the regional capabilities needed to achieve a sustainable national network of HAB-specific monitoring infrastructure are identified and prioritized, and the potential societal benefits and estimated costs of establishing the NHABON are discussed.This Framework is the first step in developing an NHABON that can ultimately integrate the respective regional HAB observing systems into a single, nationwide network.

To reduce the incidence of recreational waterborne illness, fecal indicator bacteria (FIB) are measured to assess water quality and inform beach management. Recently, predictive FIB models have been used to aid managers in making beach posting and closure decisions. However, those predictive models must be trained using rich historical data sets consisting of FIB and environmental data that span years, and many beaches lack such data sets. Here, we investigate whether water quality data collected during discrete short duration, high-frequency beach sampling events (e.g., samples collected at sub-hourly intervals for 24–48 h) are sufficient to train predictive models that can be used for beach management. We use data collected during six high-frequency sampling events at three California marine beaches and train a total of 126 models using common data-driven techniques. Tide, solar irradiation, water temperature, significant wave height, and offshore wind speed were found to be the most important environmental variables in the models. We validate the predictive performance of models using withheld data. Random forests are consistently the top performing model type. Overall, we find that data-driven models trained using high-frequency FIB and environmental data perform well at predicting water quality and can be used to inform public health decisions at beaches.

On July 30, 2020 the Sonoma Resource Conservation District (RCD) and Jackson Family Wines hosted their third demonstration workshop for winegrape growers and industry professionals. Due to COVID-19 the workshop was held virtually and the recording is now available.

This video addresses permitting and other information needed prior to residential landscape debris burning.

Dr. Mark Greenspan, viticulturist and President of Advanced Viticulture in Windsor, CA, discusses his approach to managing irrigation in vineyards to achieve optimal grape quality using the least amount of water necessary. In this interview with Keith Abeles, the Sonoma RCD's Soil and Water Specialist, he explains his program of using soil moisture probes in conjunction with pressure chambers and porometers to deliver precise amounts of irrigation when needed, and how to hold off when it is unnecessary. Discussing these and other tools, Dr. Greenspan provides a framework for any type of agricultural producer to grow the highest quality crop using water as efficiently as possible.

This guide is written for anyone seeking help from federal programs to foster sustainable and innovative initiatives associated with agriculture and forestry in this country and territories. Sustainability can be understood to embrace the triple concepts of economic, environmental and social viability. A reader can find information about program resources pertaining to economic development; farm loans; insurance and risk management; local food systems, value added and marketing innovations; natural resources conservation and management; nutrition and consumer food access; renewable energy and energy conservation; and research and outreach. The guide can help farmers, researchers, entrepreneurs, community developers, private landowners, conservationists, and other individuals, as well as private and public businesses and organizations. It describes program resources ranging from grants and loans to technical assistance and information resources.

The National Risk Index is a new, online mapping application from FEMA that identifies communities most at risk to 18 natural hazards. This application visualizes natural hazard risk metrics and includes data about expected annual losses, social vulnerabilities and community resilience.
The National Risk Index's interactive web maps are at the county and census tract level and made available via geographic information system (GIS) feature services for custom analyses. With this data, you can discover a holistic view of community risk to natural hazards via online maps and data.
Online mapping applications that provides climate risks to a user-identified community.

This report is split into three parts.Part I briefly describeswhat has changed in our understanding of climate change and climate adaptation science, as well as how the emerging field of the adaptation practice has grown. Part II cross-walks the Strategy goals with a variety of conservation plans made at federal, state, tribal, and nonprofit levels to assess where and how the Strategy has been implemented or been an influence over the past decade. Finally, Part III summarizesthe findings of this report by laying out recommendations. These recommendations include thirteen voluntary managementactions designed to highlight and address theneeds and challenges of the natural resource communityin the new decade.

Dam construction and longitudinal river habitat fragmentation disrupt important lifehistories and movement of aquatic species. This is especially true forOncorhynchus mykissthat exhibitsboth migratory (steelhead) and non-migratory (resident rainbow) forms. While the negative effectsof dams on salmonids have been extensively documented, few studies have had the opportunity tocompare population genetic diversity and structure prior to and following dam removal. Here weexamine the impacts of the removal of two dams on the Elwha River on the population genetics ofO. mykiss.Genetic data were produced from >1200 samples collected prior to dam removal from bothlife history forms, and post-dam removal from steelhead. We identified three genetic clusters priorto dam removal primarily explained by isolation due to dams and natural barriers. Following damremoval, genetic structure decreased and admixture increased. Despite largeO. mykisspopulationdeclines after dam construction, we did not detect shifts in population genetic diversity or allelefrequencies of loci putatively involved in migratory phenotypic variation. Steelhead descendantsfrom formerly below and above dammed populations recolonized the river rapidly after dam removal,suggesting that dam construction did not significantly reduce genetic diversity underlyingO. mykisslife history strategies. These results have significant evolutionary implications for the conservation ofmigratory adaptive potential in O. mykisspopulations above current anthropogenic barriers.

This report extends the application of economics beyond monetary costs and benefits or jobs and income, providing information to help local governments make the case for action The report demonstrates how economic analyses can help sustainability directors, local government staff engaged with sustainability and climate work, and other partners make concise, data-driven cases for community adaptation and resilience.

The Human Right to Water Framework and Data Tool 1.0 (CalHRTW 1.0)—comprised of this written report and accompanying web tool—builds on an initial framework presented in January 2019 (OEHHA, 2019a) and draft results that were subsequently released in August 2019 (OEHHA, 2019b). The final framework measures nine indicators, in three main areas: Water Quality, Water Accessibility and Water Affordability. CalHRTW 1.0 incorporates the most recent water quality data (from 2011 to 2019), updates the water accessibility component to include a more refined measure of physical vulnerability and includes three key metrics to assess water affordability challenges. An additional equity and vulnerability chapter explores the relationship between human right to water outcomes and three characteristics of social and institutional vulnerability: disadvantaged community status, water system size and managerial constraints. In addition to summarizing system-level information for the nine indicators and three components, the web tool includes information on critically over-drafted basins and time since the last high potential exposure or non-compliance event. The inclusion of these items reflects the incorporation of extensive public comment received during academic and public workshops, following the release of the 2019 drafts.

To help agencies plan a course of action, set priorities, and monitor progress to engage and serve broader constituencies, the Relevancy Roadmap tackles barriers under 5 categories: agency culture, agency capacity, constituent culture, constituent capacity, and political and legal constraints. When exploring relevancy barriers within the 5 categories, you will find strategies, steps, tactics, and resources to overcome the barrier and enhance relevancy. Implementation of the Roadmap should begin by exploring this site to review the full list of barriers.

With the recently documented loss of 2.9 billion birds over 50 years in North America, unprecedented and creative partnerships are needed more than ever to advance bird conservation goals. Many bird conservation outcomes align with broader societal goals, such as water quality and human health, creating opportunities for meaningful and productive partnerships that advance goals that benefit birds and people, in coalitions that are stronger than one community working alone. Developing mutually beneficial partnerships based on common or complementary goals requires commitment, flexibility, and a desire and capacity to listen and understand the needs, values and challenges of potential partners. NABCI's Field Guide to Developing Partnerships provides guidance on how to find common goals, effectively reach out to potential partners, and develop lasting relationships that benefit all players.

Each Water Leaders Class is responsible for preparing a report on a specific issue that is at the forefront of water policy in California. The 2020 Water Leaders Class was tasked with exploring both the impacts of climate change on water in California and the avenues for adapting to these impacts in ways that are technologically feasible, sustainable and inclusive of all Californians. To meet this task, each member of the 2020 Water Leaders Class was paired with and responsible for conducting an interview and developing a relationship with a mentor who is a knowledgeable water professional. Through the interview process, leaders were able to gain insight on the various impacts of climate change on water in California and the mitigation and adaptation efforts that are currently underway. Since mentors represented a wide variety of water-related professional sectors, the 2020 Water Leaders Class was able to collectively gain an understanding of the widespread impacts of climate change in most water-related sectors throughout the state. In addition to gathering knowledge from their mentors, members of the 2020 Water Leaders Class further explored water policy and history in California by participating in workshops, hearing from water experts and learning from one another.

On December 2 and 3, 2020, OEHHA convened a virtual workshop to provide a forum for exploring the scientific evidence for the interconnections between climate change and its impacts, and the implications for California. Discussions at the workshop will inform the 2021 edition of the report, Indicators of Climate Change in California. The following were the goals of the workshop:

To better understand how the various manifestations of climate change and their impacts interact in ways that create previously unrecognized risks or magnify known risks to humans and the environment.

To collect scientific information that could inform how climate change indicators can be presented in ways that reflect linkages to fully characterize climate change in California.

To identify additional climate-related issues to track using indicators.

The workshop consisted of sessions that reflect the organization of the indicator report: changes in climate; impacts on physical systems; impacts on human health and well-being; impacts on vegetation; and impacts on fish and wildlife. Speakers from academia, research institutions, government agencies, tribes, and community organizations delivered presentations during the sessions (see Speaker presentations, below). The presentations and panel discussions explored the interrelated nature of climate change and its impacts, and ideas for new indicators. Sessions available on web page.

In this webinar, viewers learn about how state programs are addressing the pressing issues of disaster mitigation and climate adaptation, including Florida's use of social vulnerability assessment, Massachusetts's prioritizing resources for communities with EJ concerns, and North Carolina's working with the historic township of Princeville to recover from multiple flood events.

SWRCB Division of Water Rights Staff Report that is an identification of data needs and recommendations to incorporate climate change into water rights permitting policies, procedures, and methodologies.

Managing invasive species becomes increasingly difficult and expensive as populations of new pathogens, plants, insects, and other animals (i.e., pests) spread and reach high densities. Research over the past decade confirms the value of early intervention strategies intended to (1) prevent invasive species from arriving within an endangered area or (2) detect and respond quickly to new species incursions (Baker et al. 2009; Ewel et al. 1999; Holden et al. 2016; Leung et al. 2014). The goal of such biosecurity approaches is to keep or return the density of invasive species to zero so that damages from those pests might be prevented or to confine populations to localized areas so that damage from those species might be limited (Magarey et al. 2009). Prediction, prevention, early detection, eradication, and other rapid responses, all components of proactive management, are less costly and more effective than reactive tactics (Epanchin-Niell and Liebhold 2015; Leung et al. 2002; Lodge et al. 2006; Rout et al. 2014) (Fig. 6.1). Prediction is achieved through risk assessment (a process to forecast the likelihood and consequence of an invasion) and pathway analysis (a process to evaluate the means by which invasive species might be brought into an area of concern). Prevention is achieved through a variety of measures including regulations and quarantine treatments. Indeed, pathway analyses and subsequent regulation of those pathways are considered "the frontline in the prevention of biological invasions" (Hulme 2009) and cost-effective approaches (Essl et al. 2015; Keller et al. 2007; Leung et al. 2002; Tidbury et al. 2016). Surveillance is fundamental to early detection, and if a target species is detected, the primary rapid responses are eradication, containment, or suppression (reviewed in Beric and MacIsaac 2015). Early intervention strategies often operate at spatial scales that are much greater than the scale at which most land managers operate. Success thus requires effective coordination among researchers, regulators, and managers at international, national, sub-national, and local levels.

The monarch butterfly (Danaus plexippus) originates in North America where an eastern and western population undertake
extensive migrations. An iconic pollinator, monarchs are of social, ecological, and economic importance and safeguarding
their migration requires cooperation across borders and sectors of society. Precipitous decline and potential listing under the
U.S. Endangered Species Act have spurred massive efforts to plant milkweed and to preserve overwintering forests. Monarch
imperilment is the result of overarching threats that are also driving the decline of other once-common species and the
efficacy of efforts to conserve them will ultimately depend on forestalling further loss of habitat and curtailing pesticides and
greenhouse gases.

This is an information website that is meant to share ideas and resources for successful implementation of the Sustainable Groundwater Management Act.
The Groundwater Exchange is a central, collaborative, and publicly accessible online resource center connecting water managers, water users, and community members with tools and resources to support the design and implementation of effective Groundwater Sustainability Plans under California's Sustainable Groundwater Management Act. The Groundwater Exchange is a program of the California Water Library and is a project of the Multiplier, a 501(c)3 nonprofit organization that helps us protect and foster a healthy, sustainable, resilient, and equitable world.

California's coastal waters include some of the most productive and diverse ecosystems in the world. To conserve this biodiversity and the coastal economies and communities that rely on a healthy ocean, OPC is committed to protecting endangered and threatened whale and sea turtle species as well as supporting thriving commercial and recreational state-managed fisheries. This strategy outlines investment priorities to reduce the risk of entanglement in California fishing gear and is one component of a more comprehensive effort to protect whales and sea turtles in California. This is consistent with Target 3.3.5 of OPC's draft Strategic Priorities to Protect California's Coast and Ocean for 2020-2025: "3.3.5: Develop a statewide whale and sea turtle protection plan by 2022 with a Vision Zero target of zero mortality. As a component of this overall plan, develop and initiate a funding strategy to reduce the risk of entanglement in California fishing gear by 2020.
Actions:
- Collaborate with the California Dungeness Crab Fishing Gear Working Group to reduce the risk of whale entanglement in California fishing gear; fund priority projects recommended by the Working Group to address data gaps and enhance results.
- Provide funding for the state's drift gillnet transition program (consistent with SB 1017) and work towards the target of elimination of large mesh drift gillnets off the California coast by 2024.
- Support research and analysis of impacts of whale strikes from the shipping industry and other sources of whale and turtle mortality, including noise and marine debris from landbased sources."
This investment strategy focuses on a comprehensive approach to reduce the risk of entanglement in California fishing gear through advancing collaborative partnerships, best available science, gear innovation, as well as response and outreach. The strategy aims to build on the success of the California Dungeness Crab Fishing Gear Working Group and could support other fixed-gear state-managed fisheries in addition to commercial and recreational Dungeness crab. This is the first critical component of California's Whale and Sea Turtle Protection Plan.

This Innovation Guidance document, along with the companion Innovation Guidance Workbook found at the end of the document, is designed to help your utility start an Innovation Program or improve its existing program. The document provides a structured process that is scalable and can be used by utilities of any size.

To explore these issues and others toward framing a vision for 21st century conservation and ways to accelerate progress in addressing them, eight institutes affiliated with nine universities came together in the spring and summer of 2020 to convene a series of "Conservation Conversations." These conversations brought together experts to share cutting edge understanding to inform the future of conservation on a range of pressing issues including climate change and biodiversity management; co-management to reduce wildland fire risk; conservation's contribution to rural economies; transboundary conservation; carbon sequestration and climate justice in cities; inclusion and co-management for native Americans; and the increasing challenge of managing the impacts of outdoor recreation on our public lands.The following report includes brief summaries of each of these Conservation Conversations highlighting some of the observations and recommendations that resulted. All of the conversations, including expert presentations and their responses to questions raised by audience participants, can be found at www.conservationconversations.org.54

As the climate continues to change, San Francisco Bay shoreline communities will need to adapt in order to build social and ecological resilience to rising sea levels. Given the complex and varied nature of the Bay shore, a science-based framework is essential to identify effective adaptation strategies that are appropriate for their particular settings and that take advantage of natural processes. This report proposes such a framework—Operational Landscape Units for San Francisco Bay.

As municipalities and water-quality regulatory agencies have implemented programs and policies to improve management of the trash loading to storm drain conveyances, there has been increased interest in using a common set of methods to quantify the effectiveness of management actions. To create a foundation for developing a consistent, standardized approach to trash monitoring statewide, the project team performed a method comparison analysis, based on two seasons of fieldwork. This analysis facilitated the assessment of the accuracy, repeatability, and efficiency of some already developed trash monitoring methodologies already in use, as well as help to investigate a new, innovative method (cf. Fielding Testing Report on trashmonitoring.org). Methods developed by the Bay Area Stormwater Management Agencies Association (BASMAA) for use in the San Francisco Bay Area were compared to methods developed by the Southern California Stormwater Monitoring Coalition (SMC) for use in coastal southern California. One of the chief goals of these comparisons was to understand the similarities and differences between the already existing methods for detecting, quantifying, and characterizing trash in selected environments. Readers will find that the data bear out remarkable levels of accuracy and precision with quantitative metrics that help to align methods and management concerns. Furthermore, the degree of correlation among tested methods were especially high, offering greater opportunities for inter-method comparisons.

The findings of this project are intended for use by public agencies, non-profit organizations, private consultants, and all of their various partners in informing a statewide effort to adopt rigorous, standardized monitoring methods to support the State Water Board's Trash Amendments. Over the next couple of decades, such public mandates will require all water bodies in California to achieve water quality objectives for trash.

This document is a bold and comprehensive plan comprised of objectives, targets, and actions in each goal area. Notably, the pace of implementation will depend on the feasibility and availability of resources and competing priorities. Nevertheless, this plan establishes an ambitious collective vision for protecting the intrinsic, cultural, ecological, and economic benefits provided by California's coast and ocean. OPC looks forward to working with state agencies, other governmental partners, tribes, and all stakeholders to ensure California advances its global leadership protecting our state's world-renowned coast and ocean.

A USGS Western Geographic Science Center website that is a library hosting water availability and sustainability science related to:
arid lands water harvesting
water sustainability
ecosystem services
water for agriculture
water from coastal fog

This SWRCB web page defines "safe" drinking water and walks consumers through how to determine if they are consuming water that is safe to drink.

This guidance offers best practices to help State agencies evaluate options, make key decisions, and avoid pitfalls as they develop effective TA programs. While State agencies are the primary audience for the TA Guidelines, other stakeholders seeking to provide or receive TA will likely find the manual useful as well.

This guide provides fishing regulations for all regions of California from March 1, 2021 through February 28, 2022 unless otherwise noted in the document.

This online publication is an informal compilation of Bulletin 74-81 and the draft supplemental, Bulletin 74-90. Although Bulletin 74-90 was not finalized by DWR, nor officially adopted into the Model Well Ordinance by the State Water Resources Control Board, it has been adopted into local ordinances around the state. To facilitate its use, DWR has combined the contents according to Table 1 (B74-90) of Bulletin 74-90 and made minor modifications in wording and formatting to improve readability.

River Network's new Community-Led Research Toolkit provides step-by-step guidance and lessons learned on how to effectively engage with community members to understand climate impacts and to develop equitable climate resilience strategies.
The toolkit can help you answer:
- What is Community-Led Research and Knowledge?
- Why should you do Community-Led Research?
- What are the benefits of Community-Led Research?
- How do I conduct Community-Led Research?

The toolkit also has real-world Community-Led Research case studies, a Community-Led Research Project Planning and Facilitation Guide, and extensive lists of references and resources.

Cyanobacterial toxins are among the most hazardous substances, widely found in waterbodies. They occur naturally, but human activity influences the extent to which toxic cyanobacteria proliferate. Therefore, management of lakes, reservoirs and rivers to prevent cyanobacterial blooms is critical to protect human health.
This second edition presents the current state of knowledge on the occurrence of cyanobacteria and cyanotoxins, as well as their impacts on health through water-related exposure pathways, chiefly drinking-water and recreational activity. It provides technical background information to support hazard identification and the assessment, prioritisation and management of the risks posed by cyanobacteria and their toxins at each step of the water-use system. It also includes practical considerations for developing management strategies, and designing monitoring programmes for cyanobacteria management.
This revised edition is intended for those working on toxic cyanobacteria with a specific focus on public health protection, and aims to empower professionals from different disciplines to communicate and cooperate for the sustainable management of toxic cyanobacteria in water.

Panel discussions of California's progress, opportunities and obstacles in working toward the state's carbon neutrality goals. Co-hosted by Livermore Lab Foundation, Lawrence Livermore National Laboratory, and the California Council on Science & Technology.

Nature-based solutions use or mimic natural processes to meet societal and environmental needs. They can be used to restore, manage, or protect water resources while also increasing biodiversity and providing additional social and economic benefits.

Yet there is no standardized method to identify, estimate, and monitor the benefits that nature-based solutions can provide, making it hard to build the case for investments in these solutions. This guide builds on the Benefit Accounting of Nature-Based Solutions for Watersheds Landscape Assessment [hyperlink], which highlights the barriers for businesses to implement nature-based solutions on a large scale. The guide outlines which specific nature-based solutions can be implemented in various habitats, and suggests methods for measuring the benefits.

This is a website. The National Integrated Drought Information System (NIDIS) is a multi-agency partnership that coordinates drought monitoring, forecasting, planning, and information at national, tribal, state, and local levels.

This DWR webpage provides information for high- and medium- priority groundwater basin assistance and engagement with state contacts. The site is meant to connect interested parties with staff who will: provide information and help GSAs and interested parties connect with DWR and locate resources, including guidance on communication and engagement and assistance services such as technical support, facilitation support, written translation, and financial assistance. It includes a communication and engagement toolkit, program events, and translated materials.

This is the second in SER-NW's webinar series: Inclusion in Ecological Restoration.

This four-part webinar series seeks to raise awareness of ecological drought, share actions that strengthen ecosystem resilience and mitigate the impacts of droughts, and discuss research and management needs for future drought planning and preparedness. The series is co-hosted by NIDIS and the U.S. Geological Survey (USGS) National Climate Adaptation Science Center, with expert speakers from the research community, tribal nations, and government agencies.

This list of resources was compiled by the organizers, presenters, and participants of the 2021 virtual National Adaptation Forum - Heat Stress Series. EcoAdapt's National Adaptation Forum program gathers climate adaptation practitioners for in-person and online events to facilitate knowledge exchange, networking, and professional development while lifting up best practices in adaptation. This page features reports, tools, and journal articles that focus on adapting to heat stress as it relates to public health, species & ecosystems, community planning, and more.

This report documents the computer software package, Basin Characterization Model, version 8 (BCMv8)—a monthly, gridded, regional water-balance model—and provides detailed operational instructions and example applications. After several years of many applications and uses of a previous version, CA-BCM, published in 2014, the BCMv8 was refined to improve the accuracy of the water-balance components, particularly the recharge estimate, which is the most difficult to accurately assess. The improvement of the various water-balance components targeted the actual evapotranspiration component, which, in turn, reduced the uncertainty of the recharge estimate. The improvement of this component was enabled by the availability of a national, gridded actual-evapotranspiration product from the U.S. Geological Survey that was unique in its scope to combine remotely sensed spatial variability and ground-based long-term water-balance constraints. This dataset provided the ability to assess monthly actual evapotranspiration for 62 vegetation types and to perform regional calibration in watersheds throughout California with the objective of closing the water balance using improved estimates for each component. The refinements, including vegetation-specific evapotranspiration, enabled the development of applications that could explore various aspects of landscape disturbance, such as wildfire, forest management, or urbanization. The improvements to BCMv8 also provided the ability to assess long-term sustainability of water resources under a variety of management applications or future climate projections.

This glossary is a compilation of terms related to water quality, environmental monitoring, hydrology, quality assurance practices and watershed management. It was especially created to bring togethertechnical words often used when talking about water, science, and stewardship; terms which often have very precise meanings. The definitions are compiled from many sources with the goal of helping individuals navigate and understand the terminology used in water quality monitoring and watershed management.

The Needs Assessment is comprised ofRisk Assessment, Affordability Assessment, and Cost Assessment components. Development of the NeedsAssessment consisted of stages between September 2019 and March 2021, each of which were detailed in publicly-available white papers and presented at public webinars. The public feedback was incorporated into the final methodology and results.

This white paper defines “land repurposing” as any activity that is undertaken by a public or private entity that converts previously irrigated agricultural land to new uses that both 1) reduce groundwater demand or use, and 2) provide some other measurable benefits to the environment or broader San Joaquin Valley community. Land repurposing can:

- Provide a number of different benefits, such as reducing water use, improving air quality, creating habitat corridors and recreational spaces and generating new sources of revenue and local jobs.
- Work in combination with ongoing productive agriculture.
- Encompass economic, environmental and/or societal benefits.

The goal of this white paper is to provide practical and creative approaches to support the development of regionally coordinated land repurposing strategies, including incentive-based voluntary programs that prioritize the health and resilience of communities and landscapes in the San Joaquin Valley.

The mission of the Internet of Water (IoW) is to promote and support efforts to improve our nation's water data infrastructure. An important part of this mission is the development of critical, but often missing, technical tools. But also essential to the IoW mission is to address the knowledge gap that exists between traditional and modern data management practices. This guidebook provides foundational knowledge about water data infrastructure in clear and non-technical language. A background in data science or information technologies is not needed.

Interactive Guide for property owners for fuel reduction on their lands.

COBRA is a screening tool that enables state, local, and tribal government staff and others interested in the effects of air pollution to estimate the air quality and health benefits of different emissions scenarios.

It is the goal of this analysis to share our findings in order to help inform and improve the development of GSPs for non-critically overdrafted basins, as well as to inform opportunities for improvement of GSPs for critically overdrafted basins.

The Navigate the Flood guide streamlines local decision-maker's and city and utility staff's navigation of the vast and complex array of technical guidance and funding resources for stormwater and flood planning and management. For local elected and appointed officials, the Guide offers a way to orient themselves to the fundamentals and language of stormwater and flood management via an overview of the key decision-making steps towards planning for and building sustainable, resilient, and equitable stormwater and flood management systems. For managers and staff, the Guide offers a way to drill down into these key planning and implementing steps and easily access a deep well of existing technical and financial resources that are available to support stormwater and flood planning and management.

An interactive mapping application. The Governor's Office of Planning and Research developed the ResilientCA Adaptation Planning Map (RAP-Map), an open data tool, to inventory local government climate risk, adaptation, and resiliency planning efforts across the state and track progress towards statewide adaptation planning goals. By clicking directly on cities and counties on the map (or by download), users can quickly access the planning details of local jurisdictions, including links to vulnerability assessments; adaptation goals, strategies and implementation measures; and updated and adopted General Plan Safety Elements, Local Hazard Mitigation Plans, or other stand-alone adaptation or resilience plans.

The color-coded RAP-Map categorizes local governments based on planning efforts that reflect key components of climate adaptation planning in California (i.e. vulnerability/risk assessments and adaptation policy development) and were updated or completed since January 1, 2017.

Describes the state of drought conditions in CA as of January 2021

Interactive mapping website. The Department of Water Resources developed this site to support drought resilience planning among small water suppliers. Indicators of risk and scoring were developed through an extensive stakeholder participatory process as part of fulfilling Assembly Bill 1668.

To improve water conservation and water shortage planning, Assembly Bill 1668 (Friedman), passed into law in 2018, directed DWR to do the following:

Identify small suppliers and rural communities at risk of drought and water shortage vulnerability and
Develop recommendations for improving drought contingency planning for those areas.

In coordination with multiple state agencies and vetted through an extensive stakeholder process, DWR developed recommendations that would allow small water suppliers and rural communities to meet their drought and water shortage planning needs. These are the report products

The Department of Water Resources developed this site to support drought resilience planning among rural communities. Indicators were developed through a stakeholder participatory process as part of fulfilling legislative requirements (AB 1668) to identify rural communities in CA at risk of drought and water shortage.

The SWRCB Needs Assessment contains three core components: Risk Assessment, Cost Assessment, and Affordability Assessment. Four different water system types: public water systems, tribal water systems, state small water systems and domestic wells, are analyzed within the Needs Assessment. Different methodologies were developed for these system types based on data availability and reli ability.

This webpage provides information and resources relevant to the current drought. It provides links to current reservoir, precipitation, snowpack and river flows, recent state actions, and a list of resources about drought-related assistance and actions.

