



Eastern Sierra Tribal Listening Session: Summary
Indicators of Climate Change in California
August 5 & 6, 2020
9:00 am – 1:00 pm

Participating Tribes:

- 1) Bishop Paiute Tribe
- 2) Big Pine Paiute Tribe of the Owens Valley
- 3) Antelope Valley Indian Community (Coeville Paiute)
- 4) Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation
(sent email)
- 5) Mono Lake Kutzadika'a
- 6) North Fork Rancheria of Mono Indians of California
- 7) Paiute-Shoshone Indians of the Lone Pine Community
- 8) Southern Sierra Miwuk Nation
- 9) Tübatulabal Tribe
- 10) Washoe Tribe of California and Nevada

Background

The Bishop Paiute Tribe and the CalEPA Office of Environmental Health Hazard Assessment (OEHHA) jointly convened a listening session with Eastern Sierra tribes. The listening session had the following objectives:

- Listen to perspectives from tribal communities in the Eastern Sierra on climate change impacts they are experiencing and identify common themes
- Collect tribal input to help the OEHHA *Indicators of Climate Change in California* report raise awareness about tribal-specific climate change impacts and increase recognition of the value of tribal knowledge in reporting climate change impacts

The listening session was held virtually (via zoom and conference line). Prior to the listening session, participants were surveyed to help OEHHA understand the issues the Eastern Sierra Tribes were facing. General themes from the questionnaire are provided in Appendix A.

OEHHA respects the right of tribal nations to govern the collection, ownership, and application of their data. Participating tribes have reviewed and approved the information shared in this summary. Permission to share the following information was obtained from each tribe.

Welcome, Introductions, and Indicators of Climate Change Report Presentation

Brian Adkins, Environmental Director for the Bishop Paiute Tribe, welcomed participants to the listening session. Brian described that the session would focus on hearing about climate change impacts participants have experienced, for example an invasive plant where native grasses had been, an important species that can no longer be relied on, or a cultural practice that has changed as the climate has changed.

Lauren Zeise, OEHHA Director, welcomed the tribes and thanked the Bishop Paiute Tribe for organizing the listening session.

Bennett Lock and Laurie Monserrat (OEHHA) gave a brief overview of the Climate Change Indicators report and OEHHA's work to include tribal perspectives in the report.

A full participant list is included in the appendix.

Introductory Comments from Each Tribe: Background and Impacts

All participating tribes were invited to share introductory comments, which served as the starting point for further discussions. The introductory comments included background information and descriptions of some important climate change impacts. These introductions are summarized below.

Bishop Paiute Tribe

Brian Adkins (Environmental Director), Monty Bengochia (Tribal Historic Preservation Officer), Emma Ruppell (Air Quality & Meteorology Specialist), BryAnna Vaughan (Water Quality Coordinator)

The Bishop Paiute Tribe is a federally recognized tribe currently located in Inyo County at the foot of the Eastern Sierra Nevada mountains, just west of the city of Bishop. They are the fifth largest tribe in California with ~2,000 enrolled members and 879 acres. The Bishop Tribe Environmental Management Office (EMO), was established in 1996 by Alan Spoonhunter, and has served the Bishop Paiute Reservation and neighboring communities for over two decades. The EMO operates under a Tribal Environmental Protection Agency (TEPA) Board and includes an Air Quality Program, a Water Quality Program, a Natural Resources Program, and a Food Sovereignty Program. The Tribe has begun working on a climate adaptation plan.

The Tribe has two distributary creeks, which the Tribe monitors, that come out of the Sierra Nevadas and flow through the reservation. Additionally, there is a wetland in the southeast corner of the reservation. Tribal lands are on the Bishop Cone, an area of slightly higher groundwater levels in the northern part of Inyo County.

In the early 1900s the Los Angeles Department of Water and Power (LADWP) began pumping water from the Owens Valley to Los Angeles. This anthropogenic climate change event has intensified the effects of climate change impacts such as drought in the Eastern Sierra.

