

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION**

RESOLUTION NO. R6T-2019-0277

**CLIMATE CHANGE
MITIGATION AND ADAPTATION STRATEGY**

WHEREAS, the California Regional Water Quality Control Board, Lahontan Region (Water Board) finds that:

1. Sharp rises in the atmospheric concentration of greenhouse gases over the last century and a half, due to human activity, have led to an increase in global average temperature, and associated climate change.
2. The mission of the Water Board is to preserve and enhance water quality in the Lahontan Region for the benefit of present and future generations. Pursuant to the federal Clean Water Act and California Porter-Cologne Water Quality Control Act, the Water Board designates beneficial uses of the Region's surface and groundwaters and establishes water quality objectives for the reasonable protection of those uses. Beneficial uses are the uses of water necessary for the survival or well-being of humans, plants, and wildlife. In the face of climate change, the Water Board's success in achieving its mission requires a clear understanding of the foreseeable impact to our water resources and associated beneficial uses and implementation strategies to adapt to and mitigate such impacts.
3. The latest climate science and research throughout the Lahontan Region indicates that our changing climate has the ability to adversely affect the quality and quantity of water within the Lahontan Region, and these climatic changes must be considered to effectively protect water quality and the beneficial uses of water.
4. Climate change is affecting and will affect the Lahontan Region in a multitude of ways. Current and future impacts include increasing frequency of extreme weather events, and prolonged fire seasons with larger and more intense fires. Changes in hydrology include more precipitation falling as rain versus snow, more extreme storm events, declining snowpack, and changes in the timing and volume of peak runoff. Vulnerabilities of water resources include, but are not limited to, subsidence from overdrafting of groundwater aquifers, erosion, flooding, related risks to water and wastewater infrastructure and operations, and reduced groundwater availability coupled with the potential for concentrated groundwater pollutants.
5. The risks of abrupt or irreversible changes increase as the magnitude of warming increases, and the California Climate Change Assessments have provided a strong foundation of research addressing the impacts of climate change on the state, as well as, potential response strategies.

6. The Sierra Nevada Region Report prepared as part of 2018 California's Fourth Climate Change Assessment (2018 CA Fourth Assessment) presented the latest, peer-reviewed climate science relevant to ten of the twelve counties within the Water Board's jurisdiction and finds:

Mountain meadows provide important habitat, hydrological, and carbon storage functions, and intact wet meadows are important groundwater-dependent ecosystems.

Water infrastructure throughout the region will be stressed by extreme heat and precipitation events, especially those that cause flooding.

Groundwater in the Sierra Nevada region is vulnerable to changes in groundwater pumping as local surface supplies deteriorate, as recharge patterns and rates change, and due to the generally smaller scale of so many of the region's aquifers.

Incidence of wildfire and drought stress will increase, and carbon storage will decrease in the Sierra Nevada in the face of the projected climate forecast.

7. The Inland Desert Region Report, also prepared as part of the 2018 CA Fourth Assessment, finds similar climate-induced impacts (also peer-reviewed) to water quality for the southern portion of the Lahontan Region (eastern San Bernardino County) as follows:

Wetland and riparian ecosystems have been impacted by lowering of groundwater levels, and impacts will continue with warming temperatures and prolonged dry periods.

Infrastructure for distribution and storage of energy will be vulnerable to climate change as warming temperatures damage lines and cause capacity losses. Transportation and water delivery infrastructure are possibly at risk due to impacts from extreme temperature and precipitation events including wildfire, flash floods, debris and mud flows.

Dependence on groundwater for communities in the Mojave River watershed in the South Lahontan hydrologic region is expected to increase as ... water supplies become limited due to recent and projected severe droughts.

Wildfires may increase in the Inland Desert region, an area already prone to rapid spread of fire due to high-winds and the presence of non-native grasses, as extreme heat and extended drought promote development of threatening fuel beds.

8. Mitigation, in the context of climate change, refers to action taken to reduce the concentrations of greenhouse gases in the atmosphere.
9. Adaptation, in the context of climate change, refers to actions taken to build resilience, and to adjust to the impacts of climate change on society and the environment.
10. Improved coordination, implementation, and integration of planning efforts and funding of the California's climate policies can directly protect California's natural and built infrastructure, communities, environmental quality, public health, safety and security, natural resources, and economy from the unavoidable impacts of climate change.
11. The California Global Warming Solutions Act of 2006, requires all state agencies to consider and implement strategies to reduce greenhouse gas emissions through 2020 and sets California on the path for additional greenhouse gas emissions reductions by 2030.
12. Executive Order B-30-15 directs the state to continue its rigorous climate change research program focused on understanding the impacts of climate change and how best to prepare and adapt to such impacts.
13. On March 17, 2017, the State Water Resources Control Board (State Water Board) adopted Resolution No. 2017-0012, which identifies actions that the State Water Board will, and the Regional Water Quality Control Boards (Regional Boards) are encouraged to undertake to address climate change, and provides a framework for the State Water Board and Regional Boards' efforts.
14. The Water Board's Climate Change Mitigation and Adaptation Strategy aims to protect beneficial uses and water quality by adhering to and following four overarching Policy Statements. These Policy Statements describe areas that the Water Board will make progress over the long-term to promote greater levels of water quality protection and water resource resiliency to climate change, while solidifying the Water Board's commitment to respond to these issues through improvement of select policies, programs and permits.
15. The Climate Change Mitigation and Adaptation Strategy Report for the Lahontan Region presents an overview of the impacts of climate change on water quality and beneficial uses and provides guidance on the development and implementation of actions to address climate change.

THEREFORE, BE IT RESOLVED THAT:

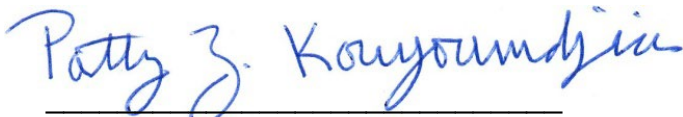
The Water Board directs Staff to:

1. Focus its efforts, as resources allow, to address the impacts of climate change on the following resource areas and Policy Statements, where the Water Board believes water quality and beneficial use protection in the face of climate change will be most effective:
 - a. Protection of Wetlands, Floodplains and Headwaters- Support external efforts and initiate necessary regulatory actions to facilitate improved meadow, wetland, and floodplain conditions and stream flows in headwater areas to achieve greater levels of watershed resiliency.
 - b. Infrastructure Protection- Support external efforts and initiate necessary regulatory actions to help build and maintain sustainably functioning infrastructure so built systems remain safe and reliable during extreme weather events including heat waves, extreme precipitation, severe droughts, and wildfires.
 - c. Protection of Groundwater Quality and Supply- Support external efforts and initiate necessary regulatory actions to protect groundwater quality and improve groundwater recharge for purposes of protecting source water and building sustainability and drought resiliency.
 - d. Protection of Headwater Forests and Promoting Fire Resiliency- Support external efforts and initiate necessary regulatory actions to facilitate the pace and scale of projects implemented to build long-term resilience of headwater forests including those that (1) reduce vulnerability to catastrophic fires and pest infestations, and (2) support resilience in recovery efforts.
2. Consider potential impacts from climate change in all Water Board programs.
3. Prioritize climate change adaptation actions (permit and policy changes) during triennial reviews and shift annual resources/workplans to support building climate change mitigation and adaptation activities into water quality programs.
4. Develop an Action Plan to provide a detailed list and expected timelines of tasks within the context of annual work planning efforts to be implemented by staff and guided by the overarching Policy Statements.
5. Use the Climate Change Mitigation and Adaptation Strategy Report as a guide to prioritizing, developing, or collaborating on actions to address impacts from climate change.
6. Prioritize implementation of actions (technical support, funding opportunities) identified in the Action Plan to ensure that disadvantaged communities have the

tools needed to prepare for natural disasters and build resiliency to climate change impacts.

7. Coordinate with appropriate partners on emergency preparedness and shift resources to efficiently respond to and recover from extreme climate related emergencies.
8. Collaborate with stakeholders and State Board to identify policies, regulations, and funding to address the impacts of climate change on water quality.
9. Engage with the State Board and other relevant agencies to develop (1) water quality monitoring to detect trends in climate change impacts, and (2) reporting requirements to gauge effectiveness of response efforts using performance-based criteria.
10. Propose updates to the Policy Statements as needed.
11. Report annually to the Water Board on progress made toward implementing the Action Plan and Policy Statements. Where relevant, each regulatory program will identify actions completed or underway that are included in the Action Plan.

I, Patty Z. Kouyoumdjian, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Lahontan Region, on November 20, 2019.