When choosing a treatment technology for nitrate or perchlorate removal, drinking water utilities overwhelmingly choose ion exchange. However, of late, biological treatment and point-of-use systems have received a great deal of attention. This article utilizes several new U.S. Environmental Protection Agency models to estimate the cost of nitrate and perchlorate treatment for small drinking water systems. The analysis here shows that, when comparing the three technologies for a typical set of design choices and drinking water quality conditions, the least-cost option varies among the three depending on system size. This relationship varies with changes to the water quality and design factors such as, but not restricted to, influent nitrate and perchlorate concentrations, the choice of residual management options, and the presence of co-contaminants and competing ions.
Article Impact Statement: Small systems that struggle with nitrate and perchlorate contamination will benefit from this evaluation of treatment costs.

EPA has developed a set of values that help state and local government policymakers and other stakeholders estimate the outdoor air quality-related public health benefits of investments in energy efficiency and renewable energy (EE/RE). These monetized values were developed using methods consistent with those EPA uses for health benefits analyses at the federal level. To learn more about the health effects included in the benefits-per-kilowatt-hour (BPK) calculations, please see the 2019 update of the technical report.

Each year the Governor's Office of Planning and Research (OPR) distributes the Annual Planning Survey (APS)to every city and county in the stateof Californiato gain information about the status of each jurisdiction's planning efforts and explore, in greater depth, the policies that jurisdictions are implementing to address issues of statewide concern. These public survey responses allowOPR and the larger planning community to identify areas of local leadership and develop tools and guidance for jurisdictions. OPR distributed the APS electronically in November 2020 and accepted responses through early January 2021. During the survey period, staff followed up with 177 jurisdictions through direct phone outreach. In addition, two reminder emails were sent to each city and county.This report provides an overview of the 2020 results and highlights key themes and insights.

Across the West, practitioners working on sustainable land management and restoration have increasingly focused on efforts that cross public, private, and tribal boundaries. Working across multiple land ownerships creates efficiencies, helps leverage resources, and better addresses the interconnected nature of today's ecological and economic challenges. While this type of "all-lands" work has gained broad support and interest, it is also complex, involving multiple partners, different land ownerships, diverse objectives and priorities, and many funding sources. Unsurprisingly, all-lands projects can be difficult to successfully implement to their full potential. For 20 years, the Rural Voices for Conservation Coalition (RVCC) has advocated for policies and developed tools and resources that support partners working together across land ownerships. In line with this work, the following checklist presents considerations and best practices for carrying out all-lands projects that leverage partners' diverse skills and capacities to accomplish more than the sum of their parts. Developed from interviews with practitioners and reviews of case studies and academic literature, the checklist is intended as a set of possible ingredients rather than a defined recipe for this type of multi-partner work. Some items may come before others or be more applicable than others depending on the project. Our hope is that this list can help guide all-lands projects that are high quality, inclusive, and strategic.

The Cyanotoxins Preparedness and Response Toolkit (CPRT) is an online tool to help states and tribes prepare for potential HABs in freshwater bodies and know how to respond to protect public health. The CPRT follows the EPA's National Response Framework (NRF), a consistent nationwide framework built on the Department of Homeland Security's National Incident Management System (NIMS). As such, the CPRT includes the essential components to prevent and respond to cyanotoxins events in drinking and recreational waters, and to update and improve preparedness and response for future cyanotoxin events.

In this report, the working group provides an overview of climate change impacts and scenarios for the California Current, catalogs potential mechanisms by which MPAs could provide resilience to climate change (and weighs the evidence for and against each), and suggests research questions and methods that could guide our detection and understanding of climate resilience in California's MPAs going forward. Lastly, we share a set of recommended actions, summarized in Table 4, that are intended to inform investments in a climate research and monitoring plan for the MPA network, help guide new policy, expand agency collaborations, position MPAs as a tool within the state's larger climate action toolbox, and ensure an inclusive, science-informed process for adaptive MPA management in a changing climate.

The science of MPAs and MPA evaluation are rapidly evolving fields in California and beyond. Consistent with the wisdom of Indigenous societies worldwide, it is now well established in the scientific literature that most successful MPAs are designed and managed with human as well as ecological considerations, with benefits for both. Therefore, the Working Group adopted a social-ecological systems (SES) framework(Figure 1) to describe key components and interconnections of the Network, placing monitoring questions and evaluation efforts in a social-ecological context. The SES framework identifies ecological, human, and governance components of the Network (referred to as domains), functions, services, and outcomes that flow from these domains, and factors that influence aspects of MPA and network performance (influencing factors). The six key findings made in the context of this SES framework are included.

Eelgrass, a vital marine plant that cleans the water, absorbs carbon, produces oxygen, acts as nursery habitat, and protects the coastline, faces a suite of threats. Now a new report commissioned by The Pew Charitable Trusts shows eelgrass restoration efforts are far more influenced by environmental conditions than by the methods used in those efforts.

The report, released June 1 by the Pacific Marine and Estuarine Fish Habitat Partnership (PMEP), showed that transplanting methods "are not as important to project success as ensuring that site conditions are conducive to eelgrass," said Kathryn M. Beheshti of the University of California, Santa Cruz, who co-wrote the study with Melissa Ward of San Diego State University.

This versatile seagrass, which is found in estuaries, bays, and other shallow nearshore areas, is disappearing due to increasing coastal development and rapidly changing ocean conditions. Approximately 30% of the world's seagrass has vanished since the 1870s.

This manual provides specific management measures for agricultural operations.

The purpose of this report is to inform a new comprehensive heat plan, which will direct DC government agencies on how best to aid frontline communities and populations most at-risk during heat waves and extreme heat crises.

Agricultural Managed Aquifer Recharge (AgMAR) is the act of intentionally flooding fallow, dormant, or active cropland when excess surface water is available. AgMAR has the potential to be a cost-effective and high impact form of MAR due to the large acreage of cropland throughout California. As more farmers adopt AgMAR, there is greater urgency to understand the potential water quality risks and benefits associated with recharge. While pesticides and geogenic contaminants such as arsenic pose additional water quality concerns in MAR projects, this paper focuses specifically on water quality considerations for nitrate and salts related to AgMAR activities.

This document represents a first step towards management guidance for on-farm recharge planners and practitioners to maximize benefits to water quality and to manage risks under AgMAR. This document is also intended to be used as a resource for communities so they can more fully participate in the GSA decision-making process. More research on this topic is needed, but with thoughtful stakeholder engagement – including communities, communitybased organizations, growers, and GSAs – and careful consideration of drinking water quality, AgMAR can be an effective strategy for securing water resources into the future for all Californians.

This report presents the methods used to estimate the consumer surplus for natural resource attribute improvements among for-hire whale watching passengers in Channel Islands National Marine Sanctuary (CINMS), along with the results of this analysis. Understanding what users are willing to pay for natural resource improvements (such as increases in the number of whales and other marine mammals) helps to inform management and policy decisions. Information on the benefits of improving resource conditions informs cost-benefit analysis of potential policy and management changes. This report is one of two methods papers that document the approach used to collect and analyze the data. Through the development and implementation of a survey and sampling design, original data were collected and then analyzed. Results include the economic contribution (jobs, income, value-added, and output) of whale watchers, the characteristics they find most important and are most satisfied with, the number of whale watching days and trips they make to the region, the types of wildlife viewing animals they most like, and the focus of this report, non-market valuation of resource attribute improvements. The findings of this research will used to support the CINMS management plan review, inform education and outreach efforts related to whales, and provide additional information to for-hire
wildlife viewing operations about their passengers and economic contributions to the region.

The California Natural Resources Agency created the Biodiversity Advisory Panel to inform biodiversity protection strategies for California's 30x30 initiative. The panelists represent broad expertise across marine, terrestrial, and freshwater systems, with specialties spanning from population genetics to ecosystem processes. The panel addressed which criteria are most helpful to identify priority lands and coastal waters for protecting California's biodiversity now and in the future. Additionally, panelists discussed effective long-term management practices to safeguard conserved lands and coastal waters for biodiversity, including how the state can partner with California Native American tribes to support traditional stewardship practices.

This toolkit provides sampling of some of the work done by ABAG, by other local, state and federal partners, by other local governments and by academics on the topic of long-term disaster recovery. It includes some conceptual and theoretical work as well as practical tools such as model ordinances.

This is a draft mapping application of the proposed 303(d) list of impaired waters for the 2020-2022 Integrated Report. The purpose of this app is to display the content of the Integrated Report in a user-friendly way.

Extreme heat causes more deaths than any other weather-related hazard.1 As climate change causes temperatures to climb across the world, this threat to public health is only expected to worsen, and cities are among the places that are hardest hit. In Washington, DC alone, on average, a typical heat wave now lasts five days.2 However, it is estimated that by 2050, the average heat wave will last 9.5 days, with areas affected by urban heat island conditions experiencing significantly higher temperatures than surrounding areas.3 Due to the legacy of racially discriminatory redlining practices and long-term lack of investment in predominantly communities of color across the country, residents and workers in these areas are disproportionately exposed to high temperatures during heat waves.4 Worse still, the COVID-19 crisis and resulting social distancing requirements have made some approaches to protecting residents from extended periods of high heat, like community cooling centers, more difficult to implement. To better mitigate this public health threat, DC government agencies and the Georgetown Climate Center worked to engage members of the most affected communities in conversations regarding planning, investments, and policy decisions that affect health outcomes and the degree of health inequities. The purpose of this report is to inform a new comprehensive heat plan, which will direct DC government agencies on how best to aid frontline communities and populations most at-risk during heat waves and extreme heat crises. Many local governments, including DC, have created Heat Emergency Plans to help their citizens adapt to and withstand periods of extreme heat.5 However, the District government is exploring opportunities to create a larger vision for addressing extreme heat from multiple perspectives. This comprehensive heat plan will not only offer recommendations on how to update the emergency heat plan, but also cover additional topics like incorporating extreme heat considerations into building design and neighborhood development patterns.

Community water systems in California's San Joaquin Valley face a host of challenges that threaten the safety and reliability of drinking water, including pollution, periodic drought, and chronic groundwater overdraft. Moreover, shallow wells, some of which serve community water systems, are vulnerable to short-term and chronic declines in groundwater levels. For example, during the 2012-2016 drought, many domestic wells and some public supply wells went dry.

California's Sustainable Groundwater Management Act was designed to prevent significant and unreasonable chronic lowering of groundwater levels across the state, among other undesirable effects. Yet implementation often does not protect shallow wells. This report examines public drinking water supply well vulnerability under the Sustainable Groundwater Management Act. It focuses on wells and water systems in the San Joaquin Valley due to the area's social and economic significance, high concentration of water-related challenges, and availability of developed groundwater sustainability plans.

The report finds that 503 of the 1,200 public supply wells in the region, or 42%, are likely to be partially or fully dry at the minimum thresholds established in the region's sustainability plans. It includes recommendations to support small water systems and domestic wells and improve the resilience of groundwater sustainability Plans, in line with the state's Human Right to Water.

Website, information network. The CaDC securely maintains cleaned, standardized, and enriched water use and rebate participation data. Under the direction of member agencies, this unique database is used to develop custom tools for planning and analysis, and to generate novel research insights.

Community forests are protected forestlands that contribute to healthy, flourishing communities. Importantly, they offer residents and community members a direct say in how these lands are stewarded over time. These assets are being nurtured across the country as they are increasingly recognized as land-based economic development tools that deliver positive outcomes to the residents, visitors, and businesses located in their service areas. The U.S. Forest Service's Community Forest and Open Space Conservation Program (CFP) helps communities create these assets and provide benefits as envisioned by the local community. Community forests can enhance quality of life, enrich cultural and spiritual heritage, strengthen economies, and provide tangible economic value. This value occurs because these resources are designed to provide access to amenities for recreation, education, and tourism; offer forest-based products (e.g., timber, maple syrup, and firewood); produce forest-based services (e.g., carbon sequestration, habitat, fire risk mitigation, and water quality); and foster economic development opportunities by bolstering the recreation economy and enhancing property value. This report identifies and expands upon the values provided by community forests.

This toolkit was developed for the Association of Fish and Wildlife Agencies' Climate Adaptation Committee at their request. The purpose is to provide state fish and wildlife agency planners and managers with the information necessary to ensure climate considerations are being accounted for and incorporated in the planning and implementation of terrestrial and aquatic connectivity initiatives. The toolkit is structured as a gateway to provide users with information, tools, and resources critical to understanding and deploying such climate adaptation strategies related to landscape connectivity. Unfortunately, no one-size-fits-all approach works for these kinds of initiatives, and so the goal of the toolkit is to provide users with a variety of considerations and resources to identify their needs. Throughout the sections, users will find Key Resources which provide links and brief annotations that will direct to websites, tools, journal publications, and other resources for more information. Sections may also contain Case Studies which will take the user to websites or reports that provide a deeper dive into on-the-ground examples. In addition, many sections also contain Key Strategies which identify broad management strategies that can be implemented to more fully incorporate climate change considerations into connectivity initiatives. All the sections begin with general background information and the subsequent lists are designed to help managers quickly find detailed information as they need it. The toolkit provides information on landscape connectivity and its connection with climate change. It details how

Web page. Fish depend on healthy habitats to survive. Throughout their lives they use many types of habitat including seagrass, salt marsh, coral reefs, kelp forests, rocky intertidal areas, rivers, and streams. Various activities on land and in the water threaten to alter, damage, or destroy these habitats. NOAA Fisheries and the Pacific Fishery Management Council work together to address these threats by identifying Essential Fish Habitat (EFH) under the Magnuson-Stevens Act (MSA) for each federally managed fish stock on the West Coast and developing conservation measures to protect and enhance these habitats. Habitat Areas of Particular Concern (HAPC), discrete subsets of EFH, have also been identified under the MSA for groundfish and salmon.

EFH on the West Coast is identified in fishery management plans (FMPs) developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce. EFH descriptions are comprised of text and maps. EFH maps complement text descriptions and spatially depict the area identified as EFH under an FMP off the West Coast. If there are differences between the descriptions of EFH in text and maps, the text description determines the EFH designation.

This document is intended as a general guide that includes strategies for managing water rights and water resources to
enhance instream flows and water supply reliability in rural watersheds in California. While it discusses water rights and
water-related legal issues, this guidebook is not intended as a definitive or authoritative legal guide. Water rights and water
law in California are complex and often depend on the specific circumstances involved. Accordingly, the statements and
conclusions presented within this document are not intended as legal advice on any issue or question. The advice of a water
law attorney should be obtained when making decisions or taking actions with respect to legal issues related to the existence
and use of water or water rights

This report, Mind the Gaps: The Case for Truly Comprehensive Sustainable Groundwater Management, based on joint analysis by Water in the West at Stanford University and The Nature Conservancy, finds that SGMA actually suffers from several major gaps in its coverage. While SGMA covers those groundwater basins where the vast majority of pumping today occurs, it does not protect many other important groundwater sources, leaving that groundwater at risk of over-pumping, now and in the future, with no state oversight to safeguard rural domestic wells, sensitive habitats, and other beneficial uses of water. This report details SGMA's gaps and their consequences and recommends several ways to remedy these gaps.

Water management practices for cannabis farming in California are not well understood. This study examined permit reporting data and found that the vast majority (>75%) of permitted cannabis farms use groundwater wells to source water, with many wells located outside regulated groundwater basins. Groundwater pumping from wells can deplete streamflow and harm fish and wildlife. State policies that regulate water use for cannabis farming have focused on surface water use from streams and rivers, but do not currently regulate well use. These results suggest that there is a gap in regulation, with most cannabis farm groundwater use practices remaining functionally unregulated at this time.

The health of ocean ecosystems is critical to maintaining natural biodiversity and sustainable fisheries, but federally-declared fishery disasters are reflecting devastating impacts to ecosystems, economies, and communities. This study represents the first nationwide synthesis of fishery disasters during the 30-year history of the federal assistance program, demonstrating that fishery disasters are occurring more frequently, linked to climate change, and represent a >$5B (and growing) problem. There is also a disproportionate impact to salmon fisheries in the Pacific Northwest in both the commercial sector and Native American communities, and fishers wait (on average, nationwide) over two years to receive federal assistance.

Overfishing threatens the health and resilience of the ocean. In response, the global conservation community has set ambitious targets for protecting biodiversity inside no-take marine reserves. Yet fully protected marine reserves currently comprise only a small fraction of the ocean. In this review, the authors explore six co-benefits of marine reserves for fisheries and discuss the challenges and opportunities for integrating these co-benefits into management decisions. Broader understanding and consideration of the benefits of marine reserves can help advance policy discussions and motivate additional support for ocean protection.

Climate change poses unprecedented challenges to the sustainable management of wild capture fisheries. Management systems that improve the flow of information so that actionable steps can be taken are critical to ensuring our ocean is resilient and healthy. In this body of work, the authors examine new ways of designing fisheries management systems that leverage partnerships between management agencies, the fishing industry, private sector players, and academia. The authors provide guidance for building and institutionalizing these fishery partnerships to achieve climate-ready fisheries management.

The first step to sustainably manage groundwater dependent ecosystems (GDEs) is to identify where they are. The Nature Conservancy developed a statewide spatial database that provides locations of seeps and springs, wetlands, and vegetation likely to depend on groundwater. This database (version 2.0) is an improvement on the version 1.0 dataset because it includes all GDEs in the state, not just the ones within groundwater basins mapped by the State of California. Groundwater managers and researchers can use these data to map, monitor, and conserve GDEs throughout California. The data is available to view in a webmap and for download.

In this paper, we describe minimum provisions for planning, managing, and monitoring groundwater in a manner that collectively can lower the risk of harm to groundwater-dependent ecosystems and species, as well as providing sustainable groundwater resources for communities. The paper has a special emphasis on arid systems, where sustainable groundwater management is most important for people as well as ecosystems and species that may be especially reliant upon and sensitive to groundwater dynamics. Please share this paper with others who may be interested.

As the world population grows, so does the demand for food, putting unprecedented pressure on agricultural lands. At the same time, climate change, soil degradation, and water scarcity mean that productivity of many of these lands is deteriorating. In many desert dryland regions, drinking wells are drying up and the land above them is sinking, soil salinity is increasing, and poor air quality is contributing to health problems in farm communities. "Rewilding" the least productive of these cultivated landscapes offers a sensible way to reverse the damage from intensive agriculture. These ecological restoration efforts can recover natural diversity while guaranteeing the long-term sustainability of the remaining farms and the communities they support. Rewilding Agricultural Landscapes, a new book from Island Press and edited by TNC staff, examines what it would take to retire eligible farmland and restore functioning natural ecosystems. Rewilding Agricultural Landscapes uses the southern Central Valley of California, which is one of the most productive and important agricultural regions in the world, as a case study for returning a balance to agricultural lands and natural ecosystems. The lessons in Rewilding Agricultural Landscapes will be useful to conservation leaders, policymakers, groundwater agencies, and water mangers looking for inspiration and practical advice solving the complicated issues of agricultural sustainability and water management.

Understanding the complex seascape of regulations that apply across U.S. ocean waters is critical for effective marine resource management. This study found that cumulative restrictions from overlapping fisheries regulations often provide stronger levels of protection than traditional marine protected areas (MPAs). About 85% of U.S. waters are managed areas that restrict living resource extraction above generally applicable regulations, with 52% managed at a low level of protection and 3% managed as highly protected no-take areas. For California state waters, about 40% are in MPAs, 13% have a high level of protection from fishing impacts, and 9% are in highly protected no take areas.

California's natural and working lands – its forests, grasslands, wetlands, farmlands, rangeland, and urban green spaces – provide Californians with numerous environmental, social, and economic benefits, including greenhouse gas reductions (e.g., carbon sequestration). However, extreme heat events, droughts, floods, wildfires, development, and other anthropogenic impacts are compromising the ability of our lands to provide climate benefits. Without direct and immediate intervention, there is a risk that California's natural and working lands will increasingly become a net source of greenhouse gas (GHG) emissions, instead of a net sink, making it more challenging for California to meet its climate goals and protect communities. In this report the authors explored thirteen nature-based climate solutions (NBS) which, if implemented in California, have the potential to reduce GHG emission by over 500 million metric tons cumulatively by 2050 – which is equivalent to reducing the total statewide emissions from the sector over 3 years. In addition to supporting the state's climate goals, these thirteen nature-based solutions combined with appropriate policy interventions (highlighted through different case studies), California has the potential to transform 28 million acres of natural working land to reduce climate risk and ensure access to multiple co-benefits from flood risk reduction, urban heat island (UHI) impacts, protect species habitat and others. View the story map summarizing the report.

To ensure that California's groundwater is sustainably managed in the future and over the long-term, current state definitions of what constitutes groundwater may need to be revised, according to this research published in PNAS. A research collaboration between McGill University, University of California Santa Barbara, and The Nature Conservancy has analyzed big data of more than 200,000 groundwater samples taken from across California and found that there are problems with the guidelines used for groundwater management. Known as the "Base of Fresh Water", the guidelines are close to fifty years old and don't reflect current uses, knowledge, concerns or technologies related to managing groundwater in this populous coastal state with a multi-billion-dollar agricultural industry. View video summarizing the paper or read the research brief.

Policy and Management Recommendations
Build and implement conservation goals based on a defnition of ocean health that includes a comprehensive view of past and current conditions, future potential, and relationships with people.
Implement conservation strategies that prioritize protection and restoration of biodiversity as necessary to achieve sustainable management, and are grounded in a dynamic and comprehensive view of ecosystem structure and function.
Partner with California Tribes and Tribal Communities to develop inclusive conservation policies.
Apply ecosystem-based fsheries management that considers biodiversity beyond commercially and recreationally important species.
Expand on current monitoring efforts and increase the accessibility and timely application of collected data to support ocean management decisions and policy.
To reach California's 30x30 goal and effectively conserve the state's ocean and coastal habitats, conservation efforts must include effective and adaptive management to sustainably protect the biological structures and ecosystem functions that support habitat and species resilience.

Web-based, spatially explicity computer application. Explore water services (drinking water, wastewater, and stormwater) to learn about the cost of services and affordability for single family residential households. To learn about the data, the dashboard, and any frequently asked questions, please visit: about the dashboard. You can watch videos on how to use the dashboard from our YouTube Playlist.

Recording of a webinar held on June 16, 2021 to provide updates on the latest science and research on alternative livestock feed sources to reduce methane, livestock methane emission cycling in the atmosphere, climate action planning in Marin and Sonoma Counties, and on-ranch climate management practice implementation. The workshop was organized and hosted by the University of California Cooperative Extension Marin and Sonoma offices in partnership with the Marin Carbon Project collaborative.

List of resources on drought with application to agriculture

Story Map

To aid in tracking the occurrence of cyanoHABs and their toxins (cyanotoxins) in the nation's freshwaters, EPA developed this user-friendly, interactive resource. Updated monthly, this story map compiles state-issued recreational waterbody and drinking water health advisories due to cyanoHABs from across the country. It also provides:

basic information about the causes and effects of the most common cyanoHABs and cyanotoxins in U.S. waters,

summaries of major cyanoHAB events in the U.S.,

national tallies of annual beach advisories and closures due to HABs,

links to EPA tools for states and tribes on HABs preparedness and response, and

state and local HAB contacts, including laboratories that perform analysis of water samples for cyanotoxins.

BARHII is proud to announce the release of our latest research-based tool to help local governments step up to these growing challenges. Farther Together lays out a path for transforming how public agencies engage communities in climate resilience planning and disaster response to foster a healthy, resilient future for everyone who calls the Bay Area home.

Our new guide provides detailed recommendations for policymakers and practitioners on centering communities impacted by inequities—from project budgeting tips to no-wrong-door approaches for gathering community-driven solutions. The report identifies systemic reforms needed in our public investments, institutional structures, and public engagement mandates. You'll also find examples of promising practices in action from across the Bay Area.

Mapping application that allows users to explore sea level rise and coastal flood threats by adjusting temporal and other variables

We synthesized 20 years of research to explain the interrelated processes that determine soil and plant responses to biochar. The properties of biochar and its effects within agricultural ecosystems largely depend on feedstock and pyrolysis conditions. We describe three stages of reactions of biochar in soil: dissolution (1–3 weeks); reactive surface development (1–6 months); and aging (beyond 6 months). As biochar ages, it is incorporated into soil aggregates, protecting the biochar carbon and promoting the stabilization of rhizodeposits and microbial products. Biochar carbon persists in soil for hundreds to thousands of years. By increasing pH, porosity, and water availability, biochars can create favorable conditions for root development and microbial functions. Biochars can catalyze biotic and abiotic reactions, particularly in the rhizosphere, that increase nutrient supply and uptake by plants, reduce phytotoxins, stimulate plant development, and increase resilience to disease and environmental stressors. Meta-analyses found that, on average, biochars increase P availability by a factor of 4.6; decrease plant tissue concentration of heavy metals by 17%–39%; build soil organic carbon through negative priming by 3.8% (range −21% to +20%); and reduce non-CO2 greenhouse gas emissions from soil by 12%–50%. Meta-analyses show average crop yield increases of 10%–42% with biochar addition, with greatest increases in low-nutrient P-sorbing acidic soils (common in the tropics), and in sandy soils in drylands due to increase in nutrient retention and water holding capacity. Studies report a wide range of plant responses to biochars due to the diversity of biochars and contexts in which biochars have been applied. Crop yields increase strongly if site-specific soil constraints and nutrient and water limitations are mitigated by appropriate biochar formulations. Biochars can be tailored to address site constraints through feedstock selection, by modifying pyrolysis conditions, through pre- or post-production treatments, or co-application with organic or mineral fertilizers. We demonstrate how, when used wisely, biochar mitigates climate change and supports food security and the circular economy.

The National Water Reuse Action Plan (WRAP) was developed in collaboration with partners across the water sector. Actions in the plan are intended to drive progress on reuse and address local and national barriers across a range of topics including technical, institutional, and financial. There are over 100 action leaders and partners working together to advance reuse around the country.

The changing climate is challenging many communities to meet their long-term water needs. Reuse of treated wastewater and stormwater for agricultural, non-potable, or even potable uses provides an alternative source of water that can be more reliable than traditional raw water sources. The capacity to incorporate water reuse into a community's water portfolio can provide resilience against climate-induced impacts.

Ultimately, the WRAP collaborative strives to ensure that water reuse is accessible, straightforward to implement, and sensitive to climate and environmental justice considerations. Over time, the collective efforts of the organizations and entities participating in WRAP actions can grow the body of reuse knowledge and best practices for the benefit of all.

The Freshwater Health Index is a web-based tool that measures system health by making clear connections between freshwater ecosystems, the benefits they provide to people and the governance system in place.

The Status of Tribes and Climate Change (STACC) Report seeks to uplift and honor the voices of Indigenous peoples across the U.S. to increase understanding of Tribal lifeways, cultures, and worldviews,the climate change impacts Tribes are experiencing, the solutions they are implementing, and ways that all of us can support Tribes in adapting to our changing world.
This report was convened by the Institute for Tribal Environmental Professionals (ITEP) Tribes and Climate Change Program and written by the STACC Working Group.

Fact sheet that explains the basics of water markets in CA

The Working Group I contribution to the Sixth Assessment Report addresses the most up-to-date physical understanding of the climate system and climate change, bringing together the latest advances in climate science, and combining multiple lines of evidence from paleoclimate, observations, process understanding, and global and regional climate simulations.