Some related impacts the Tribe is experiencing include:

- Streams in Owens Valley are drying earlier, and springs are disappearing

- In the Yosemite area, stream temperatures are increasing, and the Tribe is seeing an impact on the numbers of native fish such as salmon and Paiute cutthroat trout
- Increase in invasive non-native species such as rainbow trout, largemouth bass, catfish, perch, and others that were introduced by humans
- Reduced native desert fish (such as Owens pupfish, Owens speckled Dace, Owens tui chub, Toikona tui chub, Owens sucker). These fish are culturally important to the Paiute people.
- Increase in invasive species (such as bullfrogs and mud snails)
- Increasing bacteria levels (E. coli, cyanobacteria) in surface waters of reservation

Climate change impacts to the Bishop Tribal lands in the Eastern Sierra have impacted wildlife, native vegetation, and culturally important foods such as pine nuts and acorns. Drought in the area, along with beetle infestations, have caused an increase in tree mortality. The build-up of dead trees in the National Forest area at Indiana Summit and increase of perennial weeds (e.g., Pepperweed), grasses, and other flashy fuels has increased the fire danger over time. Sporadic heavy rains in the winter and spring increase the growth of grasses which dry and become fuel in the hot summers. During the 2019 fire season, the overlap of smoke from fires and dust from windstorms caused a build-up of PM10 that was documented by the Bishop Air Quality Program.

The Tribe has seen the local vegetation change from water-loving plants to shrubs. They have also seen an increase in invasive and non-native species such as:

- Barred Owl
- Black Witch moth (native to Mexico)
- Invasive weeds such as Pepperweed, Cheatgrass, Aster, and Tumbleweed

Big Pine Paiute Tribe of the Owens Valley

Sally Manning (Environmental Director), Danelle Gutierrez (Tribal Historic Preservation Officer), Noah Williams (Water Program Coordinator), Noelani In The Woods (Youth Employment Program)

The Big Pine Paiute Tribe is federally recognized with a reservation located adjacent to the town of Big Pine (about 18 miles (29 km) south of Bishop), at the eastern base of the Sierra Nevada mountains.

Observations by the Big Pine Tribe are consistent with what other Eastern Sierra tribes are seeing. Climate change is impacting everything from plants to animals.

In 1859, one of the first white explorers in the Owens Valley, Captain John Davidson, wrote glowing reports about the amount of water in the Valley and remarked on the green grasses, despite being there in August when California is typically fairly dry. Many of the meadows, and ground water that supported them, are gone now due to pumping by the Los Angeles Department of Water and Power.

The Tribe emphasized the need to bring water back to the land. They have observed glaciers shrinking, land eroding, mountain springs drying. In addition, man-made diversions and pumping water adversely impacts fish, animals, and the people.

A Tribal member shared, when they were young, they would travel with family through the backroads. When they were thirsty, they could pull over and find fresh spring water. When they take children out today, there is only the memory of the spring that used to be there.

The movie *Paya* describes the way tribal people would use and divert water. When water was diverted into a new channel, fish from the drying channel were harvested.

Vegetation changes have also been observed in the Eastern Sierra. The Big Pine Paiute Tribe noted the following changes:

- Conifers are moving downslope¹ to where sage brush grows.
- In Owens Valley, meadows have been replaced by sagebrush and other native or non-native species that are opportunistic, like rabbitbrush, saltbush, or stands of nonnative species which often establish a monoculture (dominated by a single species of shrub or weed).

The Tribe has observed, climate change is affecting everything in the valley (plants, animals) – these areas need to be preserved and protected. People need to understand the value of Mother Earth. The lands never forget, the plants never forget.

Coleville Tribe (Antelope Valley Indian Community)

Gracie Dick (Cultural Monitor)

The Antelope Valley Indian Community, or Coleville Paiute Tribe, is a non-federally recognized tribe in northern Mono County. Gracie Dick, the Tribe's cultural monitor, is a gatherer and fisher who hikes and camps in the mountains. She still prepares and cooks traditional foods. Ms. Dick speaks the Mono Lake language and goes on the traditional walk from Mono Lake to Yosemite.