PATTY Z. KOUYOUMDJIAN
EXECUTIVE OFFICER

Attachment A: Climate Change Mitigation and Adaptation Strategy Report for the
Lahontan Region



**CLIMATE CHANGE MITIGATION AND ADAPTATION STRATEGY
REPORT
FOR THE LAHONTAN REGION**

November 2019



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Gavin Newsom, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

Jared Blumenfeld, Secretary

STATE WATER RESOURCES CONTROL BOARD

E. Joaquin Esquivel, Chair

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD,
LAHONTAN REGION**

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	1
2. INTRODUCTION	2
3. POLICY STATEMENTS	3
4. ACTION PLAN	7
5. ADAPTIVE MANAGEMENT	12
6. CONCLUSIONS	14

LIST OF APPENDICES

Appendix A: Water Board’s Strategy Development Process and Stakeholder Involvement	15
Appendix B: Chronology of the Strategy Development Process.....	17
Appendix C: Anticipated Regional Climate Impacts	20
Appendix D: Significant Statewide Laws, Policies, and Initiatives Related to Climate Change	22
Appendix E: Key Climate Change Efforts Already Underway by Regional Partners and Opportunities for Water Board to Collaborate	27
Appendix F: References	30

1. Executive Summary

In response to both statewide laws and policies, and in general recognition that climate change is likely to have a profound impact on our vast region, the Lahontan Regional Water Quality Control Board (Water Board) has made climate change mitigation and adaptation one of its top priorities.

The Water Board's massive jurisdictional area (approximately 24% of California's total land area) includes all lands east of the Sierra Nevada crest to the Nevada border and encompasses 570 miles extending south from the Oregon border to the Mojave Desert. The climate and terrain throughout the region are diverse and to fully understand potential impacts from a changing climate, the Water Board has gathered scientific information and conducted extensive stakeholder outreach to form the foundation of the Climate Change Mitigation and Adaptation Strategy (Strategy). Conducting scientific research and thorough stakeholder outreach has been critical in improving the Water Board's understanding of both the anticipated impacts to the 3,170 miles of streams, 700 lakes, and 345 ground water basins; and fully understanding the viewpoints and values expressed by the people living in the Lahontan Region.

Along the journey to develop our Strategy, it became apparent that collaboration and partnerships, along with stakeholder involvement will remain the cornerstone of our approach as we implement and continue to refine the process. The Water Board has recognized that certain actions and activities will be best handled internally, due to our expertise and statutory authority; however, there is recognition that other actions and activities are more appropriate and better suited for other partners and stakeholder groups. Examples may include local governments, associations, non-governmental organizations, and community groups that are in a better position to influence land use planning efforts or spearhead projects that directly mitigate greenhouse gas emissions or offset greenhouse gas through increased levels of carbon sequestrations (e.g., Sierra meadows restoration and enhancement projects, healthy forest initiatives). In these cases, the appropriate role of the Water Board is to best facilitate necessary permitting and act in a supportive role to help these entities achieve mutual goals and objectives.

The Strategy is primarily comprised of two separate but related guidance and planning sections: (1) Climate Change Response Policy Statements (Policy Statements), and (2) Climate Change Mitigation and Adaptation Action Plan (Action Plan).

The Policy Statements set overarching, high-level direction to provide guidance and consistency in the agency's efforts and commitments to climate change adaptation and mitigation. The Policy Statements will serve as a touchstone to help guide all current and future work in four distinct resource areas that have been determined to be most directly influenced by agency regulations and policies and represent resource areas that are most appropriate for the Water Board to support other organizations and climate change adaptation and mitigation efforts. When implemented, such internal and external efforts should help facilitate increased pace and scale of activities to protect and restore

sensitive habitats, build more resilient and reliable infrastructure, groundwater supplies, and forested landscapes.

The Action Plan defines the specific work priorities, efforts, and actions that will be integrated into our regulatory and planning efforts to facilitate tangible climate mitigation and adaptation outcomes. The Water Board encourages staff to take a lead role to facilitate actions such as permit updates and new requirements that are within core regulatory programs or provide support to climate change adaptation activities being led by others.

To effectively respond to climate change, the Strategy is expected to be reviewed and updated as needed as new and emerging information relative to climate change and impacts on water quality is learned. The Action Plan will receive annual updates to account for any changing priorities or shifting of resources. These annual updates will be proposed through regularly held public meetings where the Water Board will have an opportunity to comment and provide direction in setting priorities.

The Water Board acknowledges that the path forward in responding to climate change will be challenging given limited staff resources and the uncertainty of any forthcoming resources dedicated specifically to support programmatic climate change actions. To maximize our efficiency in adapting to climate change, collaboration will remain the cornerstone of our approach and the Water Board supports leveraging adaptation efforts, tools and products being developed by others to address water quality impacts from climate change.

2. Introduction

California has placed itself at the forefront of addressing climate change and its increasing impacts upon people and the environment. The signing of [the California Warming Solutions Act of 2006 \(Assembly Bill 32, Chapter 488, Statutes of 2006\)](#), clearly established California's global leadership role, and a pathway to reducing greenhouse gas (GHG) emissions in an effort to minimize adverse climate change impacts. California is also taking the lead in establishing and implementing strategies for adapting to climate change impacts. A combination of State laws and Executive Orders have identified the California Air Resources Board (ARB), Natural Resources Agency (Resources Agency), and California Environmental Protection Agency (CalEPA) as the lead state agencies for developing and implementing the State's climate change laws, policies, and strategies. Under CalEPA's umbrella, the State Water Resources Control Board (State Board) and its nine Regional Water Quality Control Boards (Regional Water Boards) have a role to play in California's extensive and comprehensive response to climate change with their primary responsibility being the protection of water quality and beneficial uses of California's precious water resources in the face of our warming climate. The [Water Board's May 2017 Water Board Report on Developing a Climate Change Mitigation and Adaptation Strategy for the Lahontan Region](#) further details key state climate change laws and policies that have influenced our regional response to climate change.

The State and Regional Water Board's initial actions to respond to climate change and support the implementation of the Global Warming Solutions Act were established in the State Board's [Resolution No. 2007-0059](#). In 2017, the State Board built upon the 2007 resolution and adopted a [Comprehensive Response to Climate Change \(State Board Resolution No. 2017-0012\)](#), which presented a proactive approach to climate change in all State and Regional Water Board actions, with the intent to embed climate change consideration into all programs and activities.

Acknowledging that the Water Board is part of a larger structure of individuals and agencies responding to climate change, the Water Board started actively planning for climate change late in 2014. The Water Board initiated a process to develop a climate response strategy by engaging with interested stakeholders and the public. (See Appendix A for further details about our robust stakeholder involvement process.)

Through the public participation process, and with input from the Water Board, Water Board proposes to focus its efforts to address the impacts of climate change on four resource areas. These four resource areas form the basis of the Policy Statements contained in the Strategy and focus the Water Board's role in protecting water quality and beneficial uses of water within the context of California's climate change efforts.

3. Policy Statements

The Water Board's Policy Statements¹ provide overarching guidance and solidify our agency's commitment to respond to water quality related impacts from climate change through improvement of select policies, programs, and permits.

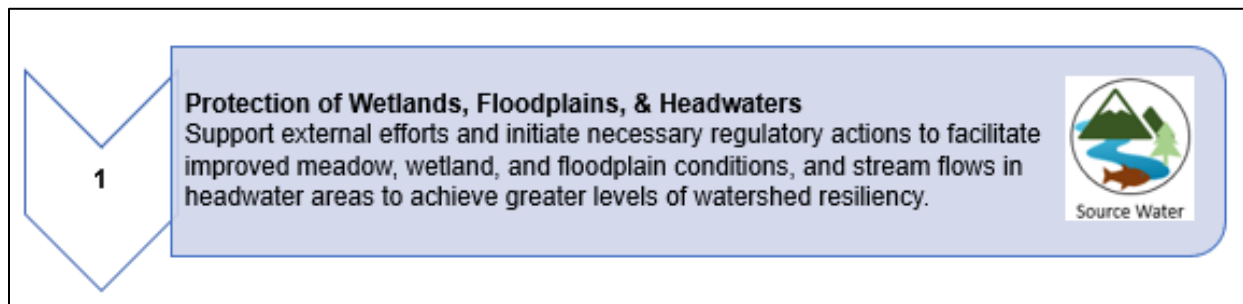
The Policy Statements describe resource areas where the Water Board will strive to make progress over the long-term (decadal time scale) to promote greater levels of water quality protection and water resource resiliency to climate change. If the impacts of climate change accelerate at a rate that is greater than what is currently being documented by the latest climate science, the Policy Statements may be updated more frequently. Prioritizing our climate change response efforts toward these areas is sensible, since regional climate science (summarized in Appendix C) indicates the Lahontan Region will experience climate related changes that will impact sensitive ecosystems, vulnerable infrastructure, groundwater resources, and increase wildfire risk.

The Water Board believes water quality and beneficial use protection in the face of climate change will be most effective by supporting both *external* climate change adaptation and mitigation efforts undertaken by other agencies and organizations; and

¹ Under the provisions of California Water Code section 13224, the Water Board is authorized to issue a Policy Statement related to any water quality matter with its jurisdiction. A Policy Statement can encourage certain actions, give general direction to staff, or make other non-regulatory statements.


direct *internal* Water Board resources toward efforts and actions that improve conditions in the resource areas identified below.

The benefits provided by healthy and intact resource areas identified in the Policy Statements are detailed further in the below paragraphs. Realizing the value of these benefits to the environment and to the well-being of people of California further validates the Water Board's commitment to protect these vulnerable sectors.



1

Protection of Wetlands, Floodplains, & Headwaters
Support external efforts and initiate necessary regulatory actions to facilitate improved meadow, wetland, and floodplain conditions, and stream flows in headwater areas to achieve greater levels of watershed resiliency.