We analyzed meteorological data for four historical summer heat waves against mortality data to determine
the numbers of excess, heat-related deaths that occur due to common heat waves in Los Angeles. We then explored the effects that various land cover prescriptions would have on reducing temperature heat and heat-related deaths. We found that roughly one in four lives currently lost during heat waves could be saved,
largely in low-income communities and communities of color. We also found that climate change-induced warming could be delayed approximately 25 to 60 years under business-as-usual and moderate mitigation scenarios, respectively.
We discuss implications for heat mitigation at the neighborhood, city, and regional level, and present approaches from around the world for how to advance heat mitigation. We share examples for how to:
Enable and establish heat-related data collection;
Raise awareness and engage communities;
Lead by example through heat mitigation policies and programs;
Offer incentives to implement heat mitigation; and
Adopt mandatory requirements and regulations to support heat mitigation.
We close with recommendations for heat-vulnerable regions, offering a wide array of entry points for individuals and entities interested in helping reduce heat-related impacts in their city.

Our coalition of leading health, planning, architecture, city policy, energy, affordable housing, energy and other organizations called the Smart Surfaces Coalition is dedicated to supporting expanded adoption of Smart Surfaces globally. Prior studies of potential city-wide Smart Surfaces adoption by El Paso, Philadelphia and Washington DC demonstrated Smart Surfaces to be a cost-effective, city-wide strategy to address climate change mitigation and adaptation that would also improve equity and create jobs.
In this report, we have expanded the technical depth of analysis from these prior reports. We analyze and model in detail the economic costs and benefits, as well as temperature
reduction impact, of one city—Baltimore—adopting Smart Surfaces.

The Smart Surface Analytic Tool is a free tool that allows cities to determine the costs and benefits of Smart Surface adoption in their cities. The analytic engine is based on 6 years of research and development conducted in trial cities including Washington DC, El Paso, TX and Philadelphia, PA—the report Delivering Urban Resilience is the result of this work. The detailed financial model in this report is being expanded for use in all cities with the help of Smart Surface Coalition partners.
Once complete, the tool will allow cities to input their desired adoption level of each Smart Surface type and see all of the costs and benefits associated with implementing the selected Smart Surface adoption mix for their city. The tool draws from climate databases, state and national databases, satellite imagery, data from partner organizations, and other industry standard sources in order to determine each cities unique costs and benefits of Smart Surface adoption. Users will also be able to drill down to see all of the underlying assumptions, raw data, and other features of the model in order to see how their specific results were calculated. Additionally, the analytic engine also allows users to adjust built-in assumptions using their own data. City officials with self-generated data can use their data as inputs in order to customize the cost-benefit analysis for parts of cities.

This report provides an in-depth analysis of the costs and benefits of applying a set of smart surface solutions1, including cool roofs, green roofs, solar PV, and permeable and reflective pavements and road surfaces across three cities: El Paso, Philadelphia and Washington, D.C. The report demonstrates that cities can strengthen resilience, improve health and comfort, expand jobs and slow global warming through smart surface strategies
while securing billions of dollars in net financial benefits. Applied nationally, these strategies could potentially deliver half a trillion dollars in net financial benefits.

A free online training program to help rural communities become more resilient to extreme weather and changing climate conditions

The need to ensure that rising investment in nature-based climate solutions delivers expected outcomes hinges on incorporating current and future climate into design and implementation. Technical guidelines and formal planning processes serve a purpose in ensuring the quality of climate-informed strategies for local projects. The inherent complexity, cost, and time required to use these tools, however, can make them inaccessible or daunting. Taking lessons learned from a decade of funding over 100 adaptation initiatives in conservation—some of which also provide mitigation benefits—we describe a simple rapid assessment framework for use by practitioners and funders. This framework, which we refer to as the 5Ws (what, when, where, why, and who) of climate-informed action, serves as a guide to make projects more robust to future climate.

The CLASIC tool is a screening tool utilizing a lifecycle cost framework to support stormwater infrastructure decisions on extent and combinations of green, hybrid green-gray and gray infrastructure practices. Users can create scenarios of stormwater control measures including climate and land use projections to assess lifecycle costs, performance, and co-benefits associated with those scenarios.

This report improves our understanding of the degree to which four socially vulnerable populations—defined based on income, educational attainment, race and ethnicity, and age—may be more exposed to the highest impacts of climate change. Understanding the comparative risks to vulnerable populations is critical for developing effective and equitable strategies for responding to climate change.

Cal OEHHA web page that provides fish advisories, benefits and risks associated with eating fish, oil spill information, and a fish advisory map, which provides current statewide and site-specific advisories.

It has been established that wells are at risk to run dry when groundwater levels decline during drought, but associated impacts to water quality are poorly understood. This study examined 30 years of data from California's Central Valley to find dramatic groundwater-level declines during drought were associated with worsening groundwater quality. This likely happens because increased pumping during drought can draw shallow, contaminated groundwater to depths commonly tapped by public drinking-water wells. This is the first study of its kind to show direct linkages between drought and groundwater quality at such a broad spatial scale.

The Adaptation Capability Advancement Toolkit (Adapt-CA) is intended to assist California local governments with overcoming common institutional barriers and improving agency capabilities. By using Adapt-CA, local governments will be able to rapidly identify opportunities to improve existing capabilities in order to pursue climate change adaptation initiatives more effectively and holistically.

This project uses local knowledge to document the social dimensions within drinking water systems during the 2012-2016 Drought and expresses the value of local knowledge in reflecting on future drinking water system needs in response to extreme events. We found that drinking water systems, despite size or government project water reliance, experienced a similar set of drought impact, response, and barrier categories (e.g., water quantity and water quality). However, within these categories, the types of impacts, responses, and barriers differed based on both system size and water source portfolio. Common disadvantages that hinder drought resilience, and thus climate adaptation, of small self-sufficient drinking water systems include: staff capacity; financial burden of revenue loss during drought compounded with increased need for staff time for additional reporting; customer awareness and outreach challenges; and consolidation. We found that consolidation is valuable but in many case needs more state support to implement and incentivize. From a long term perspective, the absence of expressed duty and lack of concern for risks of climate change among water managers indicates a major dearth in adaptation planning among these drinking water systems. Documentation of experiences from the 2012-2016 Drought can be used to inform future planning for droughts and more broadly climate change.

The need for proactive adaptation strategies to address the extreme droughts projected under climate change are frequently discussed, yet there are limited examples of such groundwater management strategies. This paper therefore explores:
1) How groundwater management agencies are planning for drought
2) What new approaches are currently being used that show promise for addressing the more extreme droughts projected under climate change?
First, the paper provides a review of the research on drought and groundwater management including strategies currently used to address drought. Second, case studies illustrate newer and varied approaches being used to reduce drought impacts. Highlighted are the different approaches used by groundwater managers to both increase storage and develop drought reserves. These strategies can help to reduce vulnerability to the extreme droughts projected under climate change. Two additional case studies discuss the limits of a drought reserve strategy and indicate that more is needed under climate change to address the range of basin conditions and the varied needs of communities reliant on groundwater. Several overall groundwater management trends are noted:
 A shift from voluntary to mandatory requirements for the sustainable management of groundwater after the 2014 passage of SGMA;
 An increase in the use of recycled water from 190,000 AF in 1976 to 714,000 AF in 2016 that can be used for groundwater recharge to enhance storage;
 An increase in the development of groundwater drought reserves;
Suggested future research projects include:
 Benefits and challenges of long-term strategies to manage groundwater under climate change and extreme droughts;
 Practices implemented during past droughts that were effective in reducing drought vulnerability in subsequent droughts
The different approaches presented in this paper to increase groundwater storage specifically for use during drought are important first steps to proactively manage groundwater to adapt to the higher temperatures and future extreme droughts projected under climate change.

Although a diversity of approaches to wildlife management persists in Canada and the United States of America, the North American Model of Wildlife Conservation (NAM) is a prevailing model for state, provincial, and federal agencies. The success of the NAM is both celebrated and refuted amongst scholars, with most arguing that a more holistic approach is needed. Colonial rhetoric permeates each of the NAM's constituent tenets—yet, beyond these cultural and historical problems are the NAM's underlying conservation values. In many ways, these values share common ground with various Indigenous worldviews. For example, the idea of safeguarding wildlife for future generations, utilizing best available knowledge to solve problems, prioritizing collaboration between nations, and democratizing the process of conserving wildlife all overlap in the many ways that the NAM and common models of Indigenous-led conservation are operationalized. Working to identify shared visions and address necessary amendments of the NAM will advance reconciliation, both in the interest of nature and society. Here, we identify the gaps and linkages between the NAM and Indigenous-led conservation efforts across Canada. We impart a revised NAM—the Indigenizing North American Model of Wildlife Conservation (I-NAM)—that interweaves various Indigenous worldviews and conservation practice from across Canada. We emphasize that the I-NAM should be a continuous learning process that seeks to update and coexist with the NAM, but not replace Indigenous-led conservation.

As part of the Rural Voices for Conservation Coalition's (RVCC) dedication to partnership-based approaches to land stewardship, we have tracked the use and expansion of GNA since it was permanently authorized in 2014. In the following report, we review the current scope and status of GNA use on Forest Service-managed lands in 12 Western states, noting both region-wide trends as well as important differences between states. For our research, we conducted 21 interviews with state, federal, tribal, and county representatives who oversaw or coordinated GNA projects. We also reviewed Good Neighbor agreements, Forest Service tracking documents, federal statutes, agency directives, and grey literature on the authority. We hope the following findings and associated interpretations provide practitioners and policymakers a ground-level perspective on how the authority is being used by the Forest Service and its non-federal partners across the West.

This training module is designed to provide a high-level overview of the Clean Water Act Section (CWA) 319 Nonpoint Source (NPS) program for State and Territory NPS Programs. The Section 319 program is an essential source of support for state, territorial and tribal efforts to control NPS pollution, the prevailing cause of the nation's water quality problems. The course contains four sections and will take about two hours to complete. This module is recommended for the Watershed Academy Certificate Program.

OEHHA's Human Right to Water Framework and Data Tool (CalHRTW 1.0) is comprised of this web-based data tool and an assessment report, Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems. The purpose of CalHRTW 1.0 is to provide a comprehensive, stand-alone, quantitative assessment of the human right to water for three core components: water quality, water accessibility and water affordability. This data tool allows users to access and explore information in these three core areas interactively.
CalHRTW 1.0 measures and scores nine indicators across the three core components for each of the state's 2,839 active community water systems (as of January 2019). Indicator scores within each of the three components are combined to create three individual composite component scores to illustrate a system's overall status in providing clean, accessible and affordable water to its customers. Scores range from 0 to 4, with higher scores indicating worse outcomes. The data used is for 2011 to 2019.

This online tool is provided by the EPA. AVERT is a free tool with a simple user interface designed to meet the needs of state air quality planners and other interested stakeholders. Non-experts can use AVERT to evaluate county, state and regional emissions displaced at fossil-fueled power plants by EE/RE policies and programs. Created by EPA's State and Local Climate and Energy Program, AVERT is designed to use public data that are accessible and auditable.

An interactive map showing areas threatened by sea level rise and coastal flooding. Combining the most advanced global model of coastal elevations with the latest projections for future flood levels.

The AWE Water Conservation Tracking Tool is an Excel-based spreadsheet tool for evaluating the water savings, costs, and benefits of urban water conservation programs and for projecting future water demands. In addition to providing users a standardized methodology for water savings and benefit-cost accounting, the tool includes a library of 50 pre-defined, fully parameterized conservation activities from which users can construct conservation programs. Water managers can use the tool in a variety of ways to aid their water resource planning and operations.

PAG created this map to help municipalities, non-profits, and neighborhood groups to select priority locations that would benefit the most from increased access to tree shade to reduce heat exposure. This tool was additionally created to help decision-makers distribute green infrastructure resources to areas with opportunities for enhanced stormwater management, mobility and livability.

California Department of Water Resources web page that provides a reference guide to data, tools, and guidance for Groundwater Sustainability Agencies and links to state agencies' data, mapping, modeling, climate change, maps, and reports of interest for groundwater planning

California's economically challenged small communities suffer from insufficient tax and service based revenues, low capital bases and limited staff capacity capable of keeping their aging infrastructure fully maintained. These challenges are pitted against an increasing need for environmentally resilient infrastructure that can meet the demands of rising populations and uncertainty due to climate change. Water infrastructure maintenance and modernization needs are often paramount to any water system's capital improvement planning yet are typically far out of reach for the budgets of economically challenged small systems, districts and cities. Unmet system needs include outdated drinking water treatment facilities, incorrectly sized and leaking distribution pipes, low quality groundwater sources, crumbling wastewater collection systems, failing wastewater treatment plants, stormwater management systems that fail to meet changing weather and regulatory conditions and localized flood mitigation hazards. Concurrently, decades of fire suppression have left many northern California regions and/or their vital water supplying watersheds at risk of catastrophic wildfire damage.

In this report, we explore the current circumstances of Disadvantaged Communities in the Sacramento River Funding Area for financing improvements to a range of water management systems as well as the possibility of connecting these efforts to holistic water conservation and economic development throughout the agricultural and environmental settings in which they are located. Alternative financing schemes, such as environmental impact bonds, are explored as possibilities to diversify municipal funding portfolios for these vital projects and to consider thinking beyond loans and grants that typically cover shortfalls in funding for capital projects.

This community-based guide has been developed to help municipalities navigate through the steps necessary to consider non-traditional funding and financing options when developing funding strategies and implementing projects. We hope it is a useful guide for municipal leaders and the stakeholders with whom they work. Like many guides, we do not expect the steps in the process to be followed exactly. Rather, local municipalities should adapt the guide and its resources to meet local needs. We encourage sharing lessons learned and communicating results with neighboring cities to facilitate learning across water systems to develop resources, capacity and finances to meet system needs. The California Department of Water Resources Integrated Regional Water Management program is a venue that could be leveraged for this purpose.

Blue carbon ecosystems are vegetated coastal habitats that have considerable potential to be managed for greenhouse gas benefits provided that policy, regulatory, and financial structures are in place to support management activities. Such structures are developing for marshes, mangroves, and seagrass ecosystems and are under research and development for kelp and mudflat ecosystems. However, in the United States, there is a great deal of state-to-state variation in the quantity, quality, and spatial representativeness of the data that is required to implement Blue Carbon projects. Here we assess the availability and quality of Blue Carbon ecosystem data in select U.S. states as captured by the most extensive database available, the Coastal Carbon Atlas, which is curated by the Smithsonian Environmental Research Center and focuses on soil data because these are generally the largest carbon pools in Blue Carbon ecosystems.

The Pew Charitable Trusts (herein Pew) identified a subset of states with attributes that make them potentially attractive for climate mitigation projects in Blue Carbon ecosystems because of state-level commitments to greenhouse gas reduction goals through the U.S. Climate Alliance, including California, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Virginia, and Washington. The Coastal Carbon Atlas is a map interface for the Coastal Carbon Library, a open-source coastal soils synthesis dataset made up of 5,784 soil profiles from all continents except Antarctica, and for the major blue carbon habitat types (marshes, mangroves, seagrasses, tidal swamps and scrub/shrub). We developed four new metrics that synthesize key features of the Coastal Carbon Atlas and are broadly relevant to management activities. Data quantity is the number of soil profiles available in the Atlas; data quality captures the utility of the data for use cases ranging from advanced inventorying to carbon sequestration modeling; spatial representativeness considers whether the observations are well distributed across the geography of the state; and habitat representativeness does the same for habitat types found in a given state. The average of these provided a composite score.

Pacific coast states (CA, OR, WA) generally scored higher than Atlantic coast states (FL, ME, MD, MA, NJ, NY, VA) because the data is extensive compared to the area of these ecosystems and is of comparatively high quality. Thus, there are data to support a wide variety of Blue Carbon activities in the Pacific coast states. Atlantic coast states with robust Blue Carbon data are MA and FL, although the large and diverse variety of

This web-based tool is intended to help state government, local government, and tribal agency officials screen and select tools and resources designed to measure the environmental and economic impacts of current and prospective electrification initiatives. Make selections below to find the to tools that are right for you.

This tool is intended to help local government officials screen tools and resources designed to measure the emissions, energy, and economic impacts of current and prospective initiatives at both the government operations and community-wide scales.

Building from strategies set forth in the Department's 2014 Climate Adaptation Plan, bureaus and offices will maintain their principal role of identifying and addressing risks to missions and programs, while the Department will continue to work closely with bureaus and offices to identify and coordinate collaboration on cross-cutting priorities and to share information and resources needed to effectively respond to climate change.

This USACE Climate Action Plan details the USACE commitment to integrate the best available observed and forwardlooking climate information into its missions, programs, and management functions, as allowed within relevant authorities. This plan describes how climate effects and vulnerabilities are and will be considered in USACE decisionmaking for managing procurement, real property, and public lands and waters. The USACE Climate Action Plan builds on prior adaptation plans to create a streamlined strategy

WGA distributed a survey to state and local agencies and interested stakeholders soliciting feedback on the interdependent relationships between western communities and state and federal land / resource management entities, and the role that local communities play in successful land planning and management processes.
The survey included questions addressing land management and planning, cross-boundary collaboration, forest and rangeland management, and rural development, as well as two general questions.

Map contains locations of Citizen Monitoring Groups in CA, clicking on a dot provides the group's name and website link.

Online map that shows location of volunteer monitoring program throughout US. Clicking on a location provides information and link to website.

Web page. Provides an overview of the 2,962 environmental organizations in California by location, type, size and provides a directory.

Video: From November 15–17, the PPIC Water Policy Center convened three expert panels (as part of our annual water priorities conference) to discuss how we can "seize the drought" to meet the challenges we're already facing.
The panels tackled several key subjects head-on: how to make our water infrastructure climate-ready, how to pay for resilience while keeping water services affordable, and how to embrace transformative change.

Table of Contents:

The multi-tiered framework
featured in this playbook provides a basis of analysis among different methods, and can also serve as scaffolding for future method revision. We anticipate that the playbook will be consulted by trash monitoring programs, non-profit organizations, volunteer efforts, and many others interested in launching new monitoring efforts with the benefit of the findings shared in this report.

California's Groundwater (Bulletin 118) is the State's official publication on the occurrence and nature of groundwater in California. The publication defines the groundwater basin boundaries and summarizes groundwater information for each of the State's 10 hydrologic regions.

The report seeks to uplif and honor the voices of Indigenous peoples across the US to increase understanding of Tribal lifeways, cultures, and worldviews, the climate change impacts Tribes are experiencing, the solutions they are implementing, and ways that all of us can support Tribes in adapting to our changing world.

This report presents five key policy recommendations identified by the Water Leaders with 21 implementable actions that can help achieve a more robust and flexible system for achieving water equity in the management and governance of California's water supply. Collectively, the recommendations present a strategy to guide California policymakers, water managers and other interested parties in implementing change towards water equity and proactively maintaining the human right to water.

OpenET uses best available science to provide easily accessible satellite-based estimates of evapotranspiration (ET) for improved water management across the western United States. Using the Data Explorer, users can explore ET data at the field scale for millions of individual fields or at the original quarter-acre resolution of the satellite data.

The principles and strategies provide a framework for State actions to continue anticipating impacts and enhancing drought management efforts. Additional Executive action, legislation, funding, and guidance may be required to fully implement these strategies.

The Energy Savings and Impacts Scenario Tool (ESIST) is a customizable and transparent Excel-based planning tool for analyzing the energy savings and costs from customer-funded energy efficiency programs and their impacts on emissions, public health, and equity. ESIST enables users to develop, explore, and share energy efficiency scenarios between 2010 and 2040.

The Cover Crop Mix, Seed Cost, and Seeding Rate Calculator is a tool designed for conservation planners and producers in the mid-South to estimate seed cost and seeding rates for both recommended and custom cover crop mixes. The tool presents 25 cool-season and 19 warm-season cover crop species and their estimated cost. Additionally, each species is listed by functional group (grass, legume, or forb) with recommended planting dates, planting rates (drill or broadcast), and recommended varieties. There are 8 recommended cover crops mixes available for users unfamiliar with developing mixes. For more experienced cover crop users, there is an option to customize mixes and planting rates for each species. To assist conservation planners, Conservation Stewardship Program enhancement practices and codes are included for each species.

Webinar that introduces and describes climate change indicators developed by EPA for a May 2021 update to the Climate Change Indicators website

Three page overview of operation and maintenance of rainwater catchment systems

A brief video covering the basic operation and maintenance of typical rainwater catchment systems. This video was produced as part of the Sonoma County Coastal Rainwater Catchment and Forbearance Project, funded by California Wildlife Conservation Board.

This report introduces a new framework to help ocean planners, managers, and stakeholders envision the full three-dimensional space requirements of different ocean uses, and to understand how their spatial footprints can create conflicts with other ocean uses in the same area. This methodology, and the insights it generates can benefit many forms of place-based ocean planning, including permitting specific activities, zoning marine protected areas, or comprehensive marine spatial planning of multiple ocean uses. This report is a guide to understanding, creating, and applying space use profiles in real-world ocean planning situations.

This study is an effort to compile a picture of the uses and users of the California coast for recreation based on available information. It synthesizes estimates compiled from a variety of sources including past studies of recreation, data from public agencies, and many other sources. The focus of the report is on the recreational uses “beyond the beach” in order to emphasize the wide variety of uses across the length of the coast. The data covers different
periods and different geographies and so is not always comparable across time and places, making summary measures difficult. Included in the report are recommendations for improving the measurement of coastal recreation

As you’ll learn in this report, more Americans are living along coasts, increasing both the economic and human risk from coastal floods and storms. Natural infrastructure, like coastal wetlands, oyster reefs, dunes and sea grasses, all help attenuate waves, buffer storm surges and capture (and filter) flood water. They do all this while providing habitat for fish and wildlife and recreational opportunities for millions of Americans. According to the National Institute of Building Sciences, every $ invested in disaster mitigation leads to $6 in cost savings and a reduction in harm to people and communities.

Explore extreme temperatures and wind speed for past weather and present day. This tool provides data from 38 weather stations across California, utilizing a quality-controlled dataset for hourly weather observations curated for use by the energy sector (Doherty 2020). Present day weather conditions are from NOAA.

Video: Hosted by California NRCS. The Rainfall Simulator provides a demonstration of how practices such as no-till farming, cover crops, and prescribed grazing benefit soil health and improve the water cycle on cropland and rangeland. Presented by Dr. Zahangir Kabir, NRCS Regional Soil Health Specialist. This demonstration includes discussion of topics such as soil structure, aggregate stability, and infiltration.

Jackson Family Wines has always been rooted in the land. Our goal is to make the best wines possible from our estate vineyard properties to truly express the terroir of each unique site. And that starts with a focus on enhancing soil health, which we believe is best done through regenerative farming practices.
Over the next 10 years, we are committed to integrating regenerative farming practices across 100% of our estate vineyard properties. This transition will be accomplished through the development of region-specific action plans centered around seven key practices: conservation tillage, planting cover crops, composting, crop diversity, animal/insect integration, preserving wild lands, and holistic vineyard cultural practices.
Watch the replay of the third session of the Jackson Family Wines #RootedForGood Virtual Masterclass Series: Regenerative Farming, hosted on Tuesday, October 5, 2021.

This video is a collaboration between Sarah Light, Agronomy Advisor with University of California Cooperative Extension, and Liz Harper, Executive Director of Colusa Resource Conservation District.

This Assessment; identifies critical uncertanties regarding lamprey life history; tracks current knowledge of habitat requiriements, abundance, distribution; describes threats and factors for decline throughout its United States range.

A new study suggests more opportunities to protect waterways: One system for keeping too many nutrients out of streams could be used more widely than it is now.

Known as saturated riparian buffer strips, the system slows down and redirects water coming off farm fields. Water passes through a strip of land planted with native plants (the buffer). The technique allows more nitrogen to get absorbed by plants or turn into nitrogen in the air. The system is affordable and fairly simple, and it can remove up to 92 percent of nitrate, a form of nitrogen.
The new study discovered that these buffers could be installed in more places than previously thought. By expanding the sites where the buffers are placed, farmers could protect more of their local streams.
"Limiting nutrient transport off of fields and into waterbodies prevents overgrowth of harmful algae and protects in-stream ecosystems," says Loulou Dickey, researcher at Iowa State University, who led the research.

The Center has recently completed an investigation on the use of monitoring methods to evaluate municipal and industrial stormwater programs and practices. The research focused on the use of environmental indicators as tools for monitoring urban stormwater runoff. Research was conducted on a total of 26 stormwater indicators which were grouped into six broad categories.
While reviewing and compiling the bibliography, we observed several common elements which suggest that the identification and selection of appropriate indicators for monitoring programs should be conducted within an established framework. This framework focuses on the relationship between urbanization and impacts on water resource quality by presenting the importance of reference conditions, reinforcing the concept of eco-regions and regional considerations, and describing tools common to many different indicators.

This manual presents six monitoring study designs that can be used by Municipal Separate Storm Sewer System (MS4) communities to assess their local stormwater programs. The central purpose of this manual is to provide guidance to MS4 communities on developing monitoring studies whose results can help improve their local stormwater programs by getting more pollutant reduction out of the total community stormwater investment.

EPA's Local Greenhouse Gas Inventory Tool was developed to help communities across the United States to evaluate their greenhouse gas emissions. Use this tool to compile a greenhouse gas (GHG) inventory for your entire community or for local government operations in particular. The tool was updated in January 2022

This aquifer risk map is developed to fulfill requirements of SB-200 and is intended to help prioritize areas where domestic wells and state small water systems may be accessing raw source groundwater that does not meet primary drinking water standards (MCL). The map is required to be updated annually.

A statewide inventory of local government adaptation and resiliency planning efforts

This BAMS special report presents assessments of how human-caused climate change may have affected the strength and likelihood of individual extreme events.
The tenth edition of the report, Explaining Extreme Events in 2020 from a Climate Perspective, presents 18 new peer-reviewed analyses of extreme weather from across the world during 2020. It features the research of 89 scientists from nine countries looking at both historical observations and model simulations to determine whether and by how much climate change may have influenced particular extreme events.

An interactive mapping tool to visualize the frequency and cost of billion-dollar climate events.

Despite growing support for environmental water transactions, funding agencies do not have standards or guidelines for cost effectiveness analysis. This report discusses the selection of cost and effectiveness metrics for a number of types of water transactions.

"The conclusion of this report is that we must walk before we run. At least initially, the metrics need to be practical and replicable across a range of transactions."

This report introduces readers to best management practices that enable local governments and water providers to integrate the two systems.

Supported by case studies from several U.S. communities, the report argues that planning is a crucial step for land and water integration, recognizing the importance of establishing policy in both land use and water plans to pilot those efforts into implementation. It further provides suggestions and solutions to putting these policies into action.

A three-bill legislative package1, referred to as the Sustainable Groundwater Management Act (SGMA), created a fundamental change in the governance of California's groundwater. SGMA requires, with some exceptions, the formation of groundwater sustainability agencies (GSAs) for identified groundwater subbasins. This report outlines the initial implementation of these new laws by the GSAs in 21 critically overdrafted groundwater subbasins2. Based on a review of multiple statutes, regulations, early research, official government documents and interviews with individuals involved in the process, the authors explain how these first GSAs were created and the organizational and governance challenges they navigated.