The Coleville Tribe has observed the drought is coming. Water is already drying up in the mountains. Pine trees are moving downslope because they need water.

The Tribe has seen changes in wildlife and local vegetation such as:

- Animals such as mountain lions and bears are coming down to lower elevations
- Reduction of native food species such as jack rabbits, cotton tail rabbits, and quail
- Reduction in deer populations
- Reduction of piñon pine (pinyon), other pine species, and juniper (commercialization of pine nuts is also a factor)

Tribal members now go into stores to buy food because not enough traditional foods are available.

Traditional gatherings are reduced and cultural ceremonies requiring fire must be postponed or cancelled, some due to COVID-19.

¹ See Appendix C for a more detailed explanation.

Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation *Sean Scruggs (Tribal Historic Preservation Officer)*

The Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation is a sovereign nation and a federally recognized tribe of Paiute people in the Owens Valley, in Inyo County, eastern California.

Mr. Scruggs was unable to attend the listening session, so he submitted the following statement by email ahead of the meeting. The statement was shared aloud during the meeting by Julia van Horn, facilitator from the Consensus and Collaboration Program. He also submitted a response to the questionnaire, which is included in the summary of themes at the end of this summary.

“Manahuu,

It has been acknowledged that Paiutes have lived in the Owens Valley for more than 14,000 years.

For thousands of years our people have kept nature in balance by living in harmony with nature and the spiritual world.

Beginning in the 1850’s our way of life changed almost overnight. Settlers worked to change boundaries and shifted our ancestors from our native homes.

Soon afterward by 1862 the U.S. Cavalry worked systematically to destroy our way of life by confining our people to geographical areas and breaking up families.

Next the valley was changed forever by the theft of water by LADWP that led to climate change that robbed our valley of precious water.

Today our culture is fragmented and left in ruins. The climate has changed in ways that are beyond description. Natives are no longer able to commune with nature or care for the environment the way our ancestors could.

The Fort independence Paiute Tribe is small with 84 members. Our birth rate is low, and we face extinction based on blood quantum because our way of life was so drastically altered.

We face climate issues, cultural issues and a myriad of issues that are spiritually related.

Language preservation is difficult as is practicing our cultural ways.”

Mono Lake Kutzadika’a

Charlotte Lange (Chairwoman), Jocelyn Sheltraw (Cultural Preservation Association Chair)

The Mono Lake Kutzadika’a are a non-federally recognized tribe. Historically the Kutzadika’a traveled between the Hetch-Hetchy/Yosemite Valleys and the Mono Lake Basin in a seasonal cycle. Currently the Tribe is in Lee Vining. They have seen many of the same climate change impacts mentioned by other tribes. The Tribe consists of four families that live all the way around the lake and are part of seven affiliated tribes in Yosemite. The Mono Lake area is becoming a dustbowl instead of the lush area it traditionally was. Air quality has declined. Lake levels continue to drop, and bacteria levels are rising.

The Tribe has had to sue LADWP to ensure there is enough water for the brine shrimp, a culturally important species, to survive in the lake. The Kutzadika'a have also noticed species such as mountain lion coming down to lower elevations.

Piñon Pines are being impacted and moving.

Drought and fires have exposed and disturbed cultural artifacts, leaving them in the open to be destroyed by non-natives. Mono Lake is a cultural resource site that has been desecrated by visitors with no respect for artifacts; tourism has also had adverse impacts on the area. The Tribe is concerned about the impacts of the planned Lake Sherwin trail. They have experienced a loss of gathering areas and a reduction of access to culturally important plants and animals.

The Kutzadika'a work to clear fire fuel from the area and from creeks to mitigate the risk from fire.

Using Native names for species should be done as much as possible. "Nanika" – we all grow together.

North Fork Rancheria of Mono Indians of California

Christina McDonald (Environmental Director)

The North Fork Rancheria, like other tribes, is acclimated to climate change. Still, these changes are increasing and impacting Tribal life.