Source Water

Healthy headwater streams and meadows support abundant biodiversity and aquatic life, filter water, manage storm flows, meter water releases, and supply a significant volume of fresh water to California. Riparian and meadow landscapes with diverse plant communities and deep rooting systems also help retain carbon, thereby directly mitigating climate change through carbon storage. Healthy streamside vegetation and riparian canopy cover help cool water temperature, which in turn helps maintain healthy levels of dissolved oxygen in the water column needed to support cold freshwater habitats. Additionally, cooler water temperatures assist with the control of microbial parasites which can proliferate under warmer temperatures and threaten freshwater fish.

Well-functioning, natural landscapes also provide multiple ecosystem services, such as those mentioned above, that benefit humans and improve quality of life. For example, healthy meadows can attenuate high intensity precipitation events and flood flows providing additional protection measures for vulnerable communities at risk of destructive flooding and subsequent property damage, unsafe travel conditions, and failure of utility and communication grids. The cooling effect provided by adequate stream flows and streamside vegetation help to maintain healthy levels of fish populations and minimize the level of harmful algae blooms, thus allowing fisherman and lake/river users the aesthetic enjoyment and benefits of safely engaging in water-fueled recreational opportunities (sportfishing, swimming, streamside picnics, etc.)


Additionally, as water demand for all uses continues to grow throughout California, the Water Board recognizes the importance of maintaining instream flows to protect native species, aquatic life, and stream health. Adequate stream flows ensure: (1) fish passage for migration; (2) stream connectivity, including sufficient water for side channels, backwater areas, and/or floodplains to support feeding and rearing habitats; (3) aquatic benthic macroinvertebrate production as food for salmonids; (4) good water

quality and temperature, both of which are influenced by the quantity of flow; and (5) the maintenance of aquatic ecosystem processes (e.g., nutrient and sediment cycling).

Maintaining the health of upper watersheds and instream flows is especially important throughout source watersheds in the Sierra Nevada since these waters serve a critical role as waters of origin, providing as much as 60% of the developed water supply to downstream end users. Because mountainous headwaters, surface flows, and groundwater are hydrologically connected, sufficient instream flows indicate a sustainable groundwater supply and ensures water supply is provided for downstream users that rely on ground or surface waters to support their drinking water, electricity, recreation, and/or agricultural needs.

2

Infrastructure Protection
Support external efforts and initiate necessary regulatory actions to build and maintain sustainably functioning infrastructure so built systems remain safe and reliable during extreme weather events including heat waves, extreme precipitation, severe drought, and wildfires.




Infrastructure

As the climate warms, California will need to design and maintain infrastructure (i.e., water conveyance treatment and delivery systems, roads, stormwater drainage, landfills) to withstand increasingly severe impacts. Unless the drinking water, stormwater, and wastewater infrastructure systems are designed to withstand extreme weather events, water quality and human health have the potential to be degraded by pollutant discharges brought about by spills or other failures related to severe erosion, flooding, drought, and wildfires.

To realize the value of constructing and maintaining climate safe infrastructure, it is important to understand the potential health and safety impacts that people of the California will face when infrastructure fails. Extreme droughts and floods can damage infrastructure (pipes, private wells, landfill covers, pump stations) and interrupt essential services (wastewater collection, drinking water supply) provided to people.

3

Protection of Groundwater Quality and Supply
Support external efforts and initiate necessary regulatory actions to protect groundwater quality and improve groundwater recharge for purposes of protecting source water and building sustainability and drought resiliency.




Groundwater

The recent multi-year (2012-2016), severe drought underscores the need to sustainably manage groundwater resources throughout California and within the Lahontan Region. The Lahontan Region contains over 300 groundwater basins and includes the Indian

Wells Valley groundwater basin, which is identified in the Department of Water Resource's Sustainable Groundwater Management Act as a high priority basin subject to critical conditions of overdraft if current water management practices continue.

Sustainable groundwater management, which includes protecting groundwater quality and supply, is increasingly critical within the Lahontan Region, given demand, impacts, population growth, and changing conditions that lay ahead. Climate induced impacts projected for the Lahontan Region that affect the quality and quantity of groundwater include hotter temperatures, severe droughts, and diminishing Sierra snowpack. When climate induced impacts degrade ground water quality and supply, environmental resources and the well-being of Californians are also negatively affected. Also within our region, drought-induced lowering of groundwater levels mobilized harmful pollutants, dried up drinking water wells, and increased the cost and difficulty of remediation (PG&E Hinkley).

Actions that protect groundwater quality and improve groundwater recharge rates will be key elements of adaptation in a hotter and drier climate. Such actions will be especially important in portions of our region that fall within the South Lahontan hydrologic region within the Mojave River watershed, which according to the Inland Desert Regional Report prepared for California's Fourth Assessment on Climate, is one of the most populated areas of the South Lahontan hydrologic region, with 66% of its water supplied by groundwater.

4	<p>Protection of Headwater Forests and Promoting Fire Resiliency Support efforts and initiate necessary regulatory actions to facilitate the pace and scale of projects implemented to build long-term headwater forests including those that (1) reduce vulnerability to catastrophic fires and pest infestations, and (2) support resilience in recovery efforts.</p>	
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Issued in May 2018, the Governor of California's Executive Order B-52-18 aims to systematically improve forest management and increase the ability of our forests to capture carbon. The multiple ecosystem service and benefits provided by forests are presented in the following excerpt of Executive Order B-52-18:

California's 33 million acres of forestland and 1,256 square miles of urban forest canopy capture and clean our water supply, provide rich biodiversity, support local economies, provide recreational and educational opportunities, and serve as spiritual and cultural centers for indigenous and local communities across the state.

Forested lands are the largest land-based carbon sink in California with trees and shrubs drawing carbon from the atmosphere and storing it in their cellulosic structure and in forest soil.

To achieve these benefits, forest landscapes must be protected to remain healthy and intact; however, under future climate scenarios extreme heat, extended drought periods, and diminishing snowpack create conditions for high-intensity wildfires that threaten forests.

If wildlands are not managed properly and overgrown forests are left vulnerable to destructive wildfires, the carbon fixation that forests can provide can quickly be lost. As such, the wildfire process creates a significant source of carbon emission into the atmosphere and the denuded landscape that is left behind no longer provides the benefit of storing carbon.

Moreover, significant post-fire water quality impacts can result when soil erodes from bare landscapes. Excessive sediment delivery to watercourses downstream of fire-impacted areas can clog fish spawning gravels, degrade drinking water supplies, cause flooding, and result in significant loss of riparian vegetation, habitat, and function. In extreme cases, bare hillslopes that are left post-fire are susceptible to mass wasting and hazardous hillslope failures during moderate rainstorms and extreme precipitation events. Destructive debris flows threaten the integrity of roads, critical infrastructure, and personal property.

Additionally, high intensity fires can directly affect the health, emotional well-being, and safety of people when unsafe air conditions result and there is loss of critical public services (power, water, transportation, and communication.) In catastrophic events, significant property damage including destruction of homes, schools, and hospitals place additional burdens on the community that continue through the rebuilding phase.

4. Action Plan

The purpose of the Action Plan is to provide a more detailed list and timeline for specific changes, modifications, and new tasks to be implemented by staff with the context of yearly work planning efforts. The Action Plan will provide program manager and staff level guidance for actions that may be integrated into work planning efforts.

The specific work efforts and key actions included in the Action Plan will be focused and guided by the overarching Policy Statements. During annual work planning efforts, program managers will integrate the priority climate change mitigation and adaptation actions identified in the Action Plan to ensure that our work remains steady toward protecting critical habitats, and enhancing the reliability and resilience of vital infrastructure, water resources, and natural lands.

As defined in State Board Resolution 2017-0012, "Mitigation, in the context of climate change, refers to actions taken to reduce concentration of greenhouse gases in the atmosphere. The most effective way to reduce greenhouse gas concentrations in the atmosphere is to reduce emission sources."

Though reducing emission sources (i.e., fossil fuel burning energy) is the most effective way to reduce greenhouse gas concentrations in the atmosphere, the ability of healthy ecosystems to provide long-term carbon capture and storage is also realized as providing vital mitigation. As such, the Water Board will strive to collaborate on efforts to revitalize these natural areas that have the potential to remove carbon from the atmosphere. The Water Board's strategies to mitigate climate change impacts included in the Action Plan will strive to support projects that help restore and enhance meadow, headwater, and forested landscapes so they remain intact and functional.

As defined in the State Board's Comprehensive Response to Climate Change, "Adaptation, in the context of climate change, refers to actions taken to build resilience, and to adjust to the impacts of climate change on society and the environment."

Actions to adapt to climate change impacts included in the Action Plan will be aimed toward increasing the resiliency and reliability of floodplains, wetlands, infrastructure, groundwater supplies, and forested landscapes. Adaptation efforts will also include measures to work collaboratively to develop and implement emergency preparedness and response for climate induced catastrophes including wildfire and extreme flooding.

To ensure the Water Board remains on track and accountable as it implements actions intended to respond to climate change, the Strategy includes direction to Staff. This direction is intended to direct and increase the efficacy of the Water Board's climate change response planning, reporting, and implementation commitments as the Water Board integrates climate change into work planning and decision making.