In November 2021, Congress passed the Infrastructure Investment and Jobs Act, now referred to as the Bipartisan Infrastructure Law, which includes multiple provisions related to conserving fish and wildlife. One of the most exciting elements of this historic legislation is a dedicated $350 million competitive grant program called the Wildlife Crossings Pilot Program.

Crossing Toolkit CoverIn order to assist eligible applicants and partners to understand and take advantage of these new funding and policy opportunities, the Center for Large Landscape Conservation's Corridors & Crossings Program has created "A Toolkit for Developing Effective Projects Under the Federal Wildlife Crossings Pilot Program."

The document provides:

An overview of the Wildlife Crossings Pilot Program and other fish and wildlife provisions in the Bipartisan Infrastructure Law

Suggestions for how applicants and their partners can engage

Best practices, examples, and resources for designing effective wildlife crossing projects in accordance with each of the grant application criterion of the Wildlife Crossings Pilot Program

Provides policy priorities and action areas developed to help all Californians prosper. Actions include: Housing for All, Ecosystems and Climate Resiliency, Thriving Economies, Education Cradle to Career, Connecting CA.

Under this strategy, the Forest Service will work with partners to engineer a paradigm shift by focusing fuels and forest health treatments more strategically and at the scale of the problem, using the best available science as the guide. At the Forest Service, we now have the science and tools we need to size and place treatments in a way that will truly make a difference. We will focus on key "firesheds"—large forested landscapes and rangelands with a high likelihood that an ignition could expose homes, communities, and infrastructure to wildfire. Firesheds, typically about 250,000 acres in size, are mapped to match the scale of community exposure to wildfire.

Our new management paradigm builds on the National Cohesive Wildland Fire Management Strategy, including efforts to create fire-adapted communities, and other collaborative strategies for cross-boundary treatments, including Cohesive Strategy projects and Shared Stewardship agreements. We will build on our long-standing work and relationships with U.S. Department of the Interior agencies. We will work collaboratively with States, Tribes, local communities, private landowners, and other stakeholders to adapt lessons learned into a

coordinated and effective program of work. Our emphasis on fuels reduction work to mitigate exposure and impacts to infrastructure and communities will complement and support efforts to develop fire-adapted communities.

Online database of rare plants statewide

This publication, which replaces the edition from 2007, provides helpful information about how parks can provide the maximum benefit for pollinators and other insects. In addition to introductory chapters about the diversity and natural history of native bees, the handbook offers detailed information on how to:

- create flower-rich habitat,
- provide places for nesting and egg laying,
- reduce the use of pesticides in parks and greenspaces, and
- engage park patrons and community members in your conservation work.

Appendices provide regional lists of recommended pollinator-friendly plants and additional sources of information for further exploration of the topics covered in these guidelines.

This report offers numerous case examples of successful initiatives along with the following guidance for stakeholders in the private and public sectors looking to boost the potential of civic organizations to implement natural climate solutions:

- Empower civic-sector initiatives that are creative and ambitious in scope and scale.
- Invest in initiatives with clear strategies and measurable impact.
- Aim for broad collaborations.
- Share advanced science, technologies, and financial engineering techniques.
- Support initiatives that are built to last, able to adapt, and ready to replicate.

Interactive, informational website to better inform Californians about hydrologic conditions, forecasts, and information at the scale of their local watershed. The website allows the public to obtain a quick snapshot of local and statewide water conditions and was developed as part of the Governor's drought emergency proclamation. This information is updated dynamically from a variety of data sources.

The California Stormwater Quality Association (CASQA) first established a Vision for Sustainable Stormwater Management (Vision) in 2015. Over the past several years, CASQA has made updates to the Vision, reflective of advancements in stormwater and regulations. In 2019, CASQA included implementation of the Vision as a core part of setting organizational priorities for each year. Those actions were not only successful in taking significant steps forward, but also inspired new thinking and ideas. CASQA therefore initiated an effort in 2020 to more fundamentally revise the Vision, and in so doing, chart the path forward to sustainable stormwater management. While this current update was being drafted in the Spring of 2020, the pandemic of COVID-19 created unprece- dented global impacts. For stormwater programs, responding to safer at home orders created challenges for day to day program implementation, yet inspired new and creative approaches. The economic impacts are just beginning to unfold, but stormwater programs anticipate financial hardships, reducing current funding levels that may last for years. COVID-19 does not change the actions necessary to achieve sustainable stormwater management, but it does put the following into sharp relief:

• Funding for Stormwater Needs to Move Beyond the General Fund: Unlike all other water resources, the vast majority of stormwater programs in California lack a dedicated funding source. Even those stormwater programs that have some level of dedicated funding cannot implement their programs based on that funding alone. Therefore, all stormwater programs rely to a significant extent on the General Fund. In the best of times, municipalities face significant challenges in meeting the needs of the community and stormwater programs must compete
for that funding with police, fire, libraries, social services, etc.
COVID-19 has devastated local economies, creating unprecedented shortfalls in the General Fund. Municipalities will struggle more than ever to secure funding for stormwater programs and will face the reality of budget cuts to staff as well as programs. COVID-19 has not changed how stormwater programs are funded, but it highlights the very real need to move past the General Fund and establish dedicated funding, on par with other water resources. The Vision addresses this need by adding a new principle, Principle 4, focused on stormwater program funding.

Numerous state agencies are dedicated to helping California prepare for sea-level rise (SLR). Our vision is to make all of California, including its coastlines, inland areas, and bays and estuaries, resilient to the impacts of SLR, such as flooding, erosion, and habitat degradation and loss. This occurs through thoughtful and coordinated plans and projects aimed to protect and conserve our unique biodiversity, public health and safety, infrastructure, outdoor access, and coastal economy. This must be done through an equitable process, inclusive of all Californians, that prioritizes environmental and climate justice with an emphasis on partnerships with California Native American tribes and supporting vulnerable communities.

The report is organized in the following manner:

• Imagination Team—Features the team collectively working to advance climate mitigation through water.
• Our 2050 Vision—Unveils a Net Zero Plus vision statement to secure our climate future.
• Advancing a Net Zero Plus Culture—Presents seven elements of an aligned cultural transformation that will achieve Net Zero Plus.
• Join Us—Invites One Water leaders and entities to participate on this critical journey.
• Commitments to Action—Features examples of water stakeholders taking action.

The efficiency of rainwater tank systems depends on tank size, local climate, and potable water demand. This study investigates optimum tank size to maximize water saving potential in semi-arid Southern California using a simple daily water balance model. The model evaluates the performance of various tank varying sizes collecting rainwater from 10,000 m2 rooftop area of a college campus for the local historical dry, average, and wet years. Results show tank sizes of 130–630 m3 having 100% capture efficiency but system reliability varies from 2.8% to 37.75% in the dry to wet years, respectively. An optimal tank size range is derived from the reliability curves that represent the tank system performance in the local climate. Optimal tank size ranges from 180 to 240 m3, which can capture more than 64% of the roof runoff and thus the campus can reduce on an average 10% of urban water demand.

For the 2020-2022 Integrated Report, the Central Coast, Central Valley, and San Diego Regional Water Boards were “on cycle.” In addition, the Colorado River Basin Regional Water Board conducted an “off-cycle” assessment for one or more waterbodies within their region. For the 2020-2022 Integrated Report, the State Board administer the public process. The 2020-2022 Integrated Report was approved by U.S. EPA on May 11, 2022.

This Analysis shows that the dairy and livestock sector is projected to achieve just over half of the annual methane emissions reductions necessary to achieve the target by 2030 through modifications to manure management systems—primarily using anaerobic digesters—and additional reductions through decreases in animal populations.

The Climate Change and Health Playbook: Adaptation Planning for Justice, Equity, Diversity and Inclusion is designed to support the work of state, local, territorial and tribal health services across the nation in embedding justice, equity, diversity and inclusion into their climate and resilience initiatives, programs and operations.
The Centers for Disease Control and Prevention's Building Resilience Against Climate Effects, or BRACE, framework was created to aid jurisdictions in navigating the health adaptation process. The playbook is a supplement to BRACE to amplify the incorporation of justice, equity, diversity and inclusion, or JEDI.
This playbook is divided into three parts:

- BRACE and JEDI 101
- Adapting to Climate Change to Protect Health
- JEDI and BRACE in Action

Identifying right-fit technologies for the small farm. We help small-scale farmers, food hubs, and farmers markets navigate technological resources & expand market opportunities.
This web page contains links to free consultations; resources; podcasts, social media groups, publications; tech FAQ; small farm innovation challenge funding opportunity; and the option to subscribe for email updates.

This toolkit describes “how” local government leads and partners can design more fundable projects by pulling specific policy levers, seeking key partnerships, using innovative accounting practices, inverting power structures, and rethinking and redesigning internal processes. It will help local government leads and partners operate within current finance and policy systems to better prepare themselves and their communities for climate resilience funding and finance.

Natural disasters take an enormous ecological, social and economic toll - can nature-based solutions help? In this podcast, Harnessing Natural Infrastructure to Protect the Built Environment, you will hear from Allied World insurance experts, and NWF scientists, as they discuss the benefits that nature-based solutions can play in hazard risk reduction.

Provides municipalities by county, state and regional contacts, state assembly, state senate, and US congress contact information.

The Benefits of Publicly Owned Water Systems module is designed for local municipal and governmental leaders nationwide facing questions about the benefits of public ownership of water systems, as well as what privatization entails, public private partnerships, and everything in between. These TiR Toolkit sections provide mechanisms, strategies, resources and support for publicly owned drinking water systems as they navigate questions about engaging with private service providers. Decision-makers, utility management, and staff are encouraged to explore the Toolkit, and share your feedback or questions with WaterNow.

As climate change poses increasing risks to communities across the country, the role of nature in addressing climate-related impacts is receiving heightened attention. “Nature-based Solutions” (NbS) can play an important role in community adaptation and resilience, not only by reducing climate-related risks but also through enhancing the quality of life for community residents.

Incorporating Nature-based Solutions into Community Climate Adaptation Planning offers guidance for local communities, planners, and climate service providers for integrating natural and nature-based features into adaptation and resilience planning. A collaboration between National Wildlife Federation and EcoAdapt, this guidance was funded by the Climate Resilience Fund in support of the U.S. Climate Resilience Toolkit, and its “Steps to Resilience” planning framework.

Nature-based solutions—also known as natural infrastructure, natural defenses, natural climate solutions, and a variety of other terms—can encompass a wide range of options, from the conservation and reliance on still-intact natural systems, the restoration of degraded ecosystems, to the use of engineered systems designed to emulate natural system functions. Nature-based approaches can also be used in concert with structural options to form hybrid or “green-gray” systems for risk reduction.

The guide offers advice on how to integrate nature-based solutions into each phase of the “Steps to Resilience” community planning process. The guide also summarizes approaches for overcoming barriers to the adoption of nature-based solutions and highlights funding and financing mechanisms that can help communities implement nature-based approaches.

To promote the adoption of nature-based solutions more broadly, the report identifies the following set of seven “key considerations” for incorporating nature-based solutions into community adaptation planning:

- Recognize natural systems and processes as critical infrastructure
- Consider climate impacts on priority natural assets
- Consider equity implications in the design and application of nature-based solutions
- Ensure nature-based solutions yield net positive biodiversity benefits
- Seek to protect or restore critical natural infrastructure
- Give natural features and processes space to function
- Integrate nature-based solutions into existing planning processes

This report explores how the economic competitiveness of U.S. cities will be impacted as climate impacts worsen – and how enhanced climate resilience could could provide a competitive advantage. It focuses on the links between climate resilience and local economic competitiveness in three particular areas: city finances, economic development, and livability.

Based on a comprehensive literature review, discussions with city representatives and private-sector experts, and analyses of local resilience and economic development plans, this report examines the links between local climate risks and economic competitiveness. It highlights emerging resilience practices, identifies cross-cutting challenges, and recommends government and private-sector actions to strengthen climate preparedness and competitiveness among U.S. cities.

With respect to city finances, we find that local governments across the country are already facing real, but largely unquantified, financial impacts from weather disasters and chronic climate-related stressors that drain local budgets and put municipal creditworthiness at risk. Climate-related damages to public assets and systems force local governments to re-direct funds that had been designated for other needs towards repair and recovery instead. Municipal revenue streams are also at risk, for example when eroding property values lead to reduced property tax revenues. Local governments that are not adequately protected from these financial risks can be forced to boost long-term borrowing or otherwise adjust their budgets when impacts strike. At the same time, credit rating agencies and investors are starting to factor climate risks into their decision making, so cities ill-prepared for climate change may receive lower credit ratings and encounter higher borrowing costs – just when their need to invest in resilience grows.

Climate change affects all Americans—regardless of socioeconomic status—and many impacts are projected to worsen as temperatures and sea levels continue to rise, snow and rainfall patterns shift, and some extreme weather events become more common.

This report contributes to a better understanding of the degree to which four socially vulnerable populations—defined based on income, educational attainment, race and ethnicity, and age—may be more exposed to the highest impacts of climate change in six categories:

- Air Quality and Health
- Extreme Temperature and Health
- Extreme Temperature and Labor
- Coastal Flooding and Traffic
- Coastal Flooding and Property
- Inland Flooding and Property

Key Findings:

Of the four socially vulnerable groups examined, minorities are most likely to currently live in areas where the analyses project the highest levels of climate change impacts with 2°C of global warming or 50 cm of global sea level rise.

Those with low income or no high school diploma are approximately 25% more likely than non-low income individuals and those with a high school diploma to currently live in areas with the highest projected losses of labor hours due to increases in high-temperature days with 2°C of global warming.

In general, adults ages 65 and older are not projected to be significantly more likely than younger individuals to currently live in areas with the highest projected impacts of climate change.

With higher levels of global warming and sea level rise, the risks to socially vulnerable groups are generally projected to remain approximately the same or increase.

Coastal Resilience is a program led by The Nature Conservancy to examine nature's role in reducing coastal flood risk. The program consists of an approach, a web mapping tool, and a network of practitioners around the world supporting hazard mitigation and climate adaptation planning.

Description

Coastal Resilience projects around the U.S., encompassing 17 coastal states, in the Caribbean, across Mexico and Central America, and a global effort enable planners, government officials, and communities to develop risk reduction, restoration and resilience strategies.

The approach consists of four critical steps:

- Assess hazard risk and community vulnerability
- Identify nature-based solutions
- Take conservation and restoration action
- Measure the effectiveness of our actions to reduce flood risk

The science of nature-based solutions in reducing flood risk is growing rapidly; Coastal Resilience and our Natural Solutions Toolkit examines when and where they are most effective.

Audience

Coastal Resilience program supports practitioners around the world who are working to address coastal hazards, particularly sea level rise and storm surge, with adaptation and risk mitigation solutions.

This "toolkit" is a collection of templates and other resources developed by the Institute for Tribal Environmental Professionals (ITEP) to assist tribes in their climate change adaptation planning process. The materials provided are not "one-size-fits-all" solutions, and users are encouraged to modify the materials to better represent the needs and priorities of their own tribe.

ITEP was created to act as a catalyst among tribal governments, research and technical resources at Northern Arizona University (NAU), various federal, state and local governments, and the private sector, in support of environmental protection of Native American natural resources. ITEP was established at NAU in 1992, in cooperation with USEPA.

Description

Adaptation Planning Toolkit Resources:

- Adaptation Planning Background Material [PDF]
- Checklist [PDF]
- Template: Tribal Climate Change Adaptation Planning Guide [PDF]
- Template: Tribal Resolution for a Climate Change Adaptation Initiative [PDF]
- Worksheet: Adaptation Planning [PDF]
- Spreadsheet: Adaptation Planning [xls]
- Template: Tribal Climate Change Adaptation Plan [PDF]
- Guides and Tools for Climate Change Adaptation Planning [xlsx]
- Example Tribal Climate Change Assessments and Plans [pdf]

The Integrated Climate Adaptation and Resiliency Program (ICARP), established through Senate Bill 246 (Wieckowski, 2016), is a critical driver of California's strategy and leadership on climate adaptation and resilience. ICARP advances a cohesive and holistic response to the impacts of climate change by coordinating state and local adaptation efforts to support comprehensive planning and accelerate implementation. Through its enabling legislation, ICARP is centrally focused on efforts that advance climate equity and support integrated climate strategies, or those strategies that benefit both greenhouse gas reductions and adaptation.
ICARP works to advance these priorities in planning and investment decisions through the development of decision-support tools, actionable climate science, guidance, technical assistance, and grant programs.

This is a draft paper for the ICARP TAC that presents initial inventory resilience metrics, identifies how the state can measure built, natural and social resilience, and identifies the characteristics needed to demonstrate resilience across the state.

This Natural and Working Lands Climate Smart Strategy will help to implement the Governor's Executive Order, and expand climate action in this sector, which has been called for in California's Climate Change Scoping Plan and California's recently updated Climate Adaptation Strategy. This Natural and Working Lands Strategy:

- Defines California's eight natural and working landscapes.
- Describes how improved management of these landscapes can deliver on our climate change goals and advance broader environmental, economic, and social objectives.
- Highlights priority nature-based climate solutions to address the climate crisis.
- Outlines regional opportunities for climate smart land management.
- Identifies options to track nature-based climate action and measure progress.
- Packages recommendations to scale nature-based climate solutions in California identified through our public engagement process

This Pathways to 30x30 strategy sets California on the path to successfully implement our 30x30 conversation goal. This strategy:

Describes the key objectives and core commitments that are a part of California's 30x30 conservation framework.

Defines conservation for the purpose of California's 30x30 initiative and establishes a current baseline of conserved areas.

Outlines strategic actions necessary to achieve our 30x30 target.

Introduces CA Nature, a suite of publicly available applications to identify conservation opportunities and track our collective progress.

Ongoing, complex, and intersecting disasters—including climate change, extreme heat, power outages, and the global COVID-19 pandemic—are disrupting the ways in which Californians live and work. The impacts of these disasters tend to be felt most severely by California's disadvantaged communities. CCST is targeting its science and technology services—expert briefings, studies and publications, workshops, and more—toward equitable solutions for California's resilience to disasters, reducing harm and improving the lives of all Californians along the way.

What is Watershed University?

Watershed University (WU) is a free educational and networking opportunity designed for professionals in floodplain management, water management, emergency management and related fields. The events hosted under the WU banner are a cooperative effort led by the California Silver Jackets, evolving from the recognition that some communities could not afford the investment of time and money to send floodplain managers and other professionals to conferences. Knowledge sharing is a critical component to interagency success at management of land, water, and natural resources, and WU is a key to achieving this goal.

What is the 2022 Watershed University Summit?

The U.S. Army Corps of Engineers (USACE) and the California Department of Water Resources (DWR) have partnered to provide this two-day, FREE virtual forum for discussion on flood and related hazards. The virtual summit was held April 26-27, 2022.

This website is an information sharing platform for source water protection. The Source Water Collaborative Learning Exchange is a platform for discussing current challenges, sharing stories, and transferring knowledge on source water protection (SWP).

This guidance delves into the opportunities for integrating NbS into community adaptation planning processes with a special focus on the "Steps to Resilience" framework. Chapter 1 provides brief overview of NbS and more broadly the role of nature in adaptation and resilience planning. Chapters 2 – 6 looks specifically at the Steps to Resilience planning framework and for each step discusses how NbS relate to and can be integrated into that planning step. This includes a discussion of key barriers to the use of NbS and opportunities for overcoming those obstacles. Chapter 7 describes a variety of financial mechanisms and government programs available to support the application of NbS in communities. Chapter 8 offers a series of case studies highlighting successful examples of the incorporation of natural and nature-based features into community adaptation plans and their implementation. Finally, an Appendix provides a checklist of considerations for the application of nature-based solutions.

Welcome to the Strategic Growth Council's Racial Equity Resource Hub, a public one-stop-shop of resources, best practices, and tools to help agencies, organizations, and individuals advance racial equity. The Resource Hub builds on the work spearheaded by the California Strategic Growth Council, representing seven state member agencies and three public members, to unanimously approve a first of its kind state-level Racial Equity Resolution and Action Plan. The Council further endeavored to advance racial equity through a resolution passed last year to create a Racial Equity Resource Hub to encourage collaboration, learning, and advance racial equity across government and beyond.

This plan outlines a strategic and comprehensive set of state actions to address extreme heat, and serves as an update to the "Preparing California for Extreme Heat Guidance and Recommendations" report released in 2013.

On this web page, there is adaptation guidance and tools in an interactive and easy to access format

Most land management agencies around the world engage with Indigenous organizations and communities in multiple ways as they strive for the best possible management of protected areas and resources while respecting and preserving traditional lands, rights, and resources affected by their decisions. In North America, each NAWPA agency is guided by its own unique laws, policies, and history, however the stories in this publication demonstrate a shared commitment to fostering respectful and innovative collaborative approaches to land management with Indigenous leaders. These stories NAWPA collected reveal a diversity of approaches geared to different ecological and social contexts, timelines, and cultural considerations. While not exhaustive, they provide examples that land management practitioners and community leaders can consider and learn from as they attempt to foster increasingly productive relationships in their own work.

The following 10 stories include projects that draw on both Indigenous and Western knowledge systems to address the following objectives:

- expanding community development
- establishing innovative solutions for challenging conservation issues
- improving resource management and protection
- enhancing education, planning, and research through improved agency and community relationships

Specific lessons and observations gleaned from these projects include:

- allowing sufficient time for cross-cultural awareness and communication
- acknowledging ancestral territory, knowledge, tradition, and culture
- engaging communities at all stages of policy development, project, or program
- showing openness to new perspectives and approaches
- recognizing and, if necessary, rebuilding connections to the landscape
- valuing youth as ambassadors for change
- building trust through openness to the ancestral knowledge and expertise of Indigenous partners

These examples show how partnership and collaboration between agencies and Indigenous organizations and communities can minimize geographic and cultural boundaries, help address sources of tension, such as historical colonialism, build and maintain positive relationships, and help strengthen protected area stewardship for the future.

The Watershed Framework (“Framework”) is designed to provide a pathway for quickly expanding, durable, and cross-generational networks that center equity and spur broad-scale coordination and collaboration across jurisdictions and sectors. The Framework pathway is not intended to be linear. The only sequential activity is preparation. Actors should choose the activities that meet them where they are and be prepared to double-back on activities as needed. Developing a common understanding of the watershed system, including vulnerabilities and vulnerable communities, for example, will be a work in progress as watersheds learn and fill information gaps. Regardless of where a watershed begins, building on common values across the watershed, the Framework urges broader collaborative action underpinned by a commitment to equity, sustainability, transparency, and shared learning

The Climate Adaptation Toolkit for Marine and Coastal Protected Areas was created to make climate adaptation planning a simple, direct, and feasible process for marine protected area managers. It contains tools that help protected area managers evaluate the vulnerability of their sites to climate change, identify appropriate adaptation strategies and learn about those strategies through case studies, reports and other resources.

The effects of climate change on natural systems will be substantial, wide-spread, and likely irreversible. Warmer temperatures and changing precipitation patterns have already contributed to forest dieback and pushed some species towards extinction. Natural systems contribute to human welfare both as an input to the production of consumption goods and through the provision of non-use values (i.e. existence and bequest values). But because they are often unpriced, it can be difficult to constrain these benefits. Understanding how climate change effects on the natural capital stock affect human well-being, and therefore the social cost of carbon (SCC), requires understanding not just the biophysical effects of climate change, but also the particular role they play in supporting human welfare. This article reviews a range of topics from natural capital accounting through climate change economics important for quantifying the ecological costs of climate change, and the integration of these costs into SCC calculations.

Coastal wetlands provide a wide array of ecosystem services, valued at trillions of dollars per year globally. Although accelerating sea level rise (SLR) poses the long-term threat of inundation to coastal areas, wetlands may be sustained in two ways: by positive net surface-elevation change (SEC) from sediment and organic matter buildup and by accumulation, or horizontal migration into refugia—low-lying, undeveloped upland areas that become inundated. Using a simple model together with high-resolution elevation data, we provide, across the contiguous United States, analysis of the local effects of SLR, maximum SEC rates, and coastal development on the long-term resilience of coastal wetlands. We find that protecting current refugia is a critical factor for retaining wetlands under accelerating SLR. If refugia are conserved under an optimistic scenario (a high universal maximum SEC rate of 8 mm/yr and low greenhouse gas emissions), wetlands may increase by 25.0% (29.4%–21.5%; 50th, 5th–95th percentiles of SLR) by the end of the century. However, if refugia are developed under a more pessimistic scenario (a moderate universal maximum SEC rate of 3 mm/yr, high greenhouse gas emissions, and projections incorporating high ice-sheet contributions to SLR), wetlands may decrease by −97.0% (−82.3%–99.9%). These median changes in wetland area could result in an annual gain of ~$222 billion compared to an annual loss of ~$732 billion in ecosystem services in the US alone. Focusing on key management options for sustaining wetlands, we highlight areas at risk of losing wetlands and identify the benefits possible from conserving refugia or managing SEC rates.

This document describes EPA's vision for the strategic use of participatory science approaches in EPA's work. Although public engagement in science is not a new concept, the term "participatory science" is relatively new. Others have used terms such as citizen science, community science, crowd-sourced science, community-based participatory monitoring, volunteer monitoring, public participation in the scientific process, public science, open science, civic science, and do-it-yourself science. There is current debate in the field about terminology, but scientists and practitioners agree on the larger goal of making these science approaches as broad and inclusive as possible. To that end, EPA is transitioning to the term "participatory science" to represent the most inclusive and accessible involvement of the public in the scientific process, especially for those who have been historically underrepresented in the field. EPA recognizes that changing terminology is a first step and commits to ensuring that everyone can influence the culture, values, and future of participatory science.

This site is for Californians experiencing problems with their private (self-managed) wells (not for residents served by a public water system already regulated by the State). Report your dry well in a few steps and find available resources.

In the 2011 report, The State of Marine and Coastal Adaptation in North America: A Synthesis of Emerging Ideas, we documented over 150 adaptation projects and initiatives from the United States, Canada, and Mexico (Gregg et al. 2011). The report concluded that the majority of activities underway were primarily focused on building awareness of how climate change may affect marine and coastal environments and adaptation planning, with some projects that had advanced into implementation. Progress has been made since then and this updated report and guide shares lessons learned from completed projects, and identifies additional adaptation initiatives from different geographies and partners.

First, we provide a summary of climatic changes, including air and ocean temperatures, precipitation patterns and coastal storms, ocean circulation, sea levels, and ocean chemistry (e.g., pH, dissolved oxygen, salinity), and associated impacts on marine and coastal systems, including species, habitats, ecosystem services, and human communities.

Second, we provide an overview and examples of common barriers to adaptation noted by practitioners, such as funding and budgetary constraints, insufficient staff capacity and technical expertise, limited political will to mandate and enforce implementation, and lack of stakeholder awareness and engagement on climate change.

Third, we present adaptation examples by the following categories:

Capacity Building: Strategies include conducting research and collecting additional information, conducting training and planning exercises, improving public awareness 6 and education, developing tools and resources, and monitoring impacts and effectiveness of adaptation actions.

Governance and Policy: Strategies include developing adaptation plans and policies, creating new or enhancing existing policies, and developing adaptive management strategies.

Infrastructure, Planning, and Development: Strategies include improving existing or designing new infrastructure to withstand the effects of climate change, incorporating climate change into community and land use planning, creating or modifying development measures (e.g., removing shoreline hardening, encouraging low-impact development), and developing disaster preparedness plans and policies.

Natural Resource Management and Conservation: Strategies include enhancing areas under protection, restoring critical habitats, and reducing non-climate stressors.