Flooding impacts the gathering of materials and reduced water resources impact the Tribe. Large scale fish die-offs have been an issue in the North Fork area. Creek flows are lower than normal, impacting all aquatic life.

Wildfires in the area have contributed to poor water quality and impacted aquatic life due to soot and sediment flowing into waterways. Culturally important sites have been exposed due to wildfire.

Mono Hot Springs, a culturally important location, has also been impacted. The pH and temperature of the springs are changing. The 2018 report "[Monitoring Thermal Springs to Improve Land Management Decision Making Sierra Nevada California](#)" documents these changes.

Drought has reduced the availability of materials needed for basket-making. This impacts the cultural health of the Tribe as cultural practices cannot be passed on to younger generations. Native plants require an ecosystem that is disappearing. Once a species is impacted or eliminated, the animals and other plants around it are impacted as well.

All of this has caused a reduction or loss of traditional foods and a loss of income for tribal members and traditional practitioners.

Cultural ceremonies have also been impacted. The North Fork Rancheria has seen a reduction in the number of days in which they can conduct cultural burning and fire ceremonies.

Paiute-Shoshone Indians of the Lone Pine Community

Mel Joseph (Environmental Director)

The Paiute-Shoshone Indians of the Lone Pine Community is a federally recognized tribe, currently residing on the Lone Pine Paiute-Shoshone Reservation, in the southern portion of the Owens Valley between the Sierra Nevada and Inyo Mountains, at the base of Mt. Whitney, approximately 200 miles north of Los Angeles and 60 miles south of Bishop.

The Lone Pine Tribe has a new Climate Change Adaptation Plan and addresses climate change in their events and programs.

The Tribe has seen changes in precipitation and snowpack. Normal rainfall for the area is 4.5 inches and the normal snow fall is 25 feet per year. Now more water is falling as rain and there is a decrease in snowpack.

Fire season in the area is more intense and longer than it traditionally has been.

Los Angeles Department of Water and Power's water export activities in the Owens Valley caused the desiccation of Owens Lake and the resulting dust is the largest source of particulate matter (PM 10) in the nation.

The Lone Pine Paiute are also seeing:

- Increased severe weather
- Increased subsidence
- Increased erosion
- Increased flooding
- Decreased groundwater and water available for Tribal use; groundwater pollutants are becoming more concentrated
- Impacts on water-loving vegetation and wildlife habitat

Southern Sierra Miwuk Nation

Bill Leonard (Chairman), Clay River (Managing Director)

Traditional lands of the Southern Sierra Miwuk Nation include the top of the Sierra Nevadas to the San Joaquin River. Lots of native people still live in this area. While their homelands include Yosemite, they extend beyond that area as well.

Since 1982 the Southern Sierra Miwuk have petitioned for federal acknowledgment. Ancestors signed treaties with the federal government during the Gold Rush. These treaties were hidden away and left unratified leaving the Southern Sierra Miwuk Nation landless.

Changes to the climate affect the entire environment and these changes are happening more rapidly. By the end of summer things are hot and dry and it has worsened in the past five years.

Chairman Leonard shared the following observations, informed in part by personal observations since the 1950s and 1960s:

- Creeks and streams are drying earlier, impacting rainbow trout and salmon, which need cold water to survive.
- Wetlands are dried up now, affecting plants that grow in the Mariposa area.
- Rain patterns have changed: in the past there was rain throughout spring and even summer. Recently, there have been periods of heavy rain, followed by prolonged dry periods.
- Flooding resulting from heavy rains limit access to certain culturally important areas.
- During heavy rains, water runs off and does not percolate into the water table, so the water table is dropping. As creeks and streams get deeper, water no longer flows onto meadows. The absence of beavers on the waterways also contributes to this dynamic. In the past, beaver dams allowed water to flow over from the creek or stream onto the meadow. The Tribe is collaborating with National Park Service and Sierra Foothill Conservancy for land management and restoration efforts, using logs and brush to dam streams and creeks so that water levels can rise and native meadow plants (which need water) can start growing again.
- With drying, some meadows have become completely taken over by star thistle.
- Glaciers in the high country have been melting. In the past, during the traditional walk from Yosemite Valley to Mono Lake, there would be a significant amount of snow along Mono Pass; there is not much snow there these days.
- With warming waters, salmon are at risk. They rely on water temperature, taste, and smell to navigate back home. Releases of cold water below dams have affected their ability to find their way upriver. Salmon are also migrating at a younger age than they did traditionally. Last year, cold water was released twice into the hatchery at Merced River instead of once and as a result salmon started coming up earlier. Dams built along rivers have stopped migration of salmon up to higher country. Fifteen to twenty years ago there were a lot of salmon coming up the river, and now this does not happen as often (although last year was a good year). Salmon in the high