On an annual schedule, staff will use the tasks identified in the Action Plan to inform programmatic and individual workplans that outline priority work for the coming fiscal year. The Water Board and the public will be updated on the progress of program specific, climate change response related actions from the previous year. The Water Board will also have an opportunity to provide input and direction to staff for future goals and priority setting during an annual presentation by the Water Board's Executive Officer, which will present proposed updates on the Action Plan, including priority key efforts, regulatory actions, and policy initiatives planned for the following year.

Several priority projects identified in the 2018 Triennial Review List as adopted in [Resolution No. R6T-2018-0050](#), when developed and implemented, will help protect and enhance (1) the function of wetlands and floodplains, and (2) the sustainability and resilience of ground water supplies and forested landscapes. These priority projects, which include developing a Riparian Protection Policy and Instream Flow Criteria; and exploring opportunities for Source Water Protection will be included in the Action Plan. The Water Board anticipates that these projects identified in the 2018 Triennial Review List will be a significant part of the Action Plan in terms of tasks the Water Board can reasonably accomplish with our limited staff.

It is expected that the Action Plan will also include the development and implementation of a suite of actions to increase the resilience of our region's water portfolio consistent

with Governor Newsome’s Executive Order N-10-19. The Action Plan may also include work related to the recent adoption of the Safe and Affordable Drinking Water Fund ([Senate Bill 200, Chapter 120, July 2019](#)). Tasks toward this end may include outreach and information sharing to eligible partners throughout our region regarding the availability and allocation of these funds throughout California and within the Lahontan Region.

The Figure below graphically presents the framework of the Action Plan and includes examples of work products that could be included. Further, in developing the Action Plan, the Water Board supports including the preliminary actions organized by resource area, which are presented below.

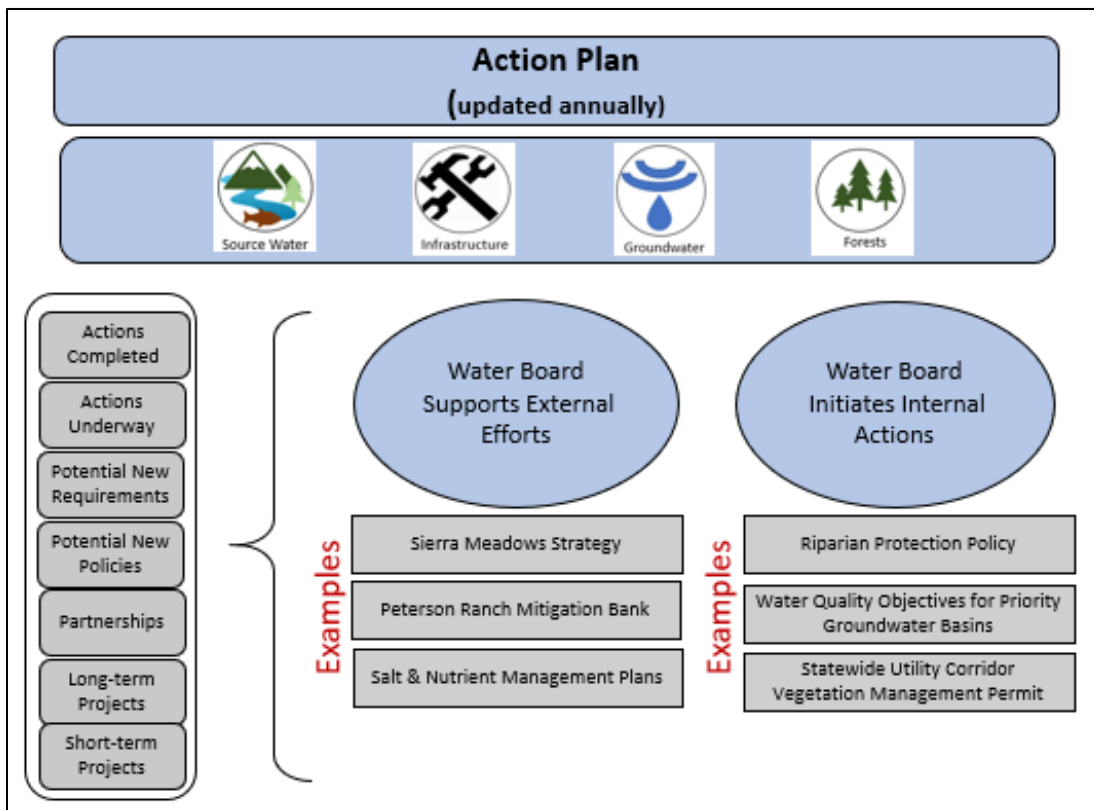


Figure: Framework of the Action Plan which includes examples of external efforts and internal actions that may be implemented to mitigate and adapt to climate change impacts within the Lahontan Region

Preliminary Actions for Protection of Wetlands, Floodplains, & Headwaters

The Water Board will support statewide efforts to develop biologically-relevant instream flow recommendations, and play a role in setting instream flow criteria to protect beneficial uses. Further, instream flows in areas affected by cannabis cultivation will be protected as the Water Board issues permits for cannabis cultivation, which establish

water quality and instream flow requirements for growing activities that may have the potential to substantially affect instream flows.

To protect and enhance the quality and function of upper watersheds, meadows and floodplains, the Water Board will strive to concentrate on actions that will help increase the pace and scale of restoration work implemented to protect these natural landscapes that are critical in building resiliency to our warming climate. Though the Water Board itself does not implement restoration projects, it issues permits (401 Water Quality Certifications and Construction Storm Water Waste Discharge Requirements) and Basin Plan prohibition exemptions to entities conducting restoration work. Opportunities to streamline the permitting process will help local, regional, and federal practitioners efficiently execute their restoration projects.

Preliminary Actions for Infrastructure Protection

Through the Water Board's planning and regulatory programs, we will facilitate better location, design, and construction of water, stormwater, and wastewater infrastructure. Bolstering the integrity of existing and new infrastructure so it withstands severe weather events will in turn better protect water quality by reducing the number and severity of sewage spills and water line breaks that typically increase with flooding events. (During the initial implementation phase of our Action Plan, the Water Board intends to concentrate on actions that improve the resiliency of water and wastewater infrastructure; however, adaptation efforts may be expanded to include other infrastructure sectors [power, communication, and transportation], since work in these sectors will also benefit from permitting and programmatic improvements.) Permitting efficiency may streamline projects implemented to address inefficiencies and damage to energy and transportation infrastructure related to climate change impacts.

The Water Board has not required risk assessments of existing permitted facilities and has not required associated upgrades or planning for upgraded new infrastructure. Where communities, utilities, and water agencies have already completed risk assessments, the Water Board encourages upgrades and improvements related to building more resilient systems. Resiliency plans should include risk abatement programs that include emergency response plans and debris cleanup and rebuilding plans.

To ensure that small and disadvantaged communities have safe and reliable drinking and wastewater systems, the Water Board will strive to provide more assistance so rural communities have access to the technical and financial capacity to upgrade antiquated infrastructure.

Preliminary Actions for Protection of Groundwater Quality and Supply

To increase the sustainability of groundwater supplies our programs and policies must support sustainable groundwater management efforts (e.g., recycled water use) being implemented by others to ensure resiliency to climate change impacts. Within the Lahontan Region, sustainable groundwater management can effectively be achieved through multiple efforts that support: Groundwater Protection (e.g. Salt and Nutrient

Management Plans, Integrated Water Regional Management Plans), Stormwater Capture and Infiltration, and Water Conservation and Recycling. Additionally, the Water Board may consider the need to develop a Riparian Protection Policy to prevent/minimize/mitigate the impacts of hydromodification upon both groundwater and surface water supplies.

The Water Board will continue to protect groundwater resources through its Site Cleanup Program, which focuses on investigation and cleanup of pollutants (other than petroleum releases associated with underground tanks) released to soils, groundwater, surface waters, and sediments. The Water Board can also achieve protection of groundwater quality by continuing to issue waste discharge and disposal permits to control discharges to land. Further protection of groundwater quality will be accomplished by issuing enforcement actions requiring cleanup and abatement of chemicals (e.g., nitrate, tetrachloroethylene [PCE]) impacting private and/or municipal groundwater supply wells such as the [Cleanup and Abatement Order for Lake Tahoe Laundry Works](#) and by overseeing site cleanup (see [PG&E Hinkley Chromium Cleanup webpage](#)).

Additionally, the Water Board encourages coordination with the Division of Drinking Water to ensure that we are aware of small drinking water systems that are at risk, especially in areas where we have naturally occurring arsenic, nitrate, and other contaminants that may threaten local supplies.

The Water Board supports actions to help diversify supply, protect groundwater quality, and use water wisely; all principals that align with the intent of higher-level statewide policies and plans including Executive Order N-10-19, which includes creating a climate-resilient water portfolio for California. The Water Board's efforts towards this end will include targeted outreach and education to downstream users so they understand the source of their water is largely dependent on geographically distant headwater systems. Targeted outreach will help downstream water users understand the importance of headwater protection and water conservation.

Protection of Headwater Forests and Promoting Fire Resiliency

To protect headwater forests and promote fire resilient landscapes the Water Board will strive to create an efficient approach to permitting that will support the increasing pace and scale of forest improvement and fire prevention projects while ensuring protection of water quality and beneficial uses in compliance with Porter-Cologne and the Lahontan Basin Plan.