The report concludes with a discussion of some notable trends from this latest review of marine and coastal

Healthy ecosystems are essential for human well-being and development. People worldwide depend on their services, such as provision of fertile soil, clean water and food as well as extreme event buffering and climate regulation. Ecosystems are essential for protecting our climate and adapting to climate change. Ecosystem-based Adaptation (EbA) means using biodiversity and services provided by ecosystems to help people adapt to the effects of climate change. It builds on healthy ecosystems, and thus requires managing the ecosystems for their long-term benefits. EbA is a holistic approach within land- and seascapes and applies to many sectors such as agriculture, forestry, tourism, city planning and water management. It involves a range of approaches for the sustainable management, conservation, and restoration of ecosystems, such as the protection of peatlands as natural water storages for buffering increasing amounts of sudden rainfall or the restoration of mangroves that act as natural barriers against storms and floods in coastal regions.
EbA measures play an increasingly important role in the context of climate change adaptation strategies. They complement or even substitute purely technological infrastructure approaches. They tend to offer economic, social and ecological co-benefits and opportunities for the mitigation of greenhouse gas emissions as well as biodiversity conservation, disaster risk reduction and prevention of desertification. This publication intends to inspire policy- and decision-makers as well as practitioners by showcasing a selection of solutions that have been applied in very different settings and focusing on key aspects and themes that are important for the longevity of EbA. It shows that EbA has 'many faces': it is being implemented successfully in a broad range of countries and ecosystems and it is driven forward by all kinds of people and organisations. At the same time, the publication makes clear that in order for EbA to be sustainable, projects need to consider cross-cutting topics such as governance and gender; they need to ensure and come up with long-term financing mechanisms and need to aim for the mainstreaming of EbA into other fields such as agriculture and urban contexts.
EbA solutions are applied examples of successful processes or approaches to solve a specific challenge related to climate change. They address current and future climate change impacts (e.g., floods, droughts, storms, sea level rise, melting of glaciers) on human wellbeing through the sustainable management of ecosystems and the services they provide — with a proven impact. A solution usually consists of a combination of building blocks. Building blocks (BB) are key elements of a solution, such as instruments,

An online tool from the Connecting Nature Project, which will help you create your Nature-based Solutions / project evaluation and monitoring plan.
By navigating through sections, you will be asked to select your main targets in terms of health, social, environmental and economic benefits and as a result, CO-IMPACT will turn them into measurable 'indicators' and provide you with a custom-made report on how to set up your baseline and measure your success.

This web page features milestones and information about the California wine industry's participation in sustainability programs in a timeline format.

This report documents the trend for agricultural land conversion to suburban and urban development. It notes that agricultural lands provide valuable ecosystem services/ It has a companion mapping tool to help readers explore alternatives.

The Framework was developed to track progress and trends in ecosystem restoration and includes a series of information variables such as monitoring indicators and project descriptors that can be shared among the many platforms and databases that collect, aggregate, evaluate, and provide access to data on ecosystem restoration.
The Framework provides a wide slate of shared variables from which organizations and project managers may adopt relevant and appropriate content for their individual monitoring protocols, reporting systems, databases, and platforms. Through the use of these shared variables, the Framework facilitates the collection of project information across the restoration monitoring data universe. Acknowledging that it would be impossible to identify one set of shared variables that would be relevant and applicable in all divergent social and ecological contexts, the uptake of all shared variables by any one user is neither expected nor recommended.

Webinar. As rainfall events become more frequent and intense, watershed management becomes paramount. Elevated bacteria levels in the nation's surface waters are a public health issue–leading to sick pets, beach closures, and posing immediate health risks to anyone who recreates in or consumes the water. Until now, there have been limited, cost-effective ways to reduce bacteria levels in stormwater. Biochar in stormwater filter media could provide safer, cleaner recreational waters for humans, pets, and wildlife. During this presentation, Stantec will discuss the biochar- and iron-enhanced sand filters (BIESF) Large-scale Demonstration Projects. These BIESFs are the largest known stormwater treatment systems designed to remove bacteria from urban runoff with far-reaching implications for the industry. Key takeaways to be presented include biochar- and iron-enhanced sand filter design considerations and specifications, site constraints and challenges, preliminary performance results, and lessons learned along the way.

Land conservation is an essential strategy to combat and adapt to climate change and supports biodiversity, the food system, soil health, and many other values. Recent State policy has elevated the importance of natural and working lands and nature-based solutions for their role in mitigating the impacts of climate change. This report presents a collection of land conservation tools organized in four State priority areas: Biodiversity Protection, Agricultural Preservation and Working Lands Management, Infill Development and Avoided Conversion, and Climate Risk Reduction. The purpose of this toolkit is to explain the type and timeframe of financial benefit a landowner can accrue by implementing one or more of these strategies, how operational each tool is, and any barriers to implementation (both from a policy perspective, and the perspective of the participant).

Companion to 2022 Sea Level Rise Technical Report. The guide is a first-of-its-kind effort to help individuals and organizations wade through various local considerations to arrive at the best approach for their community. In this way, they can advance coastal resilience on their own terms and adopt planning and adaptation initiatives that make the most sense for their situation.
The application guide is national in scope and includes examples from different geographic regions, providing broad guidance regarding where to start and how to consider the right approach for using projection data. Also included are recommended practices for using these data in the face of uncertainty. The guide does not include regulatory or engineering guidance.
The application guide includes four sections:

- A description of the content within the technical report
- An in-depth discussion of items to be considered when planning for sea level rise
- Approaches for integrating the 2022 sea level rise scenarios into community planning initiatives; and
- Additional resources to be used as communities explore next steps

Intended audiences include coastal decision makers and professionals who need to understand, communicate, and apply the best available sea level rise information.

The Sea Level Rise Technical Report provides the most up-to-date sea level rise projections available for all U.S. states and territories; decision-makers will look to it for information.

The Resilient Nation Partnership Network, NASA, and 36 partners are pleased to announce the release of "Building Alliances for Climate Action". At a time when many are searching for direction on how to address the climate crisis, this co-created resource represents a unifying voice, providing partner perspectives, personal stories, insights and resources the Whole Community can use to address climate change.

See how a geographic approach can help California leaders mitigate the impacts of climate change at both the micro and macro levels. This ebook explores how organizations such as the San Francisco Estuary Institute, LandIQ, and the US Department of Agriculture (USDA) Agricultural Research Service are using a modern geographic information system (GIS) to address adaptation and reduction by:

- Efficiently collecting, analyzing, and sharing data.
- Improving operational awareness.
- Achieving real-time intelligence.
- Understanding situations with greater context and clarity.
- Bringing stakeholders together for shared solutions.

Interactive web site. Extreme heat events have long threatened public health in the United States. The CDC Heat & Health Tracker provides local heat and health information so communities can better prepare for and respond to extreme heat events. Use the search to explore how extreme heat affects your county, populations who are at risk, and response resources.

The California Groundwater Projects Tool is an interactive map application that allows users to view groundwater management project information in a geospatial format. The tool is intended to provide information on outcomes from grant funded SGMA related projects as well as potential SGMA related projects.

These resources explore the science, trends, and local impacts of heavy rain and flooding in the US.

Heat related illnesses and death are largely preventable with proper planning, education, and action.
Heat.gov serves as the premier source of heat and health information for the nation to reduce the health, economic, and infrastructural impacts of extreme heat.
Heat.gov is the web portal for the National Integrated Heat Health Information System (NIHHIS)
Interactive website providing information related to attainment of CA climate targets with respect to emissions

In response to Senate Bill 901 (Dodd, 2018) and Assembly Bill 2911 (Friedman, 2018), OPR updated its Fire Hazard Planning Technical Advisory to include "specific land-use strategies that reduce fire risk to buildings, infrastructure, and communities". The update also helps communities:

Conduct outreach and engagement activities to promote more robust and collaborative wildfire solutions;

Conduct comprehensive wildfire hazard and risk assessments;

Align and integrate these assessments across a variety of plans; and

Develop general plan policies and programs that reduce risk for existing and future communities.

OPR released a Public Draft of the updated Technical Advisory in November 2020. The Final Draft includes revisions in response to stakeholder feedback, along with other minor edits.

Climate change threatens biodiversity through global alteration of habitats, but efficient conservation responses are often hindered by imprecise downscaling of impacts. Besides thermal effects, warming also drives important ancillary environmental changes, such as when river hydrology evolves in response to climate forcing. Earlier snowmelt runoff and summer flow declines are broadly manifested in snowdependent regions and relevant to socioeconomically important cold-water fishes. Here, we mechanistically quantify how climate-induced summer flow declines during historical and future periods cause complex local changes in Chinook salmon (Oncorhynchus tshawytscha) habitats for juveniles and spawning adults. Changes consisted of large reductions in useable habitat area and connectivity between the main channel and adjacent off-channel habitats. These reductions decrease the capacity of freshwater habitats to support historical salmon abundances and could pose risks to population persistence in some areas.

We are innovating what government open data can be by creating an open source data portal where all aspects of data ingestion, analysis, visualization, and sharing are transparent and collaboratable by the open source community. This project is a collaboration with California Water Boards, Moore Institute for Plastic Pollution Research, The Gray Lab @ UCR, San Francisco Estuary Institue, California 100, Possibility Lab and the open source community at large.
This data portal supports the implementation of Senate Bill No. 1422 which mandates sharing of microplastic data from drinking water, policy SAM 5160 which mandates that state data be open access, and policy SAM 4984 which mandates that software be open by default. Our vision is to use this project as a framework for future open software development by state agencies in the California. All engagement on this open repo will be the subject of future policy research on how government and open source communities can better collaborate on software development projects.

Coastal wetlands are not only among the world's most valued ecosystems but also among the most threatened by high greenhouse gas emissions that lead to accelerated sea level rise. There is intense debate regarding the extent to which landward migration of wetlands might compensate for seaward wetland losses. By integrating data from 166 estuaries across the conterminous United States, we show that landward migration of coastal wetlands will transform coastlines but not counter seaward losses. Two-thirds of potential migration is expected to occur at the expense of coastal freshwater wetlands, while the remaining one-third is expected to occur at the expense of valuable uplands, including croplands, forests, pastures, and grasslands. Our analyses underscore the need to better prepare for coastal transformations and net wetland loss due to rising seas.

Fifty years ago, riparian habitats were not recognized for their extensive and critical contributions to wildlife and the ecosystem function of watersheds. This changed as riparian values were identified and documented, and the science of riparian ecology developed steadily. Papers in this volume range from the more mesic northwestern United States to the arid Southwest and Mexico. More than two dozen authors - most with decades of experience - review the origins of riparian science in the western United States, document what is currently known about riparian ecosystems, and project future needs. Topics are widespread and include: interactions with fire, climate change, and declining water; impacts from exotic species; unintended consequences of biological control; the role of small mammals; watershed response to beavers; watershed and riparian changes; changes below large dams; water birds of the Colorado River Delta; and terrestrial vertebrates of mesquite bosques. Appendices and references chronicle the field's literature, authors, "riparian pioneers," and conferences. >> Volume 2 is also available on Treesearch.

This document provides an overview of workshop discussion, including additional information on solutions and next steps, as well as the underlying data reporting challenges motivating them.

To support the community of climate resilience practitioners in the State of California, the Integrated Climate Adaptation and Resiliency Program developed a series of gantt charts summarizing current state climate resilience-related funding and financing programs' timelines, as of July 1, 2022. The charts are broken down by sector.

Incorporating climate change into ecological restoration is critical for preventing future invasions and building resilient native communities. Climate-smart restoration can include a spectrum of approaches from resisting change to directing ecosystems to a transformed state (learn more in 'Embracing the Future'). However, most climate-smart projects consider graduate climate changes such as warming or sea level rise. Zabin et al. (2022) highlight the need to also consider extreme climatic events (ECEs). ECEs, such as heat waves, droughts, severe storms and flooding in the Northeast, are one of the most immediate threats caused by climate change, causing damage to native communities and providing opportunities for invasive species to colonize.

Zabin et al. (2022) examine the impacts of ECEs on restoration projects in 22 published studies, revealing a mix of positive and negative impacts. Different species and habitats were vulnerable to different extreme events, highlighting a need for restoration practitioners to incorporate a "portfolio approach" when selecting restoration sites and species. A portfolio approach involves applying the same restoration strategy to multiple habitat zones or species gene pools. In essence, diversifying the species and habitats that restoration is applied to can minimize the risk of an entire restoration project failing if an extreme climatic event occurs.

Take Home Points:

ECEs have the potential to do significant damage to restoration projects if precautions are not taken. In several cases, ECEs have been reported to kill all restoration propagules planted.

ECEs may not match the overall trend an area is experiencing due to climate change. An area that is trending warmer can still be vulnerable to extreme cold events (especially in the early spring if snowmelt disappears earlier).

Damage from ECEs can be mitigated by distributing restoration efforts over a wider variety of areas and gene sources.

Management Implications:

Managers should consider the ECEs most likely to impact their region when diversifying their restoration projects. For example, areas with extreme precipitation events may benefit from applying restoration to diverse topography, such as low areas to protect against drought and high areas to protect against flooding, as well as diverse species sources that are able to tolerate both extremes.

Climate Mapping for Resilience and Adaptation (CMRA) integrates information from across the federal government to help people consider their local exposure to climate-related hazards. People working in community organizations or for local, Tribal, state, or Federal governments can use the site to help them develop equitable climate resilience plans to protect people, property, and infrastructure. The site also points users to Federal grant funds for climate resilience projects, including those available through the Bipartisan Infrastructure Law.

Presented by CFN in partnership with the Yale Center for Business and the Environment, the 2020 Boot Camp Webinar Short Course explores the latest trends and strategies in funding and financing being put to work for land and resource conservation, restoration, and stewardship. With an emphasis on hands-on tools and lessons from relevant case studies, we review innovative and overlooked opportunities in conservation finance in this 4-part video series.

Most states have enacted laws regulating how public entities may and may not use bond dollars and/or other public debt in connection with private property. For the most part, these rules had their genesis in efforts to ensure against corruption, fraud, and misuse of public funds. However, they are also interpreted as limiting the ability of cities, towns, and utilities to access bond dollars for projects on private property even when those projects advance important public interests.
These state laws can be flexible enough to allow greater investment in localized infrastructure. To meet their state public finance statutory requirements, generally local governments must demonstrate that localized infrastructure improves and/or benefits the utility system. For example, the First Class City Revenue Bond Act and the General Water and Wastewater Revenue Bond Ordinance of 1989 govern Philadelphia's issuance of municipal bonds and provide that the City has authority to issue revenue bonds for the purpose of financing "projects" relating to the water "system." These rules do not prohibit the City from issuing revenue bonds to pay. The City would instead need to ensure that the financed LWI projects meet the statutory definitions of "projects" and "system."
Use this database to explore your state's public finance statutes and find a summary of how these state laws might be flexible enough to allow debt financing of distributed infrastructure.

The Special Report of the Working Lands, Working Communities Initiative contains targeted recommendations on issues that affect natural resource management and the role that local communities play in successful land planning and management processes.

The goal of this project was to inform and support non-Indigenous conservation groups and conservation and environmental funders' staff and boards working with Indigenous communities. Its geographic focus is what is currently parts of the western contiguous United States, Alaska, and western Canada.

Mycelium is a fungal structure that forms threads and branches which grow in complexity and serve to connect, strengthen, and share resources across an ecosystem. As a guide to undertaking equity work, the Mycelium Map borrows from this ecological metaphor, providing the user with a pathway to explore, consider/reconsider, and to act. Like any map, it does not prescribe a direction or a linear series of steps towards a destination. Rather, the Mycelium Map offers a number of approaches to undertake the complex and iterative work of centering justice, equity, and cultural responsiveness in the context of landscape stewardship. Each nodule is a connection point between you, your organization, your community, and the broader field of practice, as well as a connection to the other nodules within the map. It is nonlinear, lyrical, and rooted in the intention to support meaningful change and to increase human connectivity in our work.

The purpose of this report is to illustrate how values of diversity, equity, and inclusion have strengthened landscape conservation projects across the United States. Additional resources for the landscape conservation community are provided to assist others in the process of integrating diversity, inclusion, and equity principles into their work.

This paper provides an overall approach as well as specific recommendations for how state and federal agencies can support the building and sustaining of local and regional collaboration necessary to advance landscape-scale stewardship. These recommendations build upon the findings of two California Landscape Stewardship Network (CLSN) publications – Capacity Building for Collaboration (Goldberg, 2018) and Advancing Collaboration in California (Wright, 2020).

This landscape analysis report includes robust recommendations that can inform the State's grant programs to foster more equitable and resilient communities across California. In developing this report, the CRP team conducted an extensive data analysis to surface learnings from previous grant programs and engagement resources. The team also engaged with hundreds of diverse local, regional, and statewide community resilience leaders across California, over the course of almost 100 convenings and meetings. Finally, a working group of leaders driving equity and resilience in cross-sectoral organizations across the state provided detailed guidance to this effort via a series of working meetings. These perspectives led to six core recommendations detailing how forthcoming grant programs might best reach and be most effective in communities most in need of this funding.

This report offers three overarching sets of takeaways—based on the experiences and learnings of PACE's pilot year—to support and shape future State capacity building programs and investments. 1. Capacity building programs best practices; 2. Frontline communities challenges and recommendations; and 3. State practices challenges and recommendations.

Curriculum includes:
Community Needs Assessment Toolkit (contains a robust set of prompts and resources to guide the development of actionable, community-driven plans)
Vision Module Facilitator Guide
Assessment Module Facilitator Guide
Strategy Module Facilitator Guide
Timeline Module Facilitator Guide
Key recordings and presentations

To address the progressive impacts and challenges of climate change, there is an urgent need to adopt innovative adaptation approaches such as those that integrate both technology and nature to enhance the resilience of coastal and ocean-dependent communities. This policy brief summarizes actions and recommendations for scaling up innovative approaches to achieve multiple benefits for people and nature. The findings are based on the outcomes of a series of events on integrated adaptation approaches organized by UNFCCC Technology Executive Committee (TEC), UNFCCC Nairobi Work Programme (NWP) Expert Group on Oceans, International Union for Conservation of Nature (IUCN), and the Friends of Ecosystem-based Adaptation (FEBA) Network in 2021 as part of Technology Day.

Beyond Barriers to Implementation: a Water Sector Perspective on Sea Level Rise Adaptation was developed to provide tangible, replicable practices to help water utility staff and water resource managers advance adaptation efforts in the face of climate change. Sea level rise adaptation is context-specific (e.g., by location, by asset, and by system), and while there is no one-size-fits-all approach to adaptation, there are principles—or leading practices—that may help water sector practitioners move towards on-the-ground implementation.

Climate change has implications for both the effectiveness and hazard risk potential of many projects and activities undertaken or reviewed by natural resource management agencies. Failing to evaluate the potential vulnerability of a project or action prior to implementation or approval can lead to missed opportunities to improve design, optimize siting or otherwise reduce risk.
This tool is designed to help you determine if given climate change your project will continue to deliver intended benefits.
The Checklist supports your ability to:

- Explicitly evaluate the implications of future conditions on project function, longevity and impact
- Build climate consideration directly into funding, permitting and planning phases
- Reduce liabilities or avoid actions that will be ineffective under future conditions

Step 1: Climate Quick Check
Identify how the project may be impacted by climate change over its lifetime by considering a range of indicators
Step 2: Evaluation of Climate Impact on a Project
Explore potential of climate risk factors by answering specific questions and considering relevant, available data
Step 3: Synopsis & Adaptation Options
For each identified vulnerability in Step 2, develop adaptation options to avoid, minimize or mitigate future negative impacts, while delivering intended benefits. Use adaptation support resources to find potential options.

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This fourth edition of the Indicators of Climate Change in California report distills the effects of climate change into 41 indicators, scientific observations that track climate-related trends and patterns across the state over time. Together, these patterns tell the state's climate change story, from its underlying causes and resulting changes in climate to the compounding impacts on public health and the state's natural environment.

OEHHA recognizes the value of Tribal knowledge in reporting on, and raising awareness of, climate impacts. OEHHA engages with California Tribes on an ongoing basis.
We invite Tribes to contact us at any time to work together on this project.
The fourth edition of the Indicators of Climate Change Report includes reports on the impacts of climate change on 8 California Tribes, including the Karuk Tribe. The report on the Karuk Tribe is available in the Klamath River Watershed Tab.

Why, Where and How to support beneficial birds. Farmers, land managers and others can use this in-depth guide to support the use of the Beneficial Bird Habitat Assessment and Native Plant Tool. The guide mirrors the seven sections of the tool, providing real world examples of implementing habitat.

The State of the Birds 2022 report sounds an alarm about steep population losses in virtually all habitats. The report identifies 70 Tipping Point species that have lost half or more of their breeding population since 1970, and are on tract to lose another half or more in the next 50 years.

Recognizing the cultural and ecological importance of beaver, MSC invited the Occidental Arts & Ecology Center WATER Institute (OAEC) to generate a Beaver Recruitment Strategy for the Tásmam Koyóm Maidu Cultural Park (see Figure 2). Tribal elders remember times when beaver were abundant in the valley and have shared with OAEC their strong desire to see this cultural keystone species returned to Tásmam Koyóm. The goal of this strategy is to identify actions Maidu tribal members and other partners can take to encourage the return of beaver as a vital component in restoring wet meadow and riparian function in the valley. This report contains a summary of the methods, results and recommendations for future actions

Gridded SSURGO (gSSURGO) is similar to the standard USDA-NRCS Soil Survey Geographic (SSURGO) Database product but in the format of an Environmental Systems Research Institute, Inc. (ESRI®) file geodatabase. A file geodatabase has the capacity to store much more data and thus greater spatial extents than the traditional SSURGO product. This makes it possible to offer these data in statewide or even conterminous United States (CONUS) tiles. gSSURGO contains all of the original soil attribute tables in SSURGO. All spatial data are stored within the geodatabase instead of externally as separate shapefiles. Both SSURGO and gSSURGO are considered products of the National Cooperative Soil Survey (NCSS) partnership. The gridded SSURGO (gSSURGO) dataset was created for use in national, regional, and statewide resource planning and analysis of soils data. The raster map layer data can be readily combined with other national, regional, and local raster layers, including the National Land Cover Database (NLCD), the National Agricultural Statistics Service (NASS) Crop Data Layer (CDL), and the National Elevation Dataset (NED).

The RE-Powering Tracking Matrix tracks completed projects where renewable energy systems have been installed on contaminated lands, landfills, and mine sites. This resource is for informational purposes only and may not be comprehensive.
The RE-Powering Tracking Matrix Publication provides summary statistics of known installations and discusses emerging trends. It also includes a site list.
The RE-Powering Tracking Matrix Site List is an Excel spreadsheet of the sites to allow for easier sorting and filtering of information for completed projects.

This guide takes a pragmatic approach to stakeholder engagement by presenting general principles and best practices that should be considered throughout all stages of an NBS project, as well as outlining specific steps for incorporating stakeholder engagement throughout NBS project stages. The identified principles and best practices include engaging a diverse range of stakeholders; building long-term relationships and trust; communicating with empathy; prioritizing transparency and accountability; co-creating rather than imposing; recognizing mutual benefits; removing barriers to engagement; formalizing relationships; ensuring adequate financial support; and appointing well-trained, knowledgeable facilitators.

This is a Web app for reporting and viewing the locations of bird collisions with buildings across the globe.

he 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan) lays out a path to achieve targets for carbon neutrality and reduce anthropogenic greenhouse gas (GHG) emissions by 85 percent below 1990 levels no later than 2045, as directed by Assembly Bill 1279. The actions and outcomes in the plan will achieve: significant reductions in fossil fuel combustion by deploying clean technologies and fuels, further reductions in short-lived climate pollutants, support for sustainable development, increased action on natural and working lands to reduce emissions and sequester carbon, and the capture and storage of carbon.

This web-based report provides costs associated with green infrastructure solutions to flooding. These low-cost practices may help communities use existing land assets to protect public infrastructure, private property, and lives. The cost estimates are based on industry-standard unit costs for construction in the Midwest. Geographic variability in construction costs and inflation will affect which solutions are ultimately the most cost-effective.

The PACE Final Report provides an overview of the pilot's goals, structure, activities, and evaluation results and is accompanied by the PACE Recommendations Report and the PACE Curriculum.

The Model Recycling Program Toolkit is an interactive collection of EPA and other materials. Toolkit materials can help states, territories, local governments, tribes, schools, nonprofit organizations, companies, and public-private partnerships create effective programs for recycling, composting, anaerobic digestion, reuse, repair and waste reduction. Materials in the toolkit can help communities increase participation in recycling programs and reduce contamination in the recycling stream.

This Quick Guide to Adaptation Planning for Natural Resources Professionals gives you a starting point to help you design and implement adaptation actions in your work, with a focus on the project level. It draws on the five-step Adaptation Workbook process to help you consider how climate change will affect your lands and your associated goals for natural resources management. By intentionally considering the potential impacts, challenges, and opportunities from climate change, you can then use this lens to identify actions that enable ecosystems to cope with stressors and adapt to changing conditions, while also addressing your conservation priorities.

The Enduring Legacies Native Cases Initiative develops culturally relevant curriculum and teaching resources in the form of case studies on key issues in Indian Country.
The Native Cases Initiative has a special role in providing relevant curriculum for Indian students that supports their success in secondary and postsecondary education. Our collection of cases and teaching notes is open source and includes more than 115 cases that are being used by colleges and high schools across the U.S and overseas. We also offer professional development opportunities for educators through workshops and an annual summer institute.
Culturally relevant curriculum is a key factor in student success and essential to prepare students for leadership roles. Key topics of our cases have been identified by Native leaders. Our partners in developing and using these cases are Northwest Indian College, Salish Kootenai College, and Grays Harbor College.
This collection features case studies on climate change with associated project documents available for download.

Climate TRACE's emissions inventory is the world's first comprehensive accounting of GHG emissions based primarily on direct, independent observation. Our innovative, open, and accessible approach relies on advances in technology to fill critical knowledge gaps for all decision makers that rely on the patchwork system of self-reporting that serves as the basis for most existing emissions inventories.