country are reliant on cold water releases, which are driven by human demand (for example, to meet the need of farmers) not the needs of the salmon.

- Snakes (mostly rattlesnakes) are hatching earlier in the Mariposa area.
- Oaks are dying due to loss of water which led to beetles and mistletoe outbreaks in oaks.
- In the past ten years, there has been a significant loss of conifer trees in the San Joaquin Valley and Mariposa.
- The growing season is shortened, trees and plants are going dormant before reaching maturity.
- Buckeye trees are losing leaves and turning brown in July due to lack of water.

Fire is a traditional Native tool for managing landscapes. To do any prescribed burning, there must be clearing first. Thirty years ago, non-indigenous scientists did not think burning was a good idea and instead suppressed fire. Though there is now recognition of the benefits, the fuel load has become too large and the climate has changed. Care needs to be taken to clear the excess fuels and burn at the correct time.

- The Southern Sierra Miwuks were working to use controlled burns to clear a meadow area of star thistle. They did this for two years but were unable to get a permit the following year and the thistle has returned.
- Some plant species, such as Native Tobacco, grow well after a fire, but this is not true for all species. Care needs to be taken to use fire as a tool.

The spiritual and cultural health of the Southern Sierra Miwuk Nation has also been impacted by climate change. Chairman Leonard described several impacts he has seen:

- Acorns, important for survival and food because it was easy to store, are less abundant.
- Elderberries are not as robust as they have been. The Elderberry is used for rattles, fire, food, and medicine. To make a rattle the Elderberry pith needs to be large and the cane needs to be sturdy. It is hard to find elderberry with pith large enough, likely due to lack of water. The pith is removed so that sound can come out. The larger the hole in center, the better the sound for rattle sticks. Without these instruments, the Tribe could lose their music and songs.
- Elderberries are not producing enough berries.
- When people are not connected to their culture, they do things the wrong way. For example, Soaproot is disappearing due to people gathering at the wrong time of year and overusing the resource.

Tübatulabal Tribe

Chairman Robert Gomez

The Tübatulabal Tribe is from the Kern River Valley area. They currently have around 300 members. Tribal health relies on the land, which is even reflected in the name of the Tribe, which means “pine nut eater.” The Tübatulabal tribe is seeking federal recognition.

Chairman Gomez and his Tribe have seen many of the same impacts the other tribes mentioned. In the Tübatulabal lands:

- Snowfall has been inconsistent. Normally snow falls from January through March. This year there has been little snowfall.
- Loss of snowpack has led to lands in the South Fork of the Kern River drying earlier in the season (July instead of August)
- Cyanobacteria (harmful algal blooms) in the waters of Lake Isabella due to warmer temperatures
- Reduction of Golden Trout in the south fork of the Kern River
- Deer migration has been impacted. Deer are staying up in the mountains longer.
- Bears are migrating to lower elevations in search of food
- Snakes are emerging earlier in the season
- Native Tobacco plants and salt grass are not growing well
- Pine nut harvests have been reduced for the last several years. This year may be slightly better.

The Tübatulabal have also seen impacts from tourism and over-use of the lands. People destroy pictographs, steal artifacts, destroy cultural sites, and litter.