As wildfire prevention and vegetation management activities ramp up, so too will the road building and watercourse crossing elements needed to support these projects. Adequate measures should be built into such projects, so forest hydrology is maintained and concentration of storm flows, soil erosion, and discharge of sediment to streams is minimized.

To ensure that forested landscapes remain intact, and high-intensity fires are replaced by more frequent, low-intensity events, the Water Board needs to develop policies and permits that support rather than interfere with efforts by others to reintroduce fire and forest thinning practices, including support for forest product infrastructure (lumber mills and biofuel-generation plants). As implementation of fuel reduction activities increase, the Water Board can make certain that these projects consider and are protective of water quality.

Much of the Lahontan Region falls within public ownership, with land use controlled by agencies including the U.S. Forest Service, National Park Service, and Bureau of Land Management, various branches of the military, the California Department of Parks and Recreation, and the City of Los Angeles Department of Water and Power. Since forested land is managed by agencies with different priorities, the Water Board can work closely with land-owners to ensure certain environmental resources are not compromised during large-scale forest management projects (water quality impairment during building of logging roads and watercourse crossings). Playing an active role with partnerships, similar to the Lake Tahoe Restoration Partnership, will ensure that multiple stakeholders can collaborate to design landscape scale restoration projects that achieve a diverse set of state priorities (fire resiliency, air and water quality improvement, sustainable recreation, increased wetland refugia).

Resource Considerations

Given that current staff resources and future funding dedicated to climate change response are limited, the Water Board acknowledges that successful implementation of the Strategy and the activities identified in the Action Plan will rely largely on (1) supporting existing partnerships, (2) leveraging the efforts of stakeholders, and (3) prioritizing which select actions within the Water Board's authority.

As we move forward to protect water quality and beneficial uses in the face of climate change, the Water Board realizes staff will only implement the actions identified in the Action Plan to the extent that available funds allow and/or we are able to redirect resources to priority work and acquire additional allocations (i.e., through a regional or statewide budget change proposal) to support work toward climate change response.

5. Adaptive Management

Our Strategy and the actions undertaken to respond to climate change impacts will be influenced by and aligned with external factors and efforts including state level legislation, parallel climate change efforts by partnering agencies, and climate science discoveries.

Aligning with new statewide laws, policies, and initiatives. The Policy Statements and Action Plan will make every effort to align with statewide initiatives, directives, strategy documents, executive orders, and resolutions related to climate change mitigation and adaptation. The development of the Policy Statements and Action Plan will align with, and address, the directives provided in the [State Board's Resolution No 2017-0012](#)

which was established to comprehensively respond to climate change by (1) acknowledging the climate change impacts to water resources across the state, (2) directing certain actions of State Board staff, and (3) encouraging certain actions of Regional Water Boards. Resolution No. 2017-0012 encourages Regional Water Boards to update plans, permits, and policies, and coordinate with other agencies to enhance ecosystem resilience to the impacts of climate change, including but not limited to actions that protect headwaters, facilitate restoration, enhance carbon sequestration, build and enhance healthy soils, and reduce vulnerability to and impacts from fires.

Appendix F provides examples of significant, existing statewide legislation, initiatives, plans, and policies with which our Policy Statements and Action Plan will align. Additionally, the Water Board will rely on legislative updates provided by the State Water Board and online databases including the [Adaptation Clearinghouse](#) to keep apprised of climate change related legislation, regulations, and mandates such as executive orders that may require us to re-examine and re-focus our proposed efforts and actions to mitigate and adapt to our changing climate.

Collaboration and Partnerships. The Policy Statements and Action Plan will efficiently move climate change mitigation and adaptation forward in the Lahontan Region by coordinating with other agencies and organizations who are also making strategic planning efforts to adapt to climate change impacts. Collaboration will be key, since the impacts of climate change in the Lahontan Region will continue to be wide and varied, cutting across political boundaries, socio-economic boundaries, and watershed and ecosystem boundaries, which will increase the complexity of responding to climate change and need for balancing competing interests.

Partnering with ongoing, established efforts will be the most effective way forward. Partners in our region are already working on water conservation, education and outreach, LID design, aquatic habitat protection programs, and infrastructure risk analysis. Appendix F summarizes some key collaboration opportunities already underway that we should explore further in order to identify specific activities that would benefit from our technical contribution, and engagement and support. While some of this collaboration is mandated for us by the State Water Board, we should focus any discretionary collaboration on regional efforts as they afford the most efficient way to reach the most stakeholders (in terms of both number and diversity.)

New Science. The Water Board supports consideration and integration of sound and current science to ensure the strategies and approaches included in the Action Plan provide sensible and efficient solutions toward protecting natural landscapes, groundwater quality and supply, infrastructure and toward promoting fire resilient landscapes. As much as reasonably possible, the Water Board encourages Staff to remain up-to-date on the latest climate science to inform changes needed to our overall Strategy. The Water Board can rely on the [Office of Environmental Health Hazard and Assessment's bibliography of climate change research](#), the [State of California's Climate Change webpage](#), and relevant region specific research to stay current on relevant climate change research and findings that should be considered as we (1) revisit our

climate change goals and priorities and (2) formulate new or more appropriate actions to achieve adaptation and mitigation goals.

6. Conclusions

The Water Board's fundamental mission is to protect water quality. We acknowledge this primary responsibility will become more challenging as water resources are exposed to the anticipated changes brought about by our warming climate and extreme weather events. The Water Board recognizes that protection of water quality and beneficial uses will only be successful if we embed climate change considerations into our regulatory programs and policies. Together, our overall Strategy, and the Policy Statements and Action Plan within, certify our commitment to an approach toward climate change mitigation and adaptation. The Policy Statements describe key goals for our agency and the overarching areas where we will focus our mitigation and adaptation efforts. Actions to move forward to protect water quality and beneficial uses and build resiliency in these critical resource sectors are presented in our Action Plan. The Action Plan proposes specific actions within the Water Board's regulatory authority that we can implement to advance progress toward climate change mitigation and adaptation.

The Strategy will be updated as we learn from new scientific discovery and the evolution of knowledge about climate change impacts on water quality, and the efficacy of actions to address these impacts. With our narrow sphere of influence compared to the far-reaching nature of climate change, continued collaboration and partnerships with our stakeholders is vital as we implement our Strategy and update our Action Plan.

Appendix A: Water Board's Strategy Development Process and Stakeholder Involvement

In 2014, after recognizing the reality of climate induced impacts occurring throughout the Lahontan Region (extended drought, less snowpack, increased threat and occurrence of wildfires) the Water Board began its initial development process that consisted of two Science and Brainstorming Public Workshops. Objectives of those workshops were achieved: (1) Participants realized the new reality that faces us with our changing climate, and (2) Public provided initial input to help shape and prioritize the Water Board's role in adapting to climate change. (See [further information about the material presented at the Science and Brainstorming Workshops held in Barstow, CA and South Lake Tahoe, CA and notes from the small group break-out sessions at the Science and Brainstorming Public Workshops.](#))

Following the initial workshops, staff presented an overview of the ideas gathered from the Science/Brainstorming public workshop to the Water Board. At that meeting, the Water Board and staff acknowledged that the Water Board is already making progress toward adapting to climate change through existing regulatory tools and policies. The Water Board also directed staff to prepare a Strategy to guide our adaptation and mitigation efforts throughout the Lahontan Region.

Staff identified existing regulatory tools and programs in place to formulate a [Conceptual Model](#) that identified strategies to adapt to climate change, and gaps that needed further attention. Through a web-based survey and a series of three public outreach meetings, staff received additional public and stakeholder feedback to further refine the strategy that the Water Board could implement to respond to climate change. (Further information about the web-based survey is available on our Climate Change Program Page by viewing the [Survey Results](#) presented at the January 11-12, 2017 Water Board Meeting in Apple Valley, CA and by viewing Appendix G of the [Water Board's May 2017 Staff Report on Developing a Climate Change Mitigation and Adaptation Strategy for the Lahontan Region.](#)

Through the public participation process, together the staff distilled over 400 initial ideas to identify three overarching areas where the Water Board should focus efforts: (1) protection of infrastructure and critical recharge areas, (2) protection and restoration of wetlands, floodplains, and headwaters, and (3) increasing stormwater capture and infiltration and low-impact development.

The initial focus areas were presented to the Water Board and the public in May of 2018. Based on (1) direction from The Water Board, and (2) newly released state issued rules (Executive Order SB-52-18 - Forest Carbon Plan) and requirements to implement components of regarding vegetation management and wildfire prevention and recovery as prescribed in Senate Bill 901(Chapter 626, Statutes of 2018) the initial

focus areas were further refined into the four critical resource areas included in the Strategy as it is presented today.

Stakeholder Involvement in Developing the Strategy

Acknowledging that the Water Board is part of a large network of individuals and agencies responding to climate change, stakeholder involvement was the cornerstone of the Strategy development process. The Water Board first provided opportunities for public input at two public technical workshops and encouraged additional stakeholder input by circulating an online survey and hosting several outreach meetings throughout the region. This robust stakeholder involvement process is depicted in the figure below.