Prepared For	Prepared By	Published
	Alliance of Regional Collaboratives for Climate Adaptation	January-19
	Caltrans	October-19
	State Board of Forestry and Fire Protection and California Department of Forestry and Fire Protection (CAL FIRE)	August-18
	CAEconomy.org	July-05
NOAA National Ocean Service	Sweet, William, Gregory Dusek, Greg Carbin, John Marra, Doug Marcy and Steven Simon	July-20
	California Governor's Office of Planning and Research	June-20
	State of California, CDFA, CEPA, CNRA, CDF, CDFW, CDWR, CSWRCB, and the Delta Stewardship Council	July-20

	Office of Environmental Health Hazard Assessment (OEHHA), within the California Environmental Protection Agency (CalEPA)	January-19
	Trout Unlimited, TNC, State of California Wildlife Conservation Board	undated
	California Department of Pesticide Regulation	2017
The Urban Sustainability Directors Network	The Cadmus Group	September-18
	Wahl, Eugene R., Eduardo Zorita, Valerie Trouet, and Alan H. Taylor.	March-19
Public Policy Institute of California	Jeffrey Mount, Brian Gray, Karrigan Bork, James E. Cloern, Frank W. Davis, Ted Grantham, Letitia Grenier, Jennifer Harder, Yusuke Kuwayama, Peter Moyle, Mark W. Schwartz, Alison Whipple, and Sarah Yarnell.	December-19

	Small Watershed Instream Flow Transfers (SWIFT) Working Group	March-16
Meeting of the Minds Vibrant Cities Lab	USDA Forest Service	December-18
	California Department of Water Resources	July-05
World Resources Institute	Colin Strong, Samantha Kuzma, Samuel Vionnet and Paul Reig	July-05

California Strategic Growth Council 2018

USDA Economic Research Service September-12

North Coast Regional Water Quality Control Board undated

Pezzi, Maria Giulia, Alessandra Faggian, and Neil Reid, eds. 2021

California Department of Pesticide Regulation 2018

Dimal Matthew Oliver Ralp and Victor Jetten July-20

SWRCB	July-05
Angela Loomba, Francisco Moretra, Sebastian Klimek, Robert HG Jongman, Caroline Sullivan, James Moran, Xavier Poux, Joao P. Honrado, Teresa Pinto-Correla, Tobias Plieninger, and David I. McCracken	July-05
Environmental Defense Fund and New Current Water and Land, LLC	October-18

Maestas, Jeremy D., Richard L. Knight, and Wendell C. Gilgert October-03

California Department of Fish and Wildlife 2018

The Local Government Commission April-19

Public Policy Institute of California June-17

CAL FIRE 2012

California Geographic Information Association	2018
California Department of Toxic Substances Control	2010
California Office of Environmental Health Hazard Assessment	June-18
CalFish A California Cooperative Anadromous Fish and Habitat Data Program	undated
California Agricultural Water Stewardship Initiative	undated
California Air Resources Board	undated
State of California Resources Agency and Department of Fish and Game	January-08

California Natural Resources Agency, California Department of Food and Agriculture, and the Governor's Office of Planning and Research	September-18
State of California	2018
California Department of Water Resources	June-15
California Coastal Commission	April-13
California Department of Water Resources	2017
California Department of Fish and Wildlife	2018
California Department of Parks and Recreation	2018

San Francisco Estuary Institute	2018
Caltrans and CDFG	March-10
CalFish A California Cooperative Anadromous Fish and Habitat Data Program	2018
CalFIRE, California Natural Resources Agency, CalEPA	May-18
CAL FIRE	February-19
California Department of Conservation	2018
Babbitt Center for Land and Water Policy, Sonoran Institute, and Local Government Commission	June-20
California State Water Resources Control Board	July-17

California Stormwater Quality Association	2018
California Department of Fish and Wildlife	2018
California Department of Fish and Wildlife	2018
The Nature Conservancy	June-01
State Water Resources Control Board and California Environmental Protection Agency	2015
State of California, Government Operations Agency	undated
California Wetland Monitoring Workgroup	2018
California Department of Fish and Wildlife	February-04
California State Coastal Conservancy	November-17
California Department of Parks and Recreation	2018

	California Natural Resources Agency, California Department of Food and Agriculture, and CalEPA	January-16
	California Natural Resources Agency, California Department of Food And Agriculture, and CalEPA	January-19
	California Department of Water Resources	October-18
California Department of Forestry and Fire Protection and The California Bay Delta Authority	Shilling, Fraser, Sari Sommarstrom, Rick Kattelmann, Joan Florsheim, Russ Henly, and Barbara Washburn	May, 2005
	California Department of Conservation	2018
	California Wildlife Conservation Board	2018

California Air Resources Board	November-17
California Department of Forestry and Fire Protection Fire and Resource Assessment Program	August-18
Governor's Office of Planning and Research, California Natural Resources Agency, and the California Energy Commission	August-18
State of California: Governor's Office of Planning and Research, Energy Commission, and Natural Resources Agency	August-18

Public Policy Institute of California	January-18
Public Policy Institute of California	October-16
Public Policy Institute of California	October-16
Public Policy Institute of California	October-16
California Economic Summit	October-19
UC Agriculture and Natural Resources	November-19

	Gregr, Edward J., Villy Christensen, Linda Nichol, Rebecca G. Martone, Russell W. Markel, Jane C. Watson, Christopher D. G. Harley, Evgeny A. Pakhomov, Jonathan B. Shurin, and Kai M. A. Chan	June-20
	California Department of Fish and Wildlife	2018
	Rains, Michael T., Theodore H. Wegner, and Alan Rudie	July-15
USDA Forest Service RMRS-GTR-409	Flores, David and Emily R. Haire	July-05
	State Water Resources Control Board	July-18
	Climate Access	July-05

California Department of Water Resources	Schwarz, Andrew and Wyatt Arnold	September-18
	EcoAdapt and Foresight Partners Consulting	February-17
UF/ IFAS Extension	Harvey, Rebecca G., Laura A. Brandt, and Frank J. Mazzotti	June-18
	EcoAdapt and SPARCC	April-20
	US Department of Transportation	June-16
	US Envitonmental Protection Agency Region 9 and California Department of Water Resources	November-11

USDA Economic Research Service	September-14
USDA Economic Research Service	November-15
Geos Institute's ClimateWise® Team: Marni Koopman, Tonya Graham, Christina Mills, Geoff Weaver, and Jessica Leonard	July-19
California Climate & Agriculture Network	September-18
California Climate & Agriculture Network	September-18
California Native Plant Society	July-05
Coalition of Prescribed Fire Councils, Inc.	undated

California Coastal Commission	various dates
California Coastal Commission	August-18
California Coastal Commission	September-18
Climate Central	2020
California Department of Fish and Wildlife	2018
Zero Net Energy California	November-17

	California Department of Water Resources	February-17
California State Coastal Conservancy	Conservation Fund	August-05
Pacific States Marine Fisheries Commission and NOAA	Largier, John, Kevin O'Connor, and Ross Clark	January-19
	UCCE	2015

Atmosphere	Watts, Adam C., Vera Samburova, and Hans Moosmuller	June-20
	California Coastal Commission	2018
	US EPA	August-19
	Del Norte Fire Safe Council	July-20
	Del Norte Fire Safe Council	July-20

	California Department of Pesticide Regulation	2018
	California Department of Fish and Wildlife	2018
UC Davis College of Agricultural and Environmental Sciences	Nelson, Diane	July-20
	California State Department of Water Resources	2018
	Engstrom, Johanna, Keighobad Jafarzadegan and Hamid Moradkhani	July-20

US EPA Office of Science and Technology	PG Environmental	January-20
	Valachovic, Y.S., Lee, C.A., Scanlon, H., Varner, J.M., Glebocki, R., Graham, B.D., and D.M. Rizzo	July-05
	Ritchie, M. W., Skinner, C.N., and T. A. Hamilton	June-05
	Marks-Block, Tony, Frank K. Lake, Lisa M. Curran	October-19
Forest Policy and Economics	Reeves, Tyler, Bin Mei, Jacek Siry, Pete Bettinger, and Susana Ferreira	September-20

Departament d'Enginyeria Agroalimentària I Biotecnologia Campus del Baix Llobregat Universitat Politècnica de Catalunya Barcelona Spain	January-19
California State Water Resources Control Board	July-18
California Office of Environmental Health Hazard Assessment	Multiple dates
CAL FIRE	2012
US EPA	October-19

SWRCB	June-20
Coastal Conservancy	March-19

USDA Forest Service, Pacific Northwest Research Station	Vinyeta, Kirsten and Kathy Lynn	2013	
	California Department of Conservation	2018	
	California Department of Fish and Wildlife Marine Region	April-16	
	The Fire Adapted Communities Learning Network is supported by a cooperative agreement between The Nature Conservancy, USDA Forest Service and agencies of the Department of the Interior through a subaward to the Watershed Research and Training Center.		July-05
	NOAA Restoration Center, South Coast Habitat Restoration, Two Trumpets Communications		July-05
	Stevens, Jens T., Hugh D. Safford, Susan Harrison and Andrew M. Latimer		July-05

Kreye, J., Brewer, N., Morgan, P., Varner, J., Smith, A., Hoffman, C., and R. Ottmar	July-05
Department of Forest Rangeland, and Fire Sciences(link is external) in the University of Idaho College of Natural Resources(link is external) in Moscow, Idaho.	Undated
Department of Water Resources	June-18
DWR	October-19
Umass Amherst and University of Vermont	July-05

Ecological Applications	Prichard, Susan J., Nicholas A. Povak, Maureen C. Kennedy, and David W. Peterson	February-20
	Local Government Commission	undated
	California Governor's Office of Planning and Research	November-18

Lawrence Livermore National Laboratory	Sarah E. Baker, Joshuah K. Stolaroff, George Peridas, Simon H. Pang, Hannah M. Goldstein, Felicia R. Lucci, Wenqin Li, Eric W. Slessarev, Jennifer Pett-Ridge, Frederick J. Ryerson, Jeff L. Wagoner, Whitney Kirkendall, Roger D. Aines, Daniel L. Sanchez, Bodie Cabiyo, Joffre Baker, Sean McCoy, Sam Uden, Ron Runnebaum, Jennifer Wilcox, Peter C. Psarras, Hélène Pilorgé, Noah McQueen, Daniel Maynard, and Colin McCormick	January-20
	California Department of Pesticide Regulation	2018
	State Water Resources Control Board	July-18
	California Department of Water Resources	2018
	Marin RCD and Marin County Stormwater Pollution Prevention Program	July-05
Stanford University	Belin, Alletta	2018
	California Association of Resource Conservation Districts	August-09

American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Planning	RAND Corporation and Nelson-Nygaard	February-20
	California Department of Water Resources	September-14
	NOAA	September-01
	SWRCB	July-05
Mendocino County Resource Conservation District	Weaver, William, Eileen Weppner, and Danny Hagans, Pacific Watershed Associates	April-15
	World Health Organization	June-19
	CITRIS Policy Lab, CITRIS and the Banatao Institute, California Institute for Energy and Environment	October-19
	California Department of Food and Agriculture	January-19

	Breakthrough Strategies & Solutions	February-19
Ecological Applications	Dove, Nicholas C., Hugh D. Safford, Gabrielle N. Bohlman, Becky L. Estes, and Stephen C. Hart	January-20
	Pinoleville Pomo Nation EPA	undated
PLOS ONE	Krosby, Meade, David M. Theobald, Robert Norheim, and Brad H. McRae	November-18
	North Coast Regional Water Quality Control Board	October-17

California Public Utilities Commission and the Water Energy Team of the Climate Action Team	Griffin, Kasandra, Greg Leventis, and Brian McDonald	July-10
Assembly Budget Subcommittee No. 3 on Resources and Transportation and Assembly Committee on Natural Resources	Legislative Analyst's Office	February-19
	Public Policy Institute of California	September-17
	NAACP Environmental and Climate Justice Program	September-18
The Rockfeller Foundation	Foundation Center and Pacific Institute	December-15
	Diringer, Sarah, Heather Cooley, Morgan Shimabuku, Sonali Abraham, Cora Kammeyer, Robert Wilkinson, and Madeline Gorchels	June-20

CDFW	Science Institute	July-14
	Wamble, Phillip, Debra Perrone, Scott Jasechko, Rebecca L. Nelson, Leon F. Szeptycki, Robert T. Anderson	August-18
San Jose State University: Nature and World Cultures	Lane, Taylor, Greg Spellman, Will Stewart and Danny Brown.	
	US Geological Survey	2018
	National Park Service, US Department of the Interior, Natural Resource Stewardship and Science	December-18
	CalEPA, California Natural Resources Agency, California Department of Food and Agriculture, California Air Resources Board, and California Strategic Growth Council	January-19

California Fire Science Consortium	undated
Del Norte Fire Safe Council, County of Humboldt, FireSafe Council, USDA Forest Service, CAK FIRE, Hoopa Fire, Yurok Tribe Wildland Fire Program	July-05
US EPA	Spring 2020
California Coastal Commission	July-13
San Francisco University Adaptation to Climate Change Team	December-18
California Department of Water Resources and State Water Resources Control Board	November-18

	Public Policy Institute of California	November-17
	Public Policy Institute of California	September-18
International Journal of Wildland Fire	Syphard, Alexandra D, and Jon E. Keeley	March-20
	Asia Pacific Environmental Network	July-05
	Marin County Community Development Agency	February-18

	California Department of Public Health	September-18
	Climate Impact Lab	2020
PeerJ Peer-reviewed and Open Access	Marine Environment Division/Coastal, Marine and Disaster Prevention Department, National Institute for Land and Infrastructure Management, Yokosuka, Japan	January-19
	US EPA	February-20
Pacific Institute and Bren School of Environmental Science and Management UC Santa Barbara	Diringer, Sarah, Anne Thebo, Heather Coooley, Morgan Shimbuku, Robert Wilkinson and McKenzie Bradford	April-19
RegionsAdapt	Kupka, Sara and Vanessa Pulgarin	December-18
	Cal OES, the California Natural Resources Agency, and FEMA	2018

USDA Forests and Rangelands	April-14
US EPA	February-20
Union of Concerned Scientists	November-17
NOAA	April-18
California State Water Resources Control Board	July-14

North American Waterfowl Management Plan Committee	December-18
Humboldt County Resource Conservation District	September-16
CA Department of Conservation	
North Coast Regional Water Quality Control Board	February-05
North Coast RCDs, UCCE, California Sustainable Winegrowing Alliance, LandSmart, NRCS, Shone Farm, Mendocino Winegrowers, Noble Vineyard Management, and Anderson Valley Winegrowers Association	July-05
System Metrics Group, Economic Development Research Group, DKS Associates, Wahlstrom & Associates, and Susan Jones Moses & Associates	undated

Northern California Resource Center	copyright 2005
US Forest Service Regions 5 & 6	undated
Northwest Climate Hub	undated
California Department of Fish and Wildlife	2018
Governor's Office of Planning and Research	November-19
NAACP Environmental and Climate Justice Program	July-05

Vanden Esschert KL, Mattioli MC, Hilborn ED, et al.	July-05
Pacific Coast Joint Venture	September-04
Pacific Northwest Aquatic Monitoring Partnership	undated
California Department of Fish and Wildlife	2018

US Water Alliance and Water Foundation June-20

International Tranformational Resilience Coalition January-19

van Mantgem, P.J., Nesmith, J.C.B., Keifer, M., Knapp, E.E., Flint, A., Flint, L., July-05

Public Policy Institute of California October-17

	Public Policy Institute of California	October-19
California Department of Fish and Wildlife and NOAA Fisheries	Priority Action Coho Team (PACT).	July-05
	Stanford Water in the West	July-05
	US EPA	July-05

	US EPA	June-19
	UC Agriculture and Natural Resources	July-17
	California Department of Fish and Game	March-04
California Strategic Growth Council	Conservation Biology Institute	undated
	Sierra Nevada Fire Science Delivery Consortium	July-05

Sierra Nevada Fire Science Delivery Consortium	July-05
Sierra Nevada Fire Science Delivery Consortium	July-05
C2ES Center for Climate and Energy Solutions	August-18
NOAA Restoration Center	July-20
Lake, Frank K., Vita Wright, Penelope Morgan, Mary McFadzen, Dave McWethy, and Camille Stevens-Rumann	September-17

California Ocean Protection Council Science Advisory Team	April-17
Center on Urban Environmental Law at Golden Gate University School of Law	2018
California Natural Resources Agency	January-18
Indian Health Service Office of Environmental Health and Engineering	September-19
California Coastal Commission	August-15
Estes, B.L., Knapp, E.E., Skinner, C.N., and Uzoh, F.C.C.	July-05

California Coastal Sediment Management Workgroup	2014
North Coast Regional Water Quality Control Board	August-17
Zald, Harold S. and Christopher J. Dunn	July-05
California Department of Water Resources	December-16
CLIMsystems Ltd.	February-11

Sustainability	Wood, Benjamin T., Lindsay C. Stringer, Andrew J. Dougill and Claire H. Quinn	January-18
	Rocky Mountain Research Station Air, Water, & Aquatic Environments Program	undated
California Trout	Moyle, Peter B., Robert A Lusardi, Patrick J. Samuel, and Jacob V.E. Katz	August-17
	State Water Resources Control Board	August-18
	California Department of Fish and Wildlife	September-15

California Department of Water Resources	August-17
Water Use and Efficiency Branch California Department of Water Resources	February-19
California State Water Resources Control Board	2018
California Department of Pesticide Regulation	2018
Climate Central	undated
Institute for Local Government	undated
California Strategic Growth Council	2018

Ways of Knowing: Special Collection	McNeely, Shannon M.	March-17
	Department of Water Resources Sustainable Groundwater Management Program	April-19
	Marine Protected Areas Federal Advisory Committee	July-05
	State Water Resources Control Board	August-18
	State Water Resources Control Board	September-16
	State Water Resources Control Board	September-18

	California Governor's Office of Planning and Research	June-17
University of Georgia	Reeves, Tyler	July-05
	US Fish and Wildlife Service, NOAA, Portland State University, and US Forest Service	July-15
	Four Twenty Seven Climate Solutions	June-19
	Humphries, Tyler, "The Economic Impact of Forest Harvest Practices on Washington State Park Visitation" (2020). All Master's Theses. 1367. https://digitalcommons.cwu.edu/etd/1367	2020

	NOAA	July-20
NOAA	Abt Associates	July-19
	CAL FIRE	2012
Ecosphere	Steel, Zachary L., Hugh D. Safford and Joshua H. Viers	January-15

	California Natural Resources Agency	December-10
Leiden University	JEM Schild	December-19
	UC Davis	undated
CA FWD	Silva, Fred, Matt Horton, and Mark Pisano	July-20
	USDA Economic Research Service	April-13

	TNC and multiple partners	July-05
Urban Forestry and Urban Greening	McPherson, E. Gregory, Qingfu Xiao, Natalie S. van Doorn, John de Goede, Jacquelyn Bjorkman, Allan Hollander, Ryan M. Boynton, James F. Quinn, James H. Thorne	October-17
PLOS/ONE	Davies, Ian P., Ryan D. Haugo, James C. Robertson, and Phillip S. Levin	November-18
	Gimenez, Vidal F, and Ruiz Mas	May-20
	US EPA	May-20
	Jambeck Research Group	July-05

	van Mantgem, PJ, JCB Nesmith, M Keifer, EE Knapp, A Flint, L Flint	July-05
	Oregon Climate Change Research Institute and Adaptation International	11/1/2018 '2022
	Governor's Office of Planning and Research	April-05
	Redwood Coast Prosperity	February-11
	Hoopa Valley Tribe	2017
Climate Central	Strauss, Benjamin, Robert Kopp, William Sweet, and Klaus Bittermann	February-16
	USGS Oregon Water Science Center	December-16

US Forest Service February-18

California Department of Water Resources 2018

USGS July-20

US Geological Survey April-18

USGS undated

	SWRCB	July-20
	State Water Resources Control Board	September-08
	California Department of Water Resources	2020
Bat Conservation International	Taylor, Daniel A.R. and Merlin D. Tuttle	2007
	North Coast Regional Water Quality Control Board	June-18
	California State Water Resources Control Board	June-17
	California Coastal Commission	2018

SWRCB	June-20
US EPA, California State Water Resources Control Board	October-18
US Water Alliance	2020
Mendocino County Resource Conservation District	March-16
Jonathan B. Armstrong, Daniel E. Schindler, Curry J. Cunningham, William Deacy, Patrick Walsh	May-19
North Coast Regional Water Quality Control Board	February-05
California Air Resources Board; California Office of Environmental Health Hazard Assessment; U.S. Centers for Disease Control and Prevention; U.S. Forest Service; and U.S. Environmental Protection Agency	August-19
Miller, J.D., C.N. Skinner, H.D. Safford, E.E. Knapp, and C.M. Ramirez	July-05

Humboldt State University, Natural Resources Sciences	undated
USGS Oregon Water Science Center	2013
Congressional Research Service	August-20
Congressional Research Service	July-20

	Georgetown Climate Center	Undated
	California Trout	2020
	USDA NRCS	June-20
	Fibershed	November-18
	The YEARS Project	April-19
	Bioneers	July-18
Pacific Institute	Abraham, Sonali, Sarah Diringer, and Heather Cooley	August-20
The Nature Conservancy and the Sonoma Land Trust	Alford, Chris	June-20
	California Department of Water Resources	February-20

SCOR-IOC	Burford, MA, CJ Gobler, DP Hamilton, PM Visser, M. Lurling and GA Codd.	2019
	Ho, Lionel and SA Water	2010
	US EPA	August-20
	Mitigation Subcommittee of the CA Cyanobacteria and Harmful Algal Bloom Network	May-19
	USEPA	October-19
	Kansas State University	undated

State of California 2020

Society for Ecological Restoration 2020

Farrell, Hannah L., Ariel Leger, Martin F. Breed, and Elise S. Gornish July-20

Sustainable Conservation	2016
Legislative Analyst's Office	August-20
Water Education Foundation	undated
Water Education Foundation	August-20
California Rangeland Trust	2020

Nature Sustainability	Liu, Lu, Evan Lopez, Leonardo Duenas-Osorio, Lauren Stadler, Yuefeng Xie, Pedro J. J. Alvarez, and Qilin Li	April-20
PNAS	Borrelli, Pasquale, David Robinson, Pano Panagos, Emanuele Lugato, Jae E. Yang, Christine Alewell, David Wuepper, Luca Montanarella, and Cristiano Ballabio	August-20
nature geoscience	Padron, Ryan S., Lukas Gudmundsson, Bertrand Decharme, Agnes Ducharne, David M. Lawrence, Jiafu Mao, Daniele Peano, Gerhard Krinner, Hyungjun Kim and Sonia I. Seneviratne	June-20

	Burea of Economic Analysis and NOAA	June-20
American Meteorological Society	Knapp, Corrine Noel, Shannon M. McNeeley, John Gioia, Trevor Even, and Tyler Beeton	August-20
Nature Communications	Oke, KB, CJ Cunningham, PAH Westley, ML Baskett, SM Carlson, J. Clark, AP Hendry, VA Karatayev, NW Kendall, J. Kibele, HK Kindsvater, KM Kobayashi, B. Lewis, S. Munch, JD Reynolds, GK Vick and EP Palkovacs	August-20

Climatology	Erb, MP, J. Emile-Geay, GJ Hakim, N. Steiger, and EJ Steig		August-20
	Sustainable Conservation	undated	
AgEcon: Research in Agricultural and Applied Economics	Wang, Tong, Hailong Jim, Bishal B. Kasu, Jeffrey Jacquet, and Sandeep Kumar		May-19
	Value of Water Campaign and American Society of Civil Engineers	2020	
	WaterNow Alliance	2019	

	California OES	2020
	California Governor's Office of Planning and Research	August-20
Journal of Environmental Economics and Management	Newbold, Stephen C. and Robert J. Johnston	September-20
	Colusa County RCD and UCCE	May-20
	Ascent	undated

	Public Policy Institute of California	undated
Public Policy Institute of California	Grantham, Ted, Jeffrey Mount, Eric D. Stein, and Sarah Yarnell	August-20
UC Davis Center for Regional Change	Bostic, Darcy, Kristin Dobbin, Rich Pauloo, Jessica Mendoza, Michael Kuo, and Jonathan London	2020
	Salmonid Restoration Federation	March-20

	WaterNow Alliance	2019
Urban Forestry and Urban Greening	McPherson, E. Gregory, Qingfu Xiao, Natalie S. van Doorn, John de Goede, Jacquelyn Bjorkman, Allan Hollander, Ryan M. Boynton, James F. Quinn, James H. Thorne	Oct-17
American Farmland Trust	Bodell, Justin, Brian Brandt, Emily Bruner, Paul Lum, Michelle Perez, Aaron Ristow	July-19
	CDFA	July-20
	Conservation Conversations	August-20
	Public Policy Institute of California	September-20

Public Policy Institute of California	McCain, Henry, Van Butsic, John Battles, Ricardo Cisneros, Yufang Jin, Susie Kocher, Matthew D. Potts and Scott Stephens	April-20
	Clean Water Team	May-15
	Clean Water Team	2015
	Clean Water Team	undated
	Clean Water Team	undated
	Clean Water Team	undated

	CARCD	2001
	CARCD	2001
	Monitoring Collaboration Network	September-10
	EcoAtlas and California Wetland Monitoring Workgroup	2020
US EPA	Kershner, Jeffrey L.; Archer, Eric K.; Cc	2004

SWAMP	Ode, Peter R., A. Elizabeth Fetscher, and Lilian B. Busse	March-16
	US EPA	February-20
	Institute for Natural Resources, Oregon Forest Resources Institute, and Oregon State University College of Forestry	June-20
Geophysical Research Letters	Maavara, Taylor, Zahra Akbarzadeh, and Philippe Van Cappellen	July-20
	Model Forest Policy Program	undated

Proceedings of the National Academy of Sciences of the USA	Gherardi, Laureano A and Osvaldo El Sala	August-20
	Association of State Drinking Water Administrators	September-20
	US EPA	September-20

USGS Sherrouse, B.C., and D. J. Semmens. 2020

California Department of Fish and Wildlife 2020

Narain-Ford, Dominique M., Ruud P. Bartholomeus, Bernard W. Raterman, Ian van Zaanen, Thomas T. ter Laak, Annemarie P. van Wezel, Stefan C. Dekker January-21

State of California 2020

Office of the Governor of the State of California September-20

Canadian Journal of Fisheries and Aquatic Sciences	Lusardi, Robert A., Bruce G. Hammock, Carson A. Jeffres, Randy A. Dahlgren, and Joseph D. Kiernan	July-19
	The National Drought Mitigation Center, U	2020
	EPA National Aquatic Resource Surveys	7/1/19
	California Natural Resources Agency, CalEP	7/1/20
	California Office of the Governor	October-20

Ecological Economics	Duffield John, Chris Neher, and David Patterson	January-21
	EPA	August-20
	Morote, Alvaro-Francisco, Maria Hernandez, and Saeid Eslamian	June-20
	California Department of Water Resources	October-20

Nature Communications	Calel, Raphael, Sandra C. Chapman, David A. Stainforth, and Nicholas W. Watkins	October-20
	Salmonid Restoration Federation	undated
Water Utility Climate Alliance and Association of Metropolitan Water Agencies	Resilient Analytics	September-20

State Water Resources Control Board	October-20
Department of Water Resources	March-17

State of California Native American Heritage Commission	September-20
USDA Forest Service	January-18
Local Government Commission	2018
Local Government Commission	January-15

CA Water Plan Update 2013, Volume 4 Reference Guide	UC Davis	2013	
	Ascent Environmental	2020	
	US EPA Energy Resources for State and Local Governments		October-20
	California Trout	2019	
	Pala Band of Mission Indians	2019	
	California Department of Public Health	2018	

UC Davis 2019

Strategic Growth Council October-20

Earth and Space Science Open Archive	Siderius, C., H. Biemans, D. Conway, W. Immerzeel, J. Jaegermeyr, B. Ahmad, and P. Hellegers	August-20
	Nicholas Institute for Environmental Policy Solutions, Duke University	July-20

Belward, Alan, Jean-Francois Pekel, Andrew Cottam, Noel Gorelick, Luca De Felice, Qingke Wen, and Ian Dewsbery	2020
Environmental Defense Fund, Standford|Water in the West, and the Water Foundation	undated
Local Government Commission	October-20

GCB-Bioenergy	Kroeger, Jennifer E., Ghasideh Pourhashem, Kenneth B. Medlock, and Caroline A. Masiello	October-20
	US Bureau of Reclamation	October-20
	USDA Climate Hubs	undated
	USGS	undated
A Research Agenda for Real Estate	Warren-Myers, Georgia and Anna Hurlimann	2020