Washoe Tribe of Nevada and California

Victoria Christensen (Executive Assistant), Herman Fillmore (Culture/Language Resources Director), Emily Luscombe (Environmental Programs Coordinator)

The Washoe Tribe of Nevada and California are a federally recognized tribe of Washoe Indians (Washiw), living in California and Nevada. The Washoe people are the indigenous inhabitants of the dewʔá:gaʔa (Lake Tahoe) area. They have existed for over 19,000 years. They speak the Hokan language which is unrelated to any of the surrounding tribes. Lake Tahoe and other areas already hold Washoe names and this needs to be expanded out of respect to the Tribe.

The Washoe are a hunting, fishing, and gathering Tribe. Washoe histories and traditions are tied to the land. The Washoe pray to water, animals, and family. The Washoe did not arrive on their lands, they are of the lands. The Tribe is determined to get land back so they can get back to gathering traditional plants and creating a sustainable environment.

As with other tribes the Washoe have observed that the snowpack has changed over time. The reduction of snowpack has impacted the local fish as riverbeds dry up. The Tribal Hunting and Fishing Department is gathering data on these changes and the lack of water. The reduction in snow pack additionally impacts temperatures in the region. The cooler temperatures are important for pine nuts

and other culturally significant plants (not just to keep beetles from killing trees but because the cones themselves will burn up when exposed to prolonged heat).

Drastic shifts in temperatures as a result of climate change do make it difficult to prepare for Washoe's seasonal activities (i.e. the rabbit brush is blooming which is a sign that pine nuts are ready however because of the temperature shifts rabbit brush may bloom earlier or later increasing the uncertainty and scarcity of resources).

Water is a major resource for the Tribe. The Washoe Tribe traditionally left the valley during spring and summer for Lake Tahoe, then returned during winter. They continue to use freshwater springs from Lake Tahoe and have had the water tested. When the snows melted in spring, the Washoe gathered at Lake Tahoe's edge, where they blessed the water and themselves, a tradition that continues today.

The Leviathan mine has contributed to pollution of streams and tributaries. Ranchers' use and overuse of water continues to impact the Tribal lands. Water tables are getting lower, and this forces tribes to put pumps lower to get water.

The traditional Washoe ways of preparing foods is also impacted by lower water flows and water quality. The proper way to make acorn biscuits is to do so by a river or creek and use the cool, clean water. This is no longer possible on most Washoe lands.

In the past the cold and snow killed off beetles that would eat local oaks on the Washoe lands, with less snow they are seeing increasing infestations and death of pines and oaks. This impacts the ability to harvest pine nuts and acorns. This reduction of traditional foods has impacted both Tribal health and the Tribe's ability to trade foods with other tribes (traditionally Miwuk and Maidu). These traditional foods are becoming delicacies. The Tribe is also seeing an increase of human health impacts such as diabetes because Tribal members cannot access traditional foods, which are medicines and nutrients.

The Washoe Tribe has observed changes in native vegetation because of climate change:

- More invasive weeds (Tribe is working with Bureau of Land Management and Bureau of Indian Affairs to eradicate)
- Acorns are deteriorating more quickly, and the flavor has changed
- Reduction in the availability of Sourberry bush (used for basketry, food, medicine)
- Reduction of forageable mushrooms

The changes in water availability impact the wildlife. For example, in a wet year the Tribe has noticed an increase in rabbits early in the Spring, but come Fall, when these rabbits are typically hunted the populations have dropped.

Historically forest fires were caused by lightning. More recent fires have been human caused and have become more and more destructive. Some of the negative impacts of fire the Tribe has seen are:

- Wildfire damage to pine (pine nuts are an important tribal resource)

- Despite reforestation efforts, the harvests are impacted as it takes 80-90 years for trees to produce pine nuts. The lack of these and other traditional foods impacts the Tribe's health.