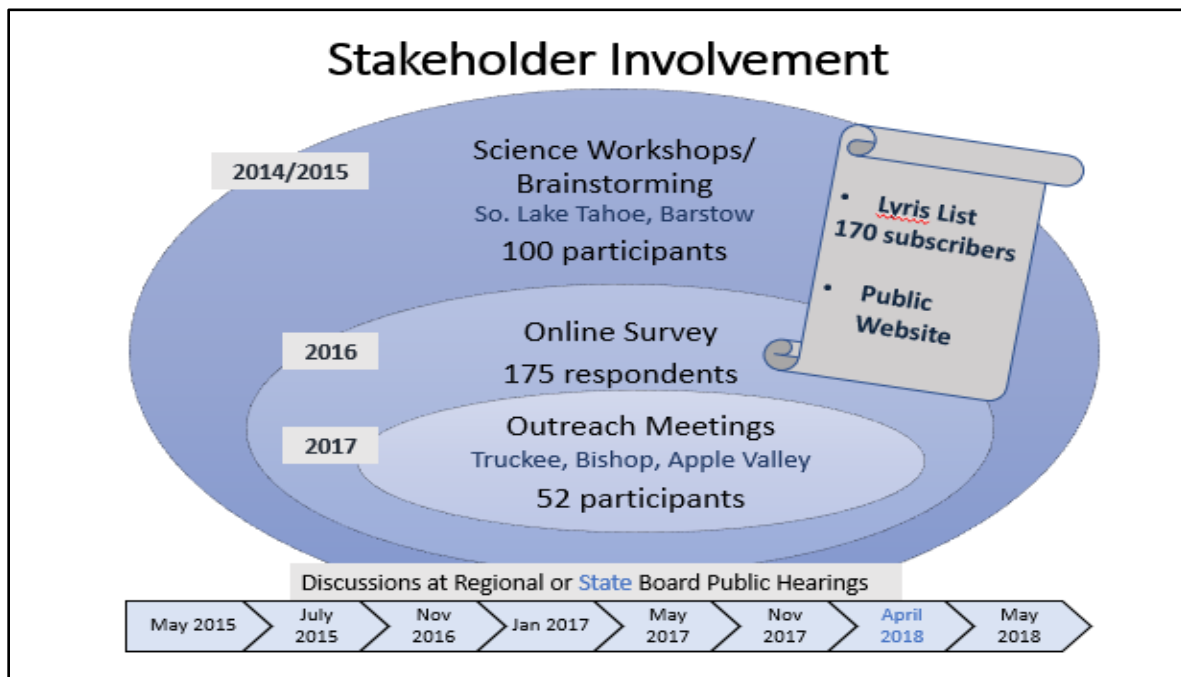


Figure: Stakeholder Involvement the Cornerstone of Our Process

Throughout every step of the process, staff synthesized the top priorities, messages, and ideas. This input guided staff to identify critical resource areas that the Strategy should address and to develop key goals to guide successful implementation of the Strategy.

Appendix B: Chronology of the Strategy Development Process

The Water Board's effort to develop the Strategy has been a collaborative and transparent effort, which is reflected in the activities listed below. The following table contains a chronology of the events intended to gather and process information/ideas as part of the Water Board's effort to develop its climate change Strategy. Further details regarding all of the events, outreach meetings, board presentations, and reports mentioned below can be downloaded from the [Water Board's Climate Change Adaptation Program Page](#).

Table: Chronology of Water Board's Strategy Development Activities

Date	Event
Nov. 2014	Staff hosted the first Climate Change Adaptation Public Workshop in Barstow, California. Climate change experts presented the latest research regarding anticipated climate change effects in the Lahontan Region to over 100 attendees. Attendees provided ideas regarding potential adaptations/responses (regulatory, policy, coordination with stakeholders, education, etc.) to climate change.
Jan. 2015	Staff hosted second Climate Change Adaptation Public Workshop in South Lake Tahoe, California, which was similar in attendance, content, and format to Nov. 2014 workshop.
May 2015	Staff presented summary of public ideas generated from the Nov. 2014 and Jan. 2015 public workshops to the Water Board. Water Board directed Staff to prepare a Climate Change Mitigation and Adaptation Strategy (Strategy) to guide our adaptation efforts throughout the Lahontan Region and at the local level.
Jul. 2015	Staff presented Climate Change Conceptual Model and Adaptation Strategy. Water Board provided direction.
Dec. 2015	Three internal staff Climate Change Working Groups formed and began meeting: Infrastructure, Storm Water and Low Impact Development, and Wetlands and Floodplains.

Date	Event
Aug. 2016	Staff widely distributed Climate Change Survey to Email Subscription Lists and other interested persons. Survey is posted on the Climate Change page of the Water Board’s web site.
Aug. – Oct. 2016	Staff attended outreach meetings with a variety of stakeholder groups to encourage stakeholder participation with survey, and to solicit input.
Nov. 2016	Staff discussed online Climate Change Survey, prioritizing potential climate change-related actions, and next steps in developing a climate change mitigation and adaptation strategy. Water Board provided direction.
Jan. 2017	Staff provided preliminary observations regarding the Climate Change Survey results and proposed a revised schedule for developing a climate change mitigation and adaptation strategy. Water Board established a Climate Change Subcommittee and provided direction.
May 2017	Staff presented a Climate Change Staff Report that provided information on the input received from outreach workshops in 2014 and from an online survey in August 2016. Water Board supported plan to hold outreach meetings throughout the region to solicit public input on various options the Water Board should pursue to adapt to climate change.
Sept. 28 – Oct. 10, 2017	Staff conducted three public outreach meetings (Truckee, Apple Valley, Bishop) to gather input on various options the Water Board could prioritize for adapting to climate change.
Nov. 2017	Staff presented the key messages learned from the three public workshops that were held throughout the Lahontan Region.
May 2018	Staff provided an update about existing and completed climate change response actions, and those that were planned. Three critical

Date	Event
	<p>areas: (1) infrastructure protection, (2) protection and enhancement of wetlands, floodplains, and headwaters, and (3) protection of groundwater and critical recharge areas were presented as areas the Water Board could prioritize its climate change response and mitigation efforts. Staff also provided information on how tasks proposed in the Strategy align with the State Board’s Comprehensive Response to Climate Change as resolved in State Board Resolution 2017-0012.</p>
<p>Sept. 2018</p>	<p>Staff posted relevant regional climate information on its Climate Change Adaptation webpage. Information includes California’s Fourth Climate Change Assessment released (Aug 2018) and region-specific reports that include climate science, impacts, and adaptation information pertaining to communities and land areas with the Water Board’s regional boundary. Findings of the regional reports are used to inform the sensitive ecosystems and vulnerable sectors that the Water Board will direct its climate change efforts.</p>
<p>Jun. 2019</p>	<p>Staff presented a Draft Staff Report of the Climate Change Mitigation and Adaptation Strategy which included a summary of the key policy statements and an action plan framework that will form the basis of the proposed Strategy. Key policies statements focused on the following critical resource areas: (1) Protection of Wetlands, Floodplains, and Headwaters, (2) Infrastructure Protection, (3) Protection of Groundwater Quality and Supply, and (4) Protection of Headwater Forests and Promoting Fire Resiliency. Staff considered comments and Board input to improve the content of the Strategy and additional language has been incorporated into the Final Strategy that will be presented for the Water Board’s consideration at the November 2019 Water Board meeting.</p>

Appendix C: Anticipated Regional Climate Impacts

The latest climate science and research throughout the Lahontan Region indicates that our changing climate has the ability to adversely affect the quality and quantity of water within the Lahontan Region, and these climatic changes must be considered to effectively protect water quality and the beneficial uses of water. The findings presented below validate and provide emphasis to the Water Board's direction to concentrate our initial climate change response efforts toward protecting select sensitive ecosystems and vulnerable sectors.

During regional workshops held in 2014 and 2015, climate researcher, Dan Cayan, PhD and hydrology researcher Michael Dettinger, PhD, both with Scripps Institute of Oceanography and the United States Geological Survey presented scientific and technical information indicating the Lahontan Region could expect warmer air and water temperatures, more severe flood events, and a decreasing snowpack in the Sierra Nevada mountains. The Sierra Nevada Region Report prepared as part of 2018 California's Fourth Climate Change Assessment¹ (2018 CA Fourth Assessment) presented the latest climate science relevant to ten of the twelve counties within the Water Board's jurisdiction. With Dettinger as lead coordinating author and Cayan as a contributing author, the [Sierra Nevada Region Report](#) contains the same findings presented during the regional workshops:

- (1) Mountain meadows provide important habitat, hydrological, and carbon storage functions, and intact wet meadows are important groundwater-dependent ecosystems (Policy Statement: Protection of Wetlands, Floodplains, and Headwaters).
- (2) Water infrastructure throughout the region will be stressed by extreme heat and precipitation events, especially those that cause flooding (Policy Statement: Infrastructure Protection).
- (3) Groundwater in the Sierra Nevada region is vulnerable to changes in groundwater pumping as local surface supplies deteriorate, as recharge patterns and rates change, and due to the generally smaller scale of so many of the region's aquifers (Policy Statement: Protection of Groundwater Quality and Supply).
- (4) Incidence of wildfire and drought stress will increase and carbon storage will decrease in the Sierra Nevada in the face of the projected climate forecast

¹ Dettinger, Michael, Holly Alpert, John Battles, Jonathan Kusel, Hugh Safford, Dorian Fougères, Clarke Knight, Lauren Miller, Sarah Sawyer. 2018. **Sierra Nevada Summary Report**. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-004.