	Public Policy Institute of California	November-20
	Resilient California	2020
Center for Community and Citizen Science and Resources Legacy Fund	Meyer, Ryan, Heidi Ballard, and Chris Jadallah	2020
	USEPA	November-20
	USEPA	November-20

	Brice, E. M., B. A. Miller, H. Zhang, K. Goldstein, S. N. Zimmer, G. J. Grosklos, P. Belmont, C. G. Flint, J. E.Givens, P. B. Adler, M. W. Brunson and J. W. Smith	September-20
	DWR	September-20
Earth's Future	Swain, D.L., O.E.J. Wing, P.D. Bates, J.M. Done, K.A. Johnson, and D.R. Cameron	October-20

Public Policy Institute of California	Hanak, Ellen, Caitrin Chappelle, Alvar Escriva-Bou, Brian Gray, Jelena Jezdimirovic, Henry McCann, Jeffrey Mount, Lori Pottinger and Gokce Sencan	November-20
	The Groundwater Project: Online Platform for Groundwater Knowledge	2020
	California Water Boards	October 13 2020
	SCRIPPS Institution of Oceanography at UC San Diego	

frontiers in Sustainable Food Systems	Bryant, Benjamin P., T. Rodd Kelsey, Adrian L. Vogl, Stacie A. Wolny, Duncan MacEwan, Paul C. Selmants, Tanushree Biswas and H. Scott Butterfield	August-20
	Boyle, Tyler, Raphael Mazor, Andrew C. Rehn, Susanna Theroux, Marcus Beck, Marco Sigala, Calvin Yang, Shuka Rastegarpour5 and Peter R. Ode3	October 30 2020
	Middleton, Arthur D., Temple Stoellinger, Harshad Karandikar, Bryan Leonard, Holly Doremus, and Claire Kremen	November-20
USDA Farmers.gov	Winger, Marlon	December-20

Frontiers in Ecology and the Environment	Diefenderfer, Heida, Gregory D. Steyer, Matthew C. Harwell, Andrew J LoSchiavo, Hilary A Neckles, David M. Burdick, Gary E. Johnson, Kare E Buenau, Elene Trujillo, John C Callaway, Ronald M. Thom, Neil K Ganju, Robert R. Twilley	October-20
	Climate Nexus	2020
	California Natural Resources Agency	November-20

frontiers in Marine Science	Cadier, Charles, Elsa Bayraktarov, Renee Piccolo, and Maria Fernanda Adame	December-20
	Espinoza, Vicky	April-20
	California Invasive Plant Council and California Landscape Stewardship Network	2020
	UC Rangelands	

Environmental Research Letters	Szinai, Julia K, Ranjit Deshmukh, Daniel M. Kammen, and Andrew D. Jones	December-20
	CaliforniaHerps.com	2000-2021
	University of California Agriculture and Natural Resources	2021

NOAA Marine Protected Areas Center	Wahle, Charles M, Mimi D'Iorio, Julian Townsend,	November-20
	Marine Protected Areas	November-20
	National Centers for Coastal Ocean Science andU.S. Integrated Ocean Observing SystemNational Oceanic and Atmospheric Administration	December-20
Environmental Science & Technology	Searcy, Ryan T. and Alexandria B. Boehm	January-21
	Sonoma RCD	July-20
	CalFire	2019

	Sonoma RCD	November-20
USDA	Richards, Donale, Margaret Krome, and Alejandra Hernandez	September-20
	FEMA	January-21
	Headwaters Economics	
	National Fish, Wildlife, and Plants Climate Adaptation Network	2021

Genes	Fraik, Alexandra K., John R. McMillan, Martin Liermann, Todd Bennett, Michael L. McHenry, Garrett J. McKinney, Abigail H. Wells, Gary Winans, Joanna L. Kelley, George R. Pess, and Krista M. Nichols	January-21
	Headwaters Economics	December-19
	Office of Environmental Health Hazard Assessment (OEHHA), within the California Environmental Protection Agency (CalEPA)	January-21
	Association of Fish and Wildlife Agencies and the Wildlife Management Institute	undated

North American Bird Conservation Initiative	2021
2020 Water Education Foundation Water Leaders	2021
California Office of Environmental Health Hazard Assessment	December-20
US EPA	December-20

	SWRCB Division of Water Rights	February-21
Estuaries and Coasts	Venette, Robert C., Doria R. Gordon, Jennifer Juzwik, Frank H. Koch, Andrew M. Liebhold, Robert K.D. Peterson, Sharlene E. Sing, and Denys Yemshanov	February-21
Center for Biological Diversity	Tierra R. Curry	2020
	Chris Austin, Environmental Defense Fund, and Stanford's Program on Water in the West	undated

Ocean Protection Council	November-19
American Water Works Association	December-20
Conservation Conversations	undated

	San Francisco Estuary Institute and The Aquatic Science Center	2019
Ocean Protection Council & SWRCB	San Francisco Estuary Institute and Southern California Coastal Water Research Project	2021
	Ocean Protection Council	undated

USGS	undated
SWRCB	2021
CA Strategic Growth Council	2021
CDFW	March-21
DWR	2021
River Network	February-21

World Health Organization	February-21
Lawrence Livermore National Laboratory	arch 2021
CEO Water Mandate, the Pacific Institute, The Nature Conservancy, Danone, and LimnoTech	2021
NOAA	undated
California Department of Water Resources	2021
Society for Ecological Restoration	March-21
USGS and NOAA	2021

Climate Adaptation Knowledge Exchange	February-21
USGS	2021
California Water Boards	March-21
State Water Resources Control Board	April-21
Environmental Defense Fund	March-21

Internet of Water	undated
CAL FIRE	undated
USEPA	April-21
Clean Water Action Fund, Audubon CA, The Nature Conservancy	February-21
The Water Center, Waternow Alliance	
CA Governor's Office of Planning & Research	2021

California Department of Water Resources	January-21
California Department of Water Resources	March-21
California Department of Water Resources	March-21
California Department of Water Resources	April-21
State Water Resources Control Board	April-22
State of California Water Resilience Portfolio Initiative	2021

AWWA Water Science	Khera, Rajiv, Pat Ransom, Mark Guttridge, and Thomas F. Speth	April-21
	EPA	May-21
	Governor's Office of Planning and Research	May-21

Rural Voices for Conservation Coalition	April-21
EPA	May-21
Ocean Protection Council	June-21
Ocean Protection Council	June-21

Pacific Marin and Estuarine Fish Habitat Partnership, Pew Charitable Trusts, and Friends of South Slough Reserve	Beheshti, Kathryn and melissa Ward	2021	
		undated	
	Georgetown Climate Center	2021	
	Sustainable Conservation		June-21
	Sustainable Conservation		June-21

NOAA Office of National Marine Sanctuaries	Schwarzmann, Danielle, Ryan Shea, Vernon (Bob) Leeworthy, Sean Hastings, Lauren Knapp, and Stephen Tracy	July-21
	Varga-Bettison, Lori, Mary Adelzadeh, Rachael Bay, Thomas W. Gillespie, and Bernie Tershy	July 27,2021
	Association of Bay Area Governments	2021

State Water Resources Control Board 7/14/21

Georgetown Climate Center 2021

Pacific Institute June-21

California Data Collaborative	undated
The Trust for Public Land	May-21

Climate Adaptation Committee of the Association of Fish and Wildlife Agencies	Albright, Whitney, Rob Ament, Renee Callahan, Mack Frantz, Matthew Grabau, Maggie Ernest Johnson, Todd Jones-Farrand, Kate Malpeli, Maureen Millmann, Nate Muenks, Rebecca Quiñones, Beth Stys, Kimberly Tenggardjaja	2021
	NOAA Fisheries	October-20

The Nature Conservancy and Salmonid Restoration Federation 2021

Brashares, Justin, Anjuli Jain Figueroa, Mark Hennelly, Nina S. Roberts, Jeannette Tuitele-Lewis, Tiana Williams-Claussen, and Sean Woods

California Natural Resources Agency August-21

The Nature Conservancy and CA conservation science	Thompson, Barton H., Melissa M. Rohde, Jeanette K. Howard, and Sand Matsumoto	March-21
The Nature Conservancy and CA conservation science	Dillis, Christopher, Van Butsic, Jennifer Carah, Samuel Zipper, and Theodore Grantham	July-21
The Nature Conservancy and CA conservation science	Bellquist, Lyall, Vienna Saccomanno, Brice X. Semmens, Mary Gleason, and Jono Wilson	April-21
The Nature Conservancy and CA conservation science	Wilson, Jono R, Darcy Bradley, Kristina Phipps, and Mary G Gleason	December-20
The Nature Conservancy and CA conservation science	Lomonico, Serena, Mary G Gleason, Jono R Wilson, Darcy Bradley, Kate Kauer, Richard J Bell, and Thomas Dempsey	January-21
The Nature Conservancy and CA conservation science	Klausmeyer, Kirk, Jeanette Howard, Melissa Rohde, and Charlotte Stanley	2021

The Nature Conservancy and CA conservation science	Saito, Laurel, Bill Christian, Jennifer Diffley, Holly Richter, Melissa M. Rohde, Scott A. Morrison	February-21
	H. Scott Butterfield, T. Rodd Kelsey, and Abigail K. Hart, eds.	April-21
	Sletten, Jennifer, Mimi D'lorio, Mary G. Gleason, Alex Driedger, Tiomth'e Vincent, Claire Colegrove, Dawn Wright, and Virgil Zetterlind	December-20
	Chamberlin, Sydney J., Michelle Passero, Ashley Conrad-Saydah, Tanushree Biswas, and Charlotte K. Stanley	undated

	Kang, Mary, Debra Perrone, Ziming Wang, Scott Jasechko, and Melissa M. Rohde	December-20
California Natural Resources Agency	Sheehan, Linda, Jennifer Caselle, Jaime Jahncke, Jameal F. Samhouri, and Megan Van Pelt	August-21
	Duke University Nicholas Insitute for Environmental Policy Solutions	undated

UCCE Marin	June-21
UC ANR	undated
US EPA	August-21
Bay Area Regional Health Inequities Initiative	March-21
Climate Central	2021

GCB Bioenergy	Joseph, Stephen, Annette L. Cowie,Lukas Van Zwieten,Nanthi Bolan,Alice Budai,Wolfram Buss,Maria Luz Cayuela,Ellen R. Graber,James A. Ippolito,Yakov Kuzyakov,Yu Luo,Yong Sik Ok,Kumuduni N. Palansooriya,Jessica Shepherd,Scott Stephens,Zhe (Han) Weng,Johannes Lehmann	July-21
	EPA	April-21
	Freshwater Health Index	2021

Institute for Tribal Environmental Professionals	STACC Working Group	August-21
PPIC	Hanak, Ellen, Gokce Sencan, and Andrew Ayres	August-21
IPCC	Working Group 1	August-21
USDA FS	TreePeopl	2020
Smart Surfaces Coalition	Kats, Greg and Rob Jarrell	undated

	Smart Surfaces Coalition	undated	
Smart Surfaces Coalition	Kats, Greg and Keith Glassbrook	undated	
	Model Forest Policy Program	2021	
Conservation Science and Practice	Oakes, Lauren E, Molly S Cross and Erika S Zavaleta		June-21
The Water Research Foundation	Colorado State University One Water Solution Institute	2021	
	US EPA	2021	
	California Office of Environmental Health Hazard Assessment	2021	

Geophysical Research Letters	Levy, Zeno F, Bryant C Jurgens, Karen R Burow, Stephan A Voss, Kirsten E Faulkner, Jose A Arroyo-Lopez, Miranda S Fram	September-21
	Local Government Commission, ICF International, Susanne Moser Research & Consulting, and ARCCA	2021
California Natural Resources Agency	Ekstrom, Julai A, Meghan R. Klasic, Amanda Fencl, Mark Lubell, Ezekiel Baker, and Frances Einterz	August-18

California Natural Resources Agency	Langridge, Ruth, Stephen Sepaniak, Amanda Fencl, Linda Esteli Mendez Barrientos	August-18
FACETS	Hessami, Mateen A., Ella Bowles, Jesse N. Popp, and Adam T. Ford	August-21

Rural Voices for Conservation Coalition	August-21
USEPA	September-21
Cal Office of Environmental Health Hazard Assessment	January-21
US EPA	October-21
Climate Central	2021
Alliance for Water Efficiency	September-21
PAG	undated

	CA DWR	undated
Sacramento River Funding Area	Odefey, Jeff and Vance Russell	November-20

Coastal Carbon Research Coordination Network	September-21
US EPA	October-21
US EPA	October-21
US DOI	2021
US ACE	2021

Western Governors' Association	September-21
Maestu, Rafael	November-19
National Water Quality Monitoring Council	undated
CauseIQ	2021
Public Policy Institute of CA	November-21
Interstate Technology and Regulatory Council Harmful Cyanobacteria Bloom Team	November-21
San Francisco Estuary Institute and the Southern CA Coastal Water Research Project	December-20
CA DWR	2020
STACC Working Group	August-21

Water Leaders Class of 2021	2021
OpenET	2021
California Department of Water Resources and State Water Resources Control Board	December-21
US EPA	December-21
USDA NRCS Plant Materials Program	undated
US EPA	September-21
Sonoma Resource Conservation District	undated
Sonoma Resource Conservation District	December-21
NOAA National Marine Protected Areas Center	November-20

	Center for the Blue Economy Middlebury Institute of Internation Studies at Monterey	November-21
Restore America's Estuaries	TBD Economics, LLC and Center for the Blue Economy	June-21
	Cal-Adapt 2021	
	California NRCS	December-21
	Jackson Family Wines	October-21
	The Soil Health Connection	December-21
	US Fish and Wildlife Service	February-19

	Dickey, Loulou C. et al.	August 14 2021
Watershed Protection Techniques		undated
The Center for Watershed Protection	Law, Neely L., Lisa Fraley-McNeal, Karen Cappiella	August-08
	US EPA	January-22
	SWRCB	December-21
	Governor's Office of Planning and Research	January-22
	Anerican Meteorological Society	undated
	NOAA	2022

	AMP Insights	July-16
Lincoln Institute of Land Policy	Rugland, Erin	January-22
	California Water Institute, Fresno State	September-21
	Center for Large Landscape Conservation	December-21
	California Forward	2022

	USDA Forest Service	January-22
	California Native Plant Society 2022	
	Xerces Society 2021	
Lincoln Institute of Land Policy	Levitt, James N. and Chandni Navalkha	February-22
	California Department of Water Resources 2022	

California Stormwater Quality Association	October-20
Sea-Level Rise Leadership Team	January-22
US Water Alliance	July-05

AWWA Water Science 4(2)	Rebeka Sultana	March-22
US EPA	CA State Water Boards	April-22
	CA Air Resources Board	March-22
	American Public Health Association 2021	
	Community Alliance with Family Farmers 2021	
	American Society of Adaptation Professionals 2022	
	Allied World and National Wildlife Federation	April-22

Municipal Publishing	2022
WaterNow Alliance	2022
EcoAdapt	March-22

Center for Climate and Energy Solutions	October-20
US EPA	September-21

The Nature Conservancy undated

Institute for Tribal Environmental Professionals November-19

Governor's Office of Planning and Research	April-22
ICARP Resilience Metrics Work Group	March-22
California Natural Resources Agency	April-22
State of California	April-22
California Council on Science and Technology	2021

US Army Corps of Engineers and CA Department of Water Resources		April-22
Source Water Collaborative	2022	
National Wildlife Federation and EcoAdapt		March-22
California Strategic Growth Council	2022	
California Natural Resources Agency		April-22
Climate Adaptation Knowledge Exchange	2022	

North American Intergovernmental Committee On Cooperation for Wilderness and Protected Areas Conservation	2022
Water Solutions Network	undated
Climate Adaptation Knowledge Exchange	2022

annual Review of Resource Economics	October-21
Environmental Research Communications	June-22
EPA Office of Research and Development	June-22
Department of Water Resources	2022

	Panorama, Solutions for a Healthy Planet	June-22
	Connecting Nature Project	2021
	California Sustainable Winegrowing Alliance	undated
American Farmland Trust	Hunter, M., A. Sorensen, T. Nogeire-McRae, S. Beck, S. Shutts, R. Murphy	2020

Society for Ecological Restoration and Climate Focus	Gann G.D., B. Walder, J. Gladstone, SM Manirajah, S. Roe	March-22
Stantec	Matthiesen, Ed and Erik Megow	June-22
California Strategic Growth Council, Governor's Office of Planning and Research, and UCLA Luskin Center for Innovation	Wong, Robyn	June-21

NOAA	June-22
NOAA	February, 2022
Resilient Nation Partnership Network, FEMA, NASA	undated
ESRI	undated
CDC Climate and Health Program	undated
Sustainable Groundwater Management Grant Program	undated
Climate Central	undated

	National Integrated Heat Health Information System	undated
	Cal EPA	2022
	Governor's Office of Planning and Research	August-22
Geophysical Research Letters: V 49	Tonina, Daniele, James A. McKean, Daniel J. Isaak, Rohan M. Benjankar, Chunling Tang, and Qiuwen Chen	July-22
	California Water Boards, Moore Institute for Plastic Pollution Research, The Gray Lab @ UCR, San Francisco Estuary Institue, California 100, Possibility Lab	undated

Science Advances, Vol 8, Issue 33	Tournier, Arnaud J., and Yves-Alexandre de Montjoye	August-22
Rocky Mountain Research Station	Johnson, R. Roy; Carothers, Steven W.; Finch, Deborah M.; Kingsley, Kenneth J.; Stanley, John T.	November-18
	California Water Data Consortium	August, 2022
	Resilient California	July-22

Frontiers in Ecology and the Environment	Zabin, Chela J., Laura J. Jurgens, Jillian M. Bible, Melissa V. Patten, Andrew L. Chang, Edwin D. Grosholz, Katharyn E. Boyer.	July-22
	U.S. Global Change Research Program	August-22
	Conservation Finance Network	2020

Tap into Resilience	2021	
Western Governors' Association		July-22
Hester Dillon, 4 Rivers Consulting, LLC	2021	
California Landscape Stewardship Network JEDI Roundtable	2021	
Network for Landscape Conservation, Salazar Center for North American and the Center for Large Landscape Conservation	undated	
California Landscape Stewardship Network		August-22

Resilient Cities Catalyst, Farallon Strategies, and CivicWell	undated
Partners Advancing Climate Equity	June-22
Partners Advancing Climate Equity	June-22
UN Framework Convention on Climate Change	August-22
Braddock, Kathryn, Abby Sullivan, Rachel M. Gregg, and Miranda Cashman	October-22

CDFW	Hansen, L.J., J.B. Hansen and L. Helbrecht.	2021
	Hansen, L.J., J.B. Hansen, C. Hoving, and L. Helbrecht.	2022
Office of Environmental Health Hazard Assessment, Cal EPA	Carmen Milanes, Tamara Kadir, Bennett Lock, Gwen Miller, Laurie Monserrat, Karen Randles	November-22

Office of Environmental Health Hazard Assessment, Cal EPA	Carmen Milanes, Tamara Kadir, Bennett Lock, Gwen Miller, Laurie Monserrat, Karen Randles	November-22
	Wild Farm Alliance	undated
	North American Bird Conservation Initiative	2022
Maidu Summit Consortium	Kate Lundquist and Brock Dolman	June-20
	USDA NRCS	undated
	US EPA	November-22

Pacific Institute	November-22
Global Bird Rescue	undated
California Air Resources Board	November-22
Headwaters Economics	September-22
Partners Advancing Climate Equity	June-22
US EPA	November-22
Northern Institute of Applied Climate Science in collaboration with the USDA Northern Forests Climate Hub	September-22

Enduring Legacies Native Cases Initiative undated

Climate TRACE

Keyword	Secondary Keyword
Climate: Planning & Management	
Salmonids: Recovery	Planning/ Management: Transportation
Fire: Planning & Management	
Socioeconomic: Equity	Socioeconomic: Disadvantaged Communities
Climate: Sea Level Rise	Climate: Predictive Modeling
Planning/ Management: Municipal (GPs, Local Area Plans, etc.)	Socioeconomic: Equity
Planning/ Management: Water Supply/ Quality	Climate: Planning & Management

Socioeconomic: Equity

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Planning/ Management: Energy

Socioeconomic: Equity

Climate: Planning & Management

Natural Resources: Ecosystem Services

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Natural Resources: Habitat Conservation & Environmental Protection

Forest Planning/ Management: Forest Health

Forest Planning/ Management: Information Networks

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Water: Assessments & Research

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Socioeconomic: Equity

Agriculture: Climate

Climate: Adaptation

Agriculture: Planning & Management

Planning/ Management: Regulatory/ CEQA & NEPA

Agriculture: Socioeconomics

Air Quality

Socioeconomic: Resource Valuation

Planning/ Management: Natural Resources

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Agriculture: Socioeconomics

Agriculture: Planning & Management

Groundwater: Planning & Management

Agriculture: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: Spatial Data

Planning/ Management: Natural Resources

Water: Drought

Forest Planning/ Management: Forest Health

Forest Planning/ Management: Information Networks

Natural Resources: Spatial Data

Natural Resources: Research

Natural Resources: Information Networks

Natural Resources: Spatial Data

Socioeconomic: Disadvantaged Communities

Salmonids: Information Networks

Salmonids: Research and Spatial Data

Agriculture: Information Networks

Agriculture: Planning & Management

Air Quality

Natural Resources: Invasive Species

Planning/ Management: Natural Resources

Planning/ Management: Natural Resources

Climate: Information Networks

Climate: Planning & Management

Coast: Management

Water: Information Networks

Planning/ Management: Hazard Mitigation

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: Information Networks

Natural Resources: Monitoring

Socioeconomic: Recreation

Natural Resources: Watershed Assessments & Inventories

Natural Resources: Spatial Data

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: Spatial Data

Salmonids: Spatial Data

Forest Planning/ Management: Forest Health

Climate: Carbon Sequestration

Forest Planning/ Management: Forest Health

Fire: Planning & Management

Natural Resources: Information Networks

Planning/ Management: Natural Resources

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Coast: Assessments & Other Research

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: Spatial Data

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Spatial Data

Planning/ Management: Natural Resources

Coast: Management

Planning/ Management: Information Networks

Natural Resources: Watershed Assessments & Inventories

Salmonids: Recovery

Natural Resources: Restoration

Coast: Management

Planning/ Management: Natural Resources

Socioeconomic: Recreation

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Natural Resources: Watershed Assessments & Inventories

Natural Resources: Information Networks

Planning/ Management: Watershed

Natural Resources: Spatial Data

Planning/ Management: Natural Resources

Climate: GHG Reduction

Climate: Planning & Management

Forest Planning/ Management: Forest Health

Climate: Planning & Management

Climate: Information Networks

Climate: Planning & Management

Climate: Adaptation

Planning/ Management: Water Supply/ Quality

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Agriculture: Planning & Management

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Natural Resources: Habitat Conservation & Environmental Protection

Fire: Planning & Management

Agriculture: Socioeconomics

Natural Resources: Research

Natural Resources: Invasive Species

Fire: Fuel reduction & Biomass

Forest Planning/ Management: Economics

Natural Resources: Ecosystem Services

Planning/ Management: Natural Resources

Planning/ Management: Regulatory/ CEQA & NEPA

Climate: Information Networks

Climate: Planning & Management

Climate: Information Networks

Climate: Adaptation

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Climate: Adaptation

Socioeconomic: Equity

Climate: Planning & Management

Socioeconomic: Equity

Climate: Planning & Management

Climate: Planning & Management

Climate: Adaptation

Agriculture: Climate

Climate: Predictive Modeling

Agriculture: Climate

Agriculture: Planning & Management

Climate: Planning & Management

Agriculture: Planning & Management

Agriculture: Climate

Agriculture: Climate

Climate: Planning & Management

Fire: Recovery

Fire: Planning & Management

Coast: Management

Agriculture: Planning & Management

Planning/ Management: Tribal

Socioeconomic: Equity

Socioeconomic: Disadvantaged Communities

Climate: Sea Level Rise

Climate: Predictive Modeling

Natural Resources: Watershed Assessments & Inventories

Climate: General Mitigation Strategies

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Planning/ Management: Energy

Natural Resources: Habitat Conservation & Environmental Protection

Coast: Assessments & Other Research

Coast: Management

Climate: GHG Reduction

Natural Resources: Restoration

Fire: Research

Coast: Assessments & Other Research

Coast: Management

Water: Information Networks

Water: Information Networks

Fire: CWPP & Neighborhood Plans

Fire: CWPP & Neighborhood Plans

Planning/ Management: Regulatory/ CEQA & NEPA

Coast: Management

Climate: Predictive Modeling

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Water: Drought

Socioeconomic: Equity

Planning/ Management: Wastewater

Planning/ Management: Regulatory/ CEQA & NEPA

Fire: Research

Fire: Fuel reduction & Biomass

Forest Planning/ Management: TEK

Fire: Prescribed burning

Forest Planning/ Management: Timber

Natural Resources: Habitat Conservation & Environmental Protection

Socioeconomic: Resource Valuation

Natural Resources: Ecosystem Services

Water: Information Networks

Climate: Information Networks

Climate: Planning & Management

Fire: Planning & Management

Planning/ Management: Regulatory/ CEQA & NEPA

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Socioeconomic: Equity

Socioeconomic: Recreation

Climate: TEK

Agriculture: Information Networks

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: Spatial Data

Fire: Information Networks

Climate: Adaptation

Climate: Planning & Management

Fire: Research

Fire: Fuel reduction & Biomass

Fire: Research

Fire: Information Networks

Groundwater: Planning & Management

Planning/ Management: Hazard Mitigation

Flood: Flood Planning & Management

Flood: Floodplain Management

Forest Planning/ Management: Forest Health

Climate: Carbon Sequestration

Natural Resources: Monitoring

Planning/ Management: Natural Resources

Fire: Ecology & behavior

Planning/ Management: Funding

Socioeconomic: Equity

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Climate: Carbon Sequestration

Climate: Planning & Management

Groundwater: Contamination

Planning/ Management: Water Supply/ Quality

Water: Spatial Data

Groundwater: Information Networks

Natural Resources: Habitat Conservation & Environmental Protection

Socioeconomic: Education

Groundwater: Planning & Management

Planning/ Management: Watershed

Planning/ Management: Regulatory/ CEQA & NEPA

Planning/ Management: Transportation

Climate: TEK

Planning/ Management: Tribal

Salmonids: Recovery

Planning/ Management: Natural Resources

Natural Resources: Spatial Data

Water: Spatial Data

Planning/ Management: Natural Resources

Natural Resources: Habitat Conservation & Environmental Protection

Climate: Information Networks

Climate: Planning & Management

Fire: Climate Change

Agriculture: BMPs

Climate: Carbon Sequestration

Agriculture: Climate

Fire: Ecology & behavior

Planning/ Management: Water Supply/ Quality

Climate: Adaptation

Natural Resources: Restoration

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Socioeconomic: Resource Valuation