(Policy Statement: Protection of Headwater Forests and Promoting Fire Resiliency).

The [Inland Desert Region Report](#)², also prepared as part of the 2018 CA Fourth Assessment, finds similar climate-induced impacts to water quality for the southern portion of the Lahontan Region (eastern San Bernardino County) as follows:

- (1) Wetland and riparian ecosystems have been impacted by lowering of groundwater levels, and impacts will continue with warming temperatures and prolonged dry periods (Policy Statement: Protection of Wetlands, Floodplains, and Headwaters).
- (2) Infrastructure for distribution and storage of energy will be vulnerable to climate change as warming temperatures damage lines and cause capacity losses. Transportation and water delivery infrastructure are possibly at risk due to impacts from extreme temperature and precipitation events including wildfire, flash floods, debris and mud flows (Policy Statement: Infrastructure Protection).
- (3) Dependence on groundwater for communities in the Mojave River watershed in the South Lahontan hydrologic region is expected to increase as ... water supplies become limited due to recent and projected severe droughts (Policy Statement: Protection of Groundwater Quality and Supply).
- (4) Wildfires may increase in the Inland Desert region, an area already prone to rapid spread of fire due to high-winds and the presence of non-native grasses, as extreme heat and extended drought promote development of threatening fuel beds (Policy Statement: Protection of Headwater Forests and Promoting Fire Resiliency).

² Hopkins, Francesca. (University of California, Riverside). 2018. *Inland Deserts Summary Report*. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-008.

Appendix D: Significant Statewide Laws, Policies, and Initiatives Related to Climate Change

1. Protection of Wetlands, Floodplains, and Headwaters



State Board Resolution 2017-0012, resolve #6 to improve ecosystem resilience by updating plans, permits and policies, and coordinate with other agencies to enhance ecosystem resilience to the impacts of climate change, including but not limited to actions that protect headwaters, facilitate restoration, enhance carbon sequestration, build and enhance healthy soils, and reduce vulnerability to and impacts from fires.

[Sierra Meadows Strategy](#) and Memorandum of Understanding between the USDS, Forest Service Pacific Southwest Region and CalTrout that formalizes a collaborative, “all-lands” approach to increase the pace and scale of meadow restoration in the Sierra Nevada to protect and restore the many functions and ecosystem services that meadows provide.

[Safeguarding California Plan: 2018 Update \(Safeguarding California Plan\)](#) acknowledges meadow restoration as a key strategy to build resilience to the threat of a hotter and drier climate and recommends state government, including the Regional Boards, advance its protection of aquatic and terrestrial ecosystem resilience, in part, by protecting and enhancing source watersheds in the Sierra Nevada. Safeguarding California also identifies that as part of on-going efforts, State and Regional Water Boards should provide ongoing support for aquatic ecosystem restoration through funding, permits, monitoring, and technical assistance on case-by-case basis.

[California 2030 Natural and Working Lands Draft Climate Change Implementation Plan \(January 2019\)](#) objectives as follows: (1) *integrate land conservation restoration, and management programs;* (2) *increase and improve conservation, restoration, and management of California’s natural and working lands, through State programs and other means, to enhance their resilience to worsening climate impacts, sequester carbon, and reduce GHGs;* (3) *Identify next steps for taking a more comprehensive approach to addressing the policy challenges facing our natural and working lands, including their contributions to achieving carbon-neutrality and meeting our long-term climate objectives.* Where applicable the Water Board will support the ongoing actions identified in the Plan to protect and restore important ecosystems will help streamline restoration and enhancement projects.

Strategies identified in [California’s 2017 Climate Change Scoping Plan](#) to enhance carbon sequestration and reduce greenhouse gas emissions that include managing forested headwaters and preserving the ability for mountain meadows in the Sierra Nevada to protect water quality and boost water storage and availability.

Directives and actions set forth in [CARB's March 2017 Short-Lived Climate Pollutant Reduction Strategy](#) required to comply with [Senate Bill No. 605](#) that target reductions in methane emissions from dairy and livestock, organic waste, and landfills.

[Recommendations developed by the Dairy and Livestock Sector Workgroup](#) to comply with requirements of [Senate Bill No. 1383](#) – Short-lived climate pollutants that advance methane reduction on California dairies and livestock operations.

2. Infrastructure Protection

Principles of the state's adaptation strategy document, [Safeguarding California Plan: 2018 Update](#), which as a long-term outcome for all California communities, strives to provide existing and built infrastructure able to withstand the projected impacts of climate change while continuing to provide essential public service.

[Climate-Safe Infrastructure Recommendations](#) provided by the Natural Resources Agency's Climate-Safe Infrastructure Working Group established under the requirements of [Assembly Bill 2800](#) to ensure that existing infrastructure is readied for future climate change impacts and investment in new infrastructure accounts for climate change from the outset.

Directive in the [State Board's Resolution 2017-0012](#) that requires Regional Water Board to work with the Division of Water Quality to evaluate and make recommendations to the State Board on the need to modify permits and other regulatory requirements to reduce vulnerability of water and wastewater infrastructure to flooding, storm surge, and sea level rise (resolved #15). Proposed recommendations in response to resolved #15 that could be incorporated into the Water Board's response efforts in this area include (1) modifying the statewide NPDES permit template to include example climate change-related language that the Water Boards may include in adopted permits, (2) adopting new, re-issued and amended permits that specifically identify proposed requirements to reduce the vulnerability of utility infrastructure and maximize the state's water supply, which could be implemented, in part, by site-specific or project-specific discharger plans (i.e., Storm Water Management Plans, Storm Water Pollution Prevention Plan and Sanitary Sewer Management Plans, and storm water capture projects) and (3) developing permitting guidance tools (Administrative Procedures Manuals) to provide guidance for addressing infrastructure vulnerability and climate change-impacts on regulated facilities.

3. Protection of Groundwater Quality and Supply

[State Board's Resolution 2017-0012 resolved # 13:](#)

Water Board will coordinate with State Board staff and relevant agencies to identify and recommend actions the Regional Water Boards could take for effective permitting of projects to develop new and underutilized water resources, expand surface water and groundwater storage where appropriate, and add operational flexibility to build and enhance resilience to impacts of climate change.

and

resolved #3: Staff will coordinate with Division of Water Quality to make annual reporting of recycled water data a requirement of waste discharge permits and water reclamation requirements where applicable.

[Executive Order B-37-16 titled "Making Water Conservation a California Way of Life"](#)

Water Board will support projects and activities that increase local drought resilience by incorporating practices to use water more wisely, eliminate water waste, and reuse water for multiple purposes where possible.

[Sustainable Groundwater Management Act \(SGMA\)](#)

Water Board will assume the responsibility to manage groundwater, which will be triggered when the deadlines of SGMA are not met locally, or DWR determines a local plan is inadequate and/or local implementation of the plan is unsuccessful. (If required, this responsibility would not come into effect until 2022, when the high and medium priority groundwater basins are required to submit Groundwater Sustainability Management Plans.)

[State Board's Recycled Water Use Policy](#) (as amended December 2018)

Through its permit review and issuance process the Water Board will support the statewide goals and mandates for recycled water use and the development of underutilized water resources (e.g. stormwater reuse and capture) to address the effects of climate change, drought, and water supply uncertainty while protecting water quality, human health, and the environment.

Key requirements of the State Board's Recycled Water Policy involve identifying ground water basins where salt and/or nutrients are a threat to water quality and developing salt and nutrient management plans for these basins to achieve water quality objectives in the long-term. For ground water basins identified as threatened by salt and nutrient discharges, the Water Board will continue its responsibility to work with stakeholders (water and waste-water districts, integrated regional water management groups, regional salt and nutrient dischargers) on their development of an effective, locally driven and controlled, salt and nutrient management plan that will achieve basin-wide management of salts and nutrients.

[State Board's - Division of Water Quality Strategy to Optimize Resource Management for Stormwater - April 2018](#) (STORMS, or Storm Water Strategy)

The STORMS Strategy identifies actions needed for the State and Regional Boards to improve the regulation, management and utilization of storm water to promote its use as a resource that when managed properly can provide multiple benefits including pollutant control and improved water quality, increased water supply, and healthier ecosystems. The Water Board will emphasize storm water capture and use, low impact development (LID), and local and regional water management through permit requirements (e.g., post-construction requirements), policy development (LID guidance), and continued and expanded coordination with healthy watershed stakeholder groups including Integrated Regional Water Management Groups.

4. **Protection of Headwater Forests and Promoting Fire Resiliency**



[State Board's Resolution 2017-0012 resolved # 14](#) which encourages Regional Water Boards to work with California Department of Forestry and Fire Protection, federal land management and other relevant agencies to restore and maintain healthy watersheds, reduce vulnerability to catastrophic fires, and support resilience in recovery efforts.

Orders prescribed in [Executive Order B-52-18](#) and its accompanying Forest Carbon Plan including those to double the total statewide rate of forest treatments (thinning, controlled fires, reforestation) within five years to at least 500,000 acres per year, implement the forest practices outlined in the Carbon Forest Plan, and provide regulatory relief for timber harvesting projects by synchronizing and expediting the regulatory review of permits.

Opportunities identified in the May 2018 [Carbon Forest Plan](#) for multi-agency and stakeholder collaboration to establish healthy and climate-change resilient forests that serve as reliable long-term carbon sinks, rather than greenhouse gas and black carbon emission sources.

Efforts underway by the Office of Emergency Services' Emergency Response Technical Working Group (ERTWG) to improve communication and coordination of multi-agency roles and responsibilities to improve preparedness and efficacy of emergency response and post-fire recovery.

Obligations of [Senate Bill 901 – Implementation for Wildfire Prevention and Recovery](#) including permit development and outreach for utility corridor vegetation and wildfire management; inspections and report reviews for forestland and utility corridor projects, revision or development of new regional permits to facilitate timber harvesting under Forest Practice Rule exemptions while ensuring water quality impacts are mitigated; inspections, data gathering and reporting of exemption use and efficacy in coordination with California's Department of Forestry and Fire Protection (CAL FIRE).

Strategies identified in [California's 2017 Climate Change Scoping Plan](#) to enhance carbon sequestration and reduce greenhouse gas emissions.

Goals established for wildland fire prevention described in the 2019 [Assembly Bill 616 \(California Forest Carbon Plan Report\)](#).

Appendix E: Key Climate Change Efforts Already Underway by Regional Partners and Opportunities for Water Board to Collaborate

California Jurisdictions – Cities, Towns and Counties

The Governor's Office of Planning and Research (OPR) maintains a list of plans and initiatives adopted, completed, in progress or planned by California jurisdictions to address climate change. This list was last updated in March 2018. The plans and initiatives vary by jurisdiction and can include vulnerability assessments, GHG Emissions Inventory, Climate Action Plans, Adaptation or Resilience Plans, Sustainability Plans, General Plan Policy, General Plan Implementation Measures, Codes or Ordinances. To get an overall sense of how many jurisdictions are addressing climate change in their planning documents please review the [2018 Annual Planning Survey Report](#). For particular information regarding each jurisdiction, please see the published [excel document](#).

Regional Efforts

Several key regional climate adaptation efforts provide opportunities for collaboration, to exchange knowledge, and to engage in targeted problem-solving:

- The Integrated Regional Water Management (IRWM) process is an effective tool to accomplish integrated water management at the Regional level. Currently, six IRWM areas are established within the Lahontan Region: Lahontan Basin, Tahoe Sierra, Inyo Mono, Antelope Valley, Mojave and Fremont Basin. We should continue to participate in these integrated efforts as the IRWM groups are best suited to address many of the impacts associated with climate change such as limited water supplies, aging infrastructure, drought, flooding, and also to develop regionally tailored solutions. Additionally, as IRWMs are comprised of a broad diversity of members and serve as a bridge into communities, our participation affords us effective and efficient access to our stakeholders for outreach and other important communications.
- The Alliance of Regional Collaboratives for Climate Adaptation (ARCCA) is a network of leading regional collaboratives from across California that work together to advance adaptation statewide and increase local capacity to build community resilience. Under the ARCCA umbrella are two regional collaboratives with substantial geographic overlap in the Lahontan Region – the Sierra Climate Adaptation and Mitigation Partnership (Sierra CAMP) and the Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC.) Both Sierra CAMP and LARC work to identify, and help local communities overcome, barriers to implementation of climate adaptation practices. This is an opportunity for us to collaborate with Sierra CAMP and LARC to address any barriers within our ability to remove or modify.

- The Sierra Water Workgroup's mission is to assist efforts in the Sierra region to protect and enhance water quality, water supply, and watershed health; to develop cooperative regional responses; and to facilitate reinvestment in Sierra watersheds and water resources by all beneficiaries. We are working with the Sierra Water Workgroup to coordinate advocacy for Cap-and-Trade Investments in the upper watersheds of the Sierra and to ensure that the Sierra region continues to be competitive in the Cap-and-Trade Program and the Greenhouse Gas Reduction Fund (GGRF.) For more about the Cap-and-Trade Program and the GGRF, please see the following section Funding Opportunities.
- The Sierra Meadows Partnership (SMP) was formed to foster effective collaboration among partners currently engaged in meadow conservation to increase the pace, scale and efficacy of meadow restoration and protection in the Sierra. The composition of the SMP thus far has included stakeholders from non-profit and for-profit natural resource organizations, public natural resource agencies, academia, and funding institutions. It remains open to new partners. The SMP recently completed *The Sierra Meadows Strategy* outlining an approach with an overarching goal of restoring and/or protecting 30,000 acres of meadows on both public and private lands in the Sierra Nevada. Becoming a partner and/or other collaboration with the SMP is an opportunity for us to progress with our efforts to enhance and sustain meadow functions in our Region's ecosystems.
- The California Tahoe Conservancy (CTC) is working with state and regional partners to develop an interagency Climate Adaptation Action Plan (CAAP) to enhance Tahoe Basin's ability to adapt to climate change. The Water Board will continue to partner with and contribute to CTC's effort toward a framework for integrating climate resilience into the Basin's planning and investment programs.

Other Key Stakeholders

There are many other types of stakeholder efforts underway that may benefit from our engagement and support, and in turn, further our climate adaptation efforts.

- The National Ski Area Association (NSAA) Climate Challenge includes participation from several ski resorts in the Lahontan Region including Boreal, Mammoth and June Mountains, Squaw Valley, and Alpine Meadows. It is a voluntary program designed to recognize ski areas that are committed to reducing their climate impact. Challengers do this by inventorying and reporting on their carbon footprints, setting goals for carbon reduction, implementing at least one on-site carbon reduction strategy per year, and engaging in climate change advocacy efforts. Vail Resorts, which owns and operates Heavenly Mountain Resort and Northstar-at-Tahoe is pursuing a comprehensive sustainability commitment, called "Epic Promise for a Zero Footprint." The project commits to zero net emissions by 2030, zero waste to landfills by 2030 and zero net operating impact to forests and habitat.

- Utility districts across the Region are implementing a variety of climate adaptation strategies focusing on education, legislation, conservation and communication that afford opportunities for our participation and support. Examples include incentive programs offering rebates for turf replacement or low flow toilets, establishing water-wise demonstration gardens, restricting landscape watering, and education about controlling dog waste impacts, aquatic invasive species, and shoreline algae.
- Schools across the Region are implementing a variety of climate adaptation strategies that focus on traditional and “hands on” education that would benefit from our support and participation. Some examples are establishing school gardens, schoolwide energy audits conducted by students, participating in programs such as CoolCalifornia or Unscrew America (“change a light bulb, change the world”) and implementing climate change curriculum developed by the Education and the Environment Initiative of CalEPA and CalRecycle, or the *Climate Change, Wildlife, and Wildlands Toolkit for Educators* from the USEPA.

Appendix F: References

1. [Water Board's Draft Staff Report on Developing a Climate Change Mitigation and Adaptation Strategy](#) (May 2017). Includes the following appendices:
 - A. First Update to the Climate Change Scoping Plan, Executive Summary
 - B. Executive Order B-30-15
 - C. Short-Lived Climate Pollutant Reduction Strategy, Executive Summary
 - D. Executive Order S-13-08
 - E. State Water Resources Control Board Resolution No. 2007-0059
 - F. State Water Resources Control Board Resolution No. 2017-0012
 - G. Water Board Climate Change Adaptation Survey Results
2. [Sierra Meadows Strategy](#)
3. [Safeguarding California Plan: 2018 Update](#)
4. [California 2030 Natural and Working Lands Draft Climate change Implementation Plan](#) (January 2019)
5. [Short-Lived Climate Pollutant Reduction Strategy](#) (California Air Resources Board, March 2017)
6. [Senate Bill No. 605](#) : Lara. Short-lived pollutants (Chapter 395, Statutes of 2014)
7. [Recommendations Developed by the Dairy and Livestock Sector Workgroup](#) (November 2018)
8. [Senate Bill No. 1383](#) Lara. Short-lived climate pollutants: methane emissions: dairy and livestock: organic waste: landfills. (Chapter 395, Statutes of 2016)
9. [Executive Order B-52-18](#): Forests (May 2018)
10. [Report of the Climate-Safe Infrastructure Working Group to the California State Legislature and the Strategic Growth Council](#) (September 2018)
11. [Assembly Bill 2800](#), as amended, Quirk. Climate change: infrastructure planning (Chapter 580, Statutes of 2016)
12. [Executive Order B-37-16](#) : Making Water Conservation a California Way of Life (May 2016)

13. [Sustainable Groundwater Management Act](#)
14. [State Board's Recycled Water Use Policy](#) (as amended December 2018)
15. [State Board's Strategy to Optimize Resource Management for Stormwater – Enhancing Stormwater Capture and Use](#) (April 2018)
16. [California Carbon Forest Plan](#) (May 2018)
17. [Senate Bill 901 – Implementation for Wildfire Prevention and Recovery](#) (Chapter 626, Statutes of 2018)
18. [California's 2017 Climate Change Scoping Plan](#)
19. [Assembly Bill 616, Patterson. California Forest Carbon Plan: report](#) (Chapter 8, Statutes of 2019)