Planning/ Management: Watershed

Forest Planning/ Management: Forest Health

Fire: Fuel reduction & Biomass

Socioeconomic: Disadvantaged Communities

Socioeconomic: Equity

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Tribal

Groundwater: Planning & Management

Fire: Prescribed burning

Natural Resources: TEK

Natural Resources: Ecosystem Services

Planning/ Management: Natural Resources

Natural Resources: Invasive Species

Agriculture: Climate

Socioeconomic: Ecosystem Services

Fire: Information Networks

Fire: Planning & Management

Planning/ Management: Energy

Coast: Management

Climate: General Mitigation Strategies

Climate: Adaptation

Planning/ Management: Water Supply/ Quality

Water: Drought

Water: Drought

Planning/ Management: Natural Resources

Water: Drought

Planning/ Management: Water Supply/ Quality

Fire: Research

Natural Resources: Spatial Data

Climate: Planning & Management

Climate: Sea Level Rise

Climate: Adaptation

Coast: Assessments & Other Research

Climate: Information Networks

Climate: Predictive Modeling

Natural Resources: Ecosystem Services

Socioeconomic: Resource Valuation

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Climate: Planning & Management

Climate: Adaptation

Planning/ Management: Hazard Mitigation

Natural Resources: Spatial Data

Fire: Planning & Management

Socioeconomic: Education

Natural Resources: Spatial Data

Planning/ Management: Watershed

Groundwater: Planning & Management

Climate: Predictive Modeling

Climate: Information Networks

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Planning/ Management: Water Supply/ Quality
Natural Resources: Spatial Data

Agriculture: Planning & Management
Planning/ Management: Spatial Data

Planning/ Management: Water Supply/ Quality

Planning/ Management: Watershed

Agriculture: Information Networks

Planning/ Management: Transportation

Planning/ Management: Watershed

Fire: Planning & Management

Forest Planning/ Management: Forest Health

Planning/ Management: Spatial Data

Water: Drought

Planning/ Management: Hazard Mitigation

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Climate: Information Networks

Socioeconomic: Equity

Socioeconomic: Recreation

Planning/ Management: Water Supply/ Quality

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: Spatial Data

Salmonids: Recovery

Salmonids: Information Networks

Salmonids: Spatial Data

Salmonids: Recovery

Planning/ Management: Water Supply/ Quality

Climate: Adaptation

Socioeconomic: Health

Fire: Prescribed burning

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Climate: Planning & Management

Salmonids: Recovery

Groundwater: Planning & Management

Planning/ Management: Energy

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Fire: Recovery

Salmonids: Recovery

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Natural Resources

Fire: Reforestation

Fire: Prescribed burning

Forest Planning/ Management: Forest Health

Forest Planning/ Management: Forest Health

Planning/ Management: Energy

Climate: Adaptation

Natural Resources: Spatial Data

Natural Resources: Restoration

Forest Planning/ Management: TEK

Fire: Ecology & behavior

Climate: Sea Level Rise

Climate: Planning & Management

Groundwater: Planning & Management

Natural Resources: Fishery Management

Climate: Adaptation

Natural Resources: Spatial Data

Planning/ Management: Tribal

Climate: Sea Level Rise

Climate: Planning & Management

Fire: Research

Fire: Fuel reduction & Biomass

Coast: Management

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Fire: Ecology & behavior

Groundwater: Planning & Management

Climate: Predictive Modeling

Planning/ Management: Spatial Data

Socioeconomic: Equity

Climate: Planning & Management

Natural Resources: Spatial Data

Natural Resources: Fishery Management

Planning/ Management: Water Supply/ Quality

Water: Information Networks

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Natural Resources

Planning/ Management: Water Supply/ Quality

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Groundwater: Planning & Management

Planning/ Management: Stormwater

Planning/ Management: Stormwater

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Climate: Sea Level Rise

Climate: Predictive Modeling

Planning/ Management: Information Networks

Socioeconomic: Equity

Agriculture: Planning & Management

Climate: TEK

Planning/ Management: Tribal

Groundwater: Planning & Management

Coast: Assessments & Other Research

Natural Resources: Research

Climate: Information Networks

Climate: Planning & Management

Planning/ Management: Stormwater

Planning/ Management: Water Supply/ Quality

Water: Drought

Planning/ Management: Regulatory/ CEQA & NEPA

Planning/ Management: Tribal

Forest Planning/ Management: Timber

Natural Resources: Restoration

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife

Climate: Planning & Management

Socioeconomic: Health

Forest Planning/ Management: Timber

Coast: Assessments & Other Research

Socioeconomic: Recreation

Coast: Assessments & Other Research

Socioeconomic: Recreation

Fire: Information Networks

Fire: Ecology & behavior

Planning/ Management: Natural Resources

Socioeconomic: Resource Valuation

Natural Resources: Ecosystem Services

Natural Resources: Information Networks

Socioeconomic: Equity

Agriculture: Planning & Management

Water: Drought

Salmonids: Information Networks

Salmonids: Recovery

Socioeconomic: Resource Valuation

Forest Planning/ Management: Economics

Fire: Planning & Management

Socioeconomic: Equity

Socioeconomic: Recreation

Socioeconomic: Resource Valuation

Planning/ Management: Energy

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Natural Resources: Research

Fire: Research

Climate: Adaptation

Planning/ Management: Tribal

Planning/ Management: Tribal

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Planning/ Management: Tribal

Socioeconomic: Equity

Climate: Information Networks

Climate: Sea Level Rise

Climate: Predictive Modeling

Groundwater: Assessments and Research

Groundwater: Information Networks

Socioeconomic: Health

Natural Resources: Restoration

Water: Information Networks

Water: Spatial Data

Natural Resources: Watershed Assessments & Inventories

Water: Information Networks

Water: Spatial Data

Planning/ Management: Wastewater

Socioeconomic: Assessments & Research

Planning/ Management: Water Supply/ Quality

Water: Spatial Data

Agriculture: Planning & Management

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Planning/ Management: Water Supply/ Quality

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Planning/ Management: Regulatory/ CEQA & NEPA

Salmonids: Recovery

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Flood: Flood Planning & Management

Socioeconomic: Equity

Agriculture: BMPs

Salmonids: Assessment & Research

Planning/ Management: Watershed

Fire: Socioeconomic & Health Considerations

Fire: Research

Fire: Research

Planning/ Management: Watershed

Natural Resources: Spatial Data

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Climate: Adaptation

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Agriculture: BMPs

Socioeconomic: Equity

Planning/ Management: Natural Resources

Agriculture: Climate

Climate: GHG Reduction

Agriculture: BMPs

Agriculture: BMPs

Climate: Carbon Sequestration

Agriculture: BMPs

Planning/ Management: Water Supply/ Quality

Agriculture: Climate

Planning/ Management: Water Supply/ Quality

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality Socioeconomic: Education

Water: Drought

Planning/ Management: Water Supply/ Quality

Natural Resources: Restoration

Natural Resources: Information Networks

Natural Resources: Restoration

Planning/ Management: Natural Resources

Natural Resources: Information Networks

Climate: Sea Level Rise

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Socioeconomic: Disadvantaged Communities

Water: Information Networks

Socioeconomic: Equity

Agriculture: Socioeconomics

Natural Resources: Ecosystem Services

Planning/ Management: Water Supply/ Quality

Water: Assessments & Research

Agriculture: Planning & Management

Climate: Predictive Modeling

Climate: Predictive Modeling

Water: Drought

Socioeconomic: Resource Valuation

Natural Resources: Ecosystem Services

Climate: Planning & Management

Agriculture: Planning & Management

Salmonids: Assessment & Research

Natural Resources: Fishery Management

Water: Drought

Climate: Predictive Modeling

Natural Resources: Restoration

Planning/ Management: Regulatory/ CEQA & NEPA

Agriculture: BMPs

Agriculture: Socioeconomics

Planning/ Management: Water Supply/ Quality

Socioeconomic: Resource Valuation

Planning/ Management: Water Supply/ Quality

Planning/ Management: Information Networks

Climate: Planning & Management

Climate: Information Networks

Planning/ Management: Funding

Socioeconomic: Resource Valuation

Planning/ Management: Water Supply/ Quality

Agriculture: Planning & Management

Agriculture: Information Networks

Planning/ Management: Regulatory/ CEQA & NEPA

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Natural Resources: Habitat Conservation & Environmental Protection

Groundwater: Planning & Management

Socioeconomic: Equity

Salmonids: Recovery

Salmonids: Assessment & Research

Planning/ Management: Water Supply/ Quality

Water: Information Networks

Socioeconomic: Resource Valuation

Socioeconomic: Resource Valuation

Agriculture: BMPs

Agriculture: Socioeconomics

Agriculture: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Socioeconomic: Tribal / TEK

Planning/ Management: Water Supply/ Quality

Natural Resources: Habitat Conservation & Environmental Protection

Forest Planning/ Management: Forest Health	Natural Resources: Ecosystem Services
Water: Monitoring	Planning/ Management: Water Supply/ Quality
Water: Monitoring	Planning/ Management: Water Supply/ Quality
Water: Monitoring	Planning/ Management: Water Supply/ Quality
Water: Monitoring	Planning/ Management: Water Supply/ Quality
Water: Monitoring	Planning/ Management: Water Supply/ Quality

Water: Monitoring	Planning/ Management: Water Supply/ Quality
Water: Monitoring	Coast: Assessments & Other Research
Water: Monitoring	Natural Resources: Monitoring
Water: Monitoring	Natural Resources: Monitoring
Natural Resources: Monitoring	

Natural Resources: Monitoring

Natural Resources: Monitoring

Natural Resources: Watershed Assessments & Inventories

Forest Planning/ Management: Information Networks

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Natural Resources: Ocean and Marine

Climate: Adaptation

Climate: Planning & Management

Climate: Carbon Sequestration

Planning/ Management: Water Supply/ Quality

Water: Assessments & Research

Planning/ Management: Water Supply/ Quality

Planning/ Management: Hazard Mitigation

Socioeconomic: Ecosystem Services

Planning/ Management: Spatial Data

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Socioeconomic: Education

Water: Assessments & Research

Planning/ Management: Water Supply/ Quality

Planning/ Management: Information Networks

Planning/ Management: Tribal

Socioeconomic: Tribal / TEK

Salmonids: Assessment & Research

Salmonids: Recovery

Water: Drought

Water: Information Networks

Water: Monitoring

Water: Information Networks

Climate: Planning & Management

Planning/ Management: Natural Resources

Climate: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Tribal

Socioeconomic: Tribal / TEK

Water: Spatial Data

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Water: Assessments & Research

Water: Assessments & Research

Planning/ Management: Water Supply/ Quality

Climate: Planning & Management

Socioeconomic: Assessments & Research

Socioeconomic: Equity

Natural Resources: Information Networks

Climate: Adaptation

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality	Socioeconomic: Disadvantaged Communities
Planning/ Management: Water Supply/ Quality	Water: Assessments & Research

Socioeconomic: Tribal / TEK	Socioeconomic: Assessments & Research
Natural Resources: Spatial Data	Planning/ Management: Tribal
Socioeconomic: Disadvantaged Communities	Socioeconomic: Tribal / TEK
Socioeconomic: Disadvantaged Communities	Planning/ Management: Water Supply/ Quality

Socioeconomic: Tribal / TEK

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Socioeconomic: Equity

Climate: GHG Reduction

Planning/ Management: Energy

Salmonids: Recovery

Planning/ Management: Natural Resources

Climate: Adaptation

Planning/ Management: Tribal

Socioeconomic: Health

Socioeconomic: Assessments & Research

Planning/ Management: Transportation

Socioeconomic: Health

Planning/ Management: Tribal

Agriculture: Planning & Management

Planning/ Management: Water Supply/ Quality

Coast: Management

Natural Resources: Ocean and Marine

Water: Spatial Data

Water: Assessments & Research

Groundwater: Planning & Management

Groundwater: Information Networks

Planning/ Management: Water Supply/ Quality

Socioeconomic: Equity

Agriculture: Climate

Agriculture: BMPs

Natural Resources: Spatial Data

Natural Resources: Information Networks

Agriculture: Climate

Agriculture: Information Networks

Water: Spatial Data

Water: Monitoring

Climate: Planning & Management

Socioeconomic: Assessments & Research

Water: Drought

Fire: Planning & Management

Climate: Adaptation

Natural Resources: Habitat Conservation & Environmental Protection

Climate: GHG Reduction

Climate: Planning & Management

Climate: GHG Reduction

Climate: Planning & Management

Climate: Planning & Management

Planning/ Management: Natural Resources

Planning/ Management: Water Supply/ Quality

Flood: Flood Planning & Management

Climate: Predictive Modeling

Planning/ Management: Water Supply/ Quality

Groundwater: Information Networks

Water: Spatial Data

Planning/ Management: Water Supply/ Quality

Climate: Information Networks

Natural Resources: Information Networks

Agriculture: Planning & Management

Natural Resources: Restoration

Natural Resources: Monitoring

Water: Monitoring

Natural Resources: Habitat Conservation & Environmental Protection

Socioeconomic: Resource Valuation

Agriculture: Information Networks

Agriculture: BMPs

Natural Resources: Restoration

Planning/ Management: Natural Resources

Water: Information Networks

Socioeconomic: Equity

Planning/ Management: Regulatory/ CEQA & NEPA

Natural Resources: Restoration

Natural Resources: Habitat Conservation & Environmental Protection

Groundwater: Planning & Management

Socioeconomic: Equity

Natural Resources: Invasive Species

Natural Resources: Monitoring

Agriculture: BMPs

Planning/ Management: Water Supply/ Quality

Planning/ Management: Energy

Water: Assessments & Research

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Coast: Assessments & Other Research

Coast: Management

Coast: Assessments & Other Research

Coast: Management

Water: Monitoring

Water: Assessments & Research

Coast: Management

Water: Monitoring

Agriculture: BMPs

Agriculture: Planning & Management

Fire: Planning & Management

Agriculture: BMPs

Agriculture: Planning & Management

Planning/ Management: Funding

Socioeconomic: Equity

Flood: Flood Planning & Management

Climate: Information Networks

Climate: Predictive Modeling

Climate: Planning & Management

Climate: Adaptation

Salmonids: Assessment & Research

Socioeconomic: Resource Valuation

Climate: Adaptation

Socioeconomic: Equity

Planning/ Management: Water Supply/ Quality

Planning/ Management: Natural Resources

Planning/ Management: Natural Resources

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Climate: Planning & Management

Climate: Information Networks

Climate: Adaptation

Socioeconomic: Equity

Planning/ Management: Water Supply/ Quality

Planning/ Management: Regulatory/ CEQA & NEPA

Natural Resources: Invasive Species

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Groundwater: Information Networks

Natural Resources: Fishery Management

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Planning/ Management: Water Supply/ Quality

Planning/ Management: Natural Resources

Natural Resources: Habitat Conservation & Environmental Protection

Climate: Sea Level Rise

Climate: Planning & Management

Natural Resources: Monitoring

Coast: Management

Planning/ Management: Natural Resources

Water: Information Networks

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Socioeconomic: Equity

Natural Resources: Fishery Management

Socioeconomic: Recreation

Groundwater: Information Networks

Groundwater: Planning & Management

Climate: Planning & Management

Socioeconomic: Education

Socioeconomic: Health

Planning/ Management: Water Supply/ Quality

Climate: Carbon Sequestration

Socioeconomic: Resource Valuation

Water: Drought

Water: Information Networks

Groundwater: Planning & Management

Groundwater: Information Networks

Socioeconomic: Tribal / TEK

Natural Resources: Restoration

Water: Drought

Planning/ Management: Information Networks

Climate: Adaptation

Climate: Information Networks

Planning/ Management: Water Supply/ Quality

Water: Assessments & Research

Water: Monitoring

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Socioeconomic: Disadvantaged Communities

Groundwater: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Water: Assessments & Research

Planning/ Management: Water Supply/ Quality

Fire: Fuel reduction & Biomass

Socioeconomic: Health

Planning/ Management: Natural Resources

Groundwater: Planning & Management

Flood: Flood Planning & Management

Planning/ Management: Stormwater

Climate: Adaptation

Planning/ Management: Spatial Data

Water: Drought	
Water: Spatial Data	Water: Drought
Water: Drought	Planning/ Management: Water Supply/ Quality
Water: Drought	Planning/ Management: Water Supply/ Quality
Water: Assessments & Research	Socioeconomic: Assessments & Research
Water: Drought	Water: Information Networks

Planning/ Management: Water Supply/ Quality

Climate: GHG Reduction

Socioeconomic: Health

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Planning/ Management: Natural Resources

Socioeconomic: Equity

Planning/ Management: Water Supply/ Quality

Socioeconomic: Health

Climate: Planning & Management

Natural Resources: Ocean and Marine

Natural Resources: Monitoring

Natural Resources: Ocean and Marine

Natural Resources: Restoration

Coast: Assessments & Other Research

Agriculture: Climate

Water: Drought

Climate: Adaptation

Socioeconomic: Health

Groundwater: Planning & Management

Agriculture: Planning & Management

Groundwater: Planning & Management

Agriculture: Planning & Management

Coast: Assessments & Other Research

Natural Resources: Ocean and Marine

Climate: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Hazard Mitigation

Planning/ Management: Municipal (GPs, Local Area Pla

Planning/ Management: Water Supply/ Quality

Natural Resources: Spatial Data

Climate: Planning & Management

Socioeconomic: Health

Groundwater: Planning & Management

Planning/ Management: Water Supply/ Quality

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Forest Planning/ Management: Economics

Climate: Planning & Management

Climate: Information Networks

Natural Resources: Ocean and Marine

Salmonids: Spatial Data

Planning/ Management: Water Supply/ Quality

Water: Information Networks

Climate: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Groundwater: Planning & Management

Groundwater: Assessments and Research

Groundwater: Planning & Management

Natural Resources: Fishery Management

Climate: Planning & Management

Natural Resources: Fishery Management

Natural Resources: Fishery Management

Climate: Adaptation

Groundwater: Spatial Data

Groundwater: Assessments and Research

Groundwater: Planning & Management

Agriculture: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: Ocean and Marine

Natural Resources: Habitat Conservation & Environmental Protection

Climate: Planning & Management

Groundwater: Spatial Data

Groundwater: Planning & Management

Coast: Management

Natural Resources: Habitat Conservation & Environmental Protection

Water: Spatial Data

Socioeconomic: Assessments & Research

Agriculture: Planning & Management
Water: Drought

Climate: Planning & Management
Agriculture: Planning & Management

Planning/ Management: Water Supply/ Quality

Natural Resources: Spatial Data

Socioeconomic: Health

Socioeconomic: Equity

Climate: Sea Level Rise

Climate: Planning & Management

Fire: Fuel reduction & Biomass

Planning/ Management: Water Supply/ Quality

Water: Assessments & Research

Socioeconomic: Health

Socioeconomic: Tribal / TEK

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Socioeconomic: Resource Valuation

Climate: Predictive Modeling

Climate: Planning & Management

Climate: Adaptation

Climate: Adaptation

Climate: General Mitigation Strategies

Climate: Adaptation

Climate: General Mitigation Strategies

Climate: Adaptation

Socioeconomic: Assessments & Research

Climate: Adaptation

Socioeconomic: Education

Climate: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Stormwater

Climate: Predictive Modeling

Socioeconomic: Equity

Socioeconomic: Health

Natural Resources: Spatial Data

Groundwater: Assessments and Research

Agriculture: Climate

Climate: Adaptation

Climate: Planning & Management

Water: Drought

Climate: Adaptation

Climate: Adaptation

Groundwater: Planning & Management

Natural Resources: TEK

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: Restoration

Planning/ Management: Watershed

Planning/ Management: Water Supply/ Quality

Planning/ Management: Information Networks

Planning/ Management: Water Supply/ Quality

Natural Resources: Spatial Data

Climate: GHG Reduction

Climate: Planning & Management

Climate: Sea Level Rise

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Natural Resources: Spatial Data

Groundwater: Planning & Management

Natural Resources: Information Networks

Planning/ Management: Funding

Climate: Adaptation

Natural Resources: Restoration

Planning/ Management: Energy

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Climate: Planning & Management

Climate: Planning & Management

Climate: Planning & Management

Agriculture: Planning & Management

Natural Resources: Monitoring

Natural Resources: Monitoring

Natural Resources: Habitat Conservation & Environmental Protection

Socioeconomic: Assessments & Research

Natural Resources: Spatial Data

Natural Resources: Spatial Data

Water: Drought

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Natural Resources: Monitoring

Groundwater: Assessments and Research

Groundwater: Planning & Management

Climate: Planning & Management

Planning/ Management: Tribal

Planning/ Management: Water Supply/ Quality

Socioeconomic: Equity

Agriculture: Planning & Management

Water: Spatial Data

Water: Drought

Groundwater: Planning & Management

Energy

Planning/ Management: Energy

Agriculture: BMPs

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Agriculture: Planning & Management

Planning/ Management: Water Supply/ Quality

Agriculture: Planning & Management

Natural Resources: Ocean and Marine

Coast: Management

Natural Resources: Ocean and Marine

Coast: Management

Coast: Assessments & Other Research

Socioeconomic: Resource Valuation

Climate: Information Networks

Agriculture: Planning & Management

Agriculture: BMPs

Agriculture: Planning & Management

Agriculture: BMPs

Agriculture: Planning & Management

Agriculture: BMPs

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Agriculture: BMPs

Planning/ Management: Natural Resources

Planning/ Management: Stormwater

Water: Monitoring

Planning/ Management: Stormwater

Water: Monitoring

Climate: GHG Reduction

Climate: Planning & Management

Groundwater: Spatial Data

Socioeconomic: Health

Climate: Adaptation

Natural Resources: Spatial Data

Climate: Information Networks

Climate: Information Networks

Planning/ Management: Spatial Data

Water: Assessments & Research

Planning/ Management: Water Supply/ Quality

Planning/ Management: Natural Resources

Planning/ Management: Water Supply/ Quality

Groundwater: Planning & Management

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: Habitat Conservation & Environmental Protection

Socioeconomic: Equity

Climate: Planning & Management

Fire: Planning & Management

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: Spatial Data

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Natural Resources

Natural Resources: Habitat Conservation & Environmental Protection

Climate: Adaptation

Water: Information Networks

Planning/ Management: Stormwater

Climate: Sea Level Rise

Climate: Planning & Management

Climate: Planning & Management

Planning/ Management: Water Supply/ Quality

Planning/ Management: Water Supply/ Quality

Climate: Adaptation

Planning/ Management: Regulatory/ CEQA & NEPA

Water: Information Networks

Air Quality

Agriculture: Planning & Management

Climate: Planning & Management

Socioeconomic: Equity

Agriculture: Information Networks

Agriculture: Planning & Management

Planning/ Management: Funding

Planning/ Management: Information Networks

Planning/ Management: Natural Resources

Natural Resources: Ecosystem Services

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Planning/ Management: Information Networks

Planning/ Management: Water Supply/ Quality

Water: Information Networks

Climate: Adaptation

Natural Resources: Ecosystem Services

Climate: Planning & Management

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Climate: Adaptation

Socioeconomic: Disadvantaged Communities

Coast: Management

Climate: Sea Level Rise

Climate: Planning & Management

Natural Resources: TEK

Climate: Adaptation	Socioeconomic: Equity
Climate: Planning & Management	Socioeconomic: Assessments & Research
Climate: Adaptation	Climate: GHG Reduction
Climate: Planning & Management	Climate: Adaptation
Planning/ Management: Hazard Mitigation	Socioeconomic: Equity

Planning/ Management: Stormwater

Water: Information Networks

Planning/ Management: Watershed

Climate: Adaptation

Climate: Planning & Management

Socioeconomic: Equity

Socioeconomic: Assessments & Research

Climate: Adaptation

Climate: Planning & Management

Climate: Information Networks

Climate: Adaptation

Forest Planning/ Management: TEK

Socioeconomic: Tribal / TEK

Planning/ Management: Watershed

Natural Resources: Watershed Assessments & Inventories

Climate: Adaptation

Coast: Management

Climate: Planning & Management

Socioeconomic: Resource Valuation

Climate: Sea Level Rise

Natural Resources: Ecosystem Services

Natural Resources: Monitoring

Socioeconomic: Education

Water: Drought

Water: Information Networks

Climate: Planning & Management

Climate: Adaptation

Climate: Planning & Management

Natural Resources: Ecosystem Services

Natural Resources: Monitoring

Socioeconomic: Assessments & Research

Agriculture: Planning & Management

Agriculture: BMPs

Agriculture: Planning & Management

Agriculture: Information Networks

Natural Resources: Monitoring

Natural Resources: Restoration

Planning/ Management: Stormwater

Planning/ Management: Water Supply/ Quality

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Natural Resources

Climate: Sea Level Rise

Climate: Sea Level Rise

Climate: Planning & Management

Socioeconomic: Collaboration & Partnerships

Climate: Planning & Management

Planning/ Management: Spatial Data

Climate: Planning & Management

Socioeconomic: Health

Groundwater: Spatial Data

Climate: Predictive Modeling

Climate: Adaptation

Climate: Predictive Modeling

Socioeconomic: Health

Climate: Information Networks

Climate: General Mitigation Strategies

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Fire: Planning & Management

Salmonids: Climate Change

Salmonids: Assessment & Research

Water: Information Networks

Planning/ Management: Water Supply/ Quality

Climate: Sea Level Rise

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: Habitat Conservation & Environmental Protection

Planning/ Management: Natural Resources

Water: Assessments & Research

Water: Drought

Planning/ Management: Funding

Climate: Adaptation

Climate: Planning & Management

Natural Resources: Restoration

Climate: Predictive Modeling

Agriculture: Planning & Management

Planning/ Management: Funding

Planning/ Management: Funding

Planning/ Management: Natural Resources

Agriculture: Planning & Management

Planning/ Management: Tribal

Natural Resources: Habitat Conservation & Environmental Protection

Socioeconomic: Equity

Socioeconomic: Collaboration & Partnerships

Socioeconomic: Tribal / TEK

Socioeconomic: Collaboration & Partnerships

Socioeconomic: Collaboration & Partnerships

Planning/ Management: Natural Resources

Climate: Adaptation	Climate: Planning & Management
Socioeconomic: Equity	Climate: Adaptation
Socioeconomic: Equity	Climate: Adaptation
Climate: Adaptation	Coast: Management
Climate: Sea Level Rise	Planning/ Management: Water Supply/ Quality

Climate: Planning & Management

Climate: Adaptation

Climate: Planning & Management

Climate: Adaptation

Climate: Planning & Management

Natural Resources: Monitoring

Climate: Planning & Management

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: Habitat Conservation & Environmental Protection

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: Spatial Data

Planning/ Management: Energy

Natural Resources: TEK

Agriculture: Planning & Management

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Natural Resources: TEK

Planning/ Management: Natural Resources

Planning/ Management: Spatial Data

Socioeconomic: Collaboration & Partnerships

Natural Resources: Spatial Data

Planning/ Management: Natural Resources

Natural Resources: T & E Species, Ecologically Important Species, Species of Special Concern, and other wildlife and plants

Climate: GHG Reduction

Climate: Planning & Management

Flood: Flood Planning & Management

Planning/ Management: Stormwater

Socioeconomic: Collaboration & Partnerships

Climate: Planning & Management

Planning/ Management: Municipal (GPs, Local Area Plans, etc.)

Climate: Adaptation

Climate: Planning & Management

Climate: TEK

Climate: Adaptation

Climate: GHG Reduction

Natural Resources: Spatial Data

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If you are interested in more information on the report including access to the appendices please contact:

Kevin O'Connor
Program Manager
Central Coast Wetlands Group
Moss Landing Marine Labs
Office: 831 771-4495
koconnor@mlml.calstate.edu

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