The removal of Washiw people from the land has also caused more overgrown forests which choke out other plants and even cause some plants to creep into areas that they shouldn't be (we can see this with the overgrowth in the Meeks Meadow area). This limits both key species but also makes fires more devastating. It should also be noted that it is much harder to return people to land in a way that is beneficial for that place than it is to restrict access and this has caused us to come up with creative solutions to maintain the health of our forest and people as one in the same.

The Washiw understand the benefits of fire on their lands. There are medicines, seeds, and traditional foods that are gathered from burned areas such as dáhal (sand seed), c'é:gelhu (wild onion), and wá:šiw bájkuš (tobacco).

Open Discussion and Dialogue on Climate Change Impacts Experienced by Tribes

Following the introductory comments from the participating tribes, the participants discussed some of the themes that emerged and shared additional climate change impacts they have been experiencing. The impacts discussed are summarized below, organized into themes. In addition to impacts specifically tied to climate change, the participants described how climate change compounds the many other anthropogenic changes to ecology that challenge their traditional ways of life.

Changes in Climate

- Precipitation: sporadic – periods of heavy rain then periods of dryness (tools to measure are off)
- More rain, less snow
- Drought
 - Cultural artifacts exposed
 - Creeks, wetlands drying up
- Hotter and drier each year – climate changing rapidly
- Air pollution and dust (including elevated levels of particulate matter when wildfire/fall storm occurred at the same time)
- More extreme weather: flooding, dust storms
- Tribes are acclimated to dealing with changes

Physical Systems (Hydrologic Changes)

- Glaciers melting
- Streams and rivers dry or drying earlier
- Springs are dying (drying up)
- Dry wetlands and meadows
- Increasing stream temperatures (impacts on Owens Valley fish); fluctuating or no change in others
- Less snowpack
- Earlier peak runoff, less runoff, unpredictable
- Flooding
- Lowering groundwater table – less recharge and more runoff because of extreme fluctuations between very dry and very wet
 - Groundwater pollutants become concentrated
- Decreasing water quality
- Increased/Different bacteria in water, harmful algal blooms
- Man-made changes to surface and groundwater (LADWP)
 - Removal of water from Owens Valley and Eastern Sierra
- Warmer water temperatures in Coso Hot Springs

Vegetation

- Changes in forests: reduced conifer forests; oaks, juniper
- Woodland denseification²
- Decreases in Native food crop yields
- Wildfires: more intense
 - Retardant acts as a fertilizer and increases grass/shrub growth (double expected growth if retardant used in an area)
- Increase in fuels (dying trees, grasses, and weeds)
 - Vegetation losing moisture earlier increases fuel load
- Dying trees – piñon, live oak
- Vegetation shifts
 - Meadows becoming scrub brush or nonnative weeds
 - Trees moving downslope into sagebrush basins
 - Elderberry (pith reduced)
 - Acorns (flavor changed, unable to store as long)
 - Reduction of salt grass, soap root, tobacco
 - Increase in invasives (Pepperweed, thistles, Cheatgrass, Aster, Tumbleweed, Knapweed, Toadflax)

Wildlife

- Bear, mountain lion moving downslope
- Changes in deer migration timing, decreased numbers
- Invasives: Black Witch moth, Barred owl, trout
- Reduced fish: Golden Trout on the Kern River, Salmon on the Merced, Owens pup fish, Speckled Dace, Tui chub, Toikona tui cub, Owens sucker
- Spawning time changing (salmon spawning at younger age, snakes emerging earlier)
- Decline in native species – due to changes in weather patterns, water

² See Appendix C for a more detailed explanation.

Human Health and Wellbeing

- Cultural Practices impacted:
 - Loss of gathering areas and ceremonial locations
 - Required changes to cultural practices
 - Exposure and disturbance of cultural items
 - Unable to have ceremonial fires
 - Loss of traditional medicines
 - Loss and reduction of traditional tribal materials (elderberry)
- Impacts on trading and connections between tribes
- Increase in human migration to cooler climates. Central Valley residents are moving to the foothill/mountain zones to live and recreate
- Impact of tourism
- Food:
 - Shortened growth seasons (e.g. elderberry)
 - Fish dying due to water temperature increase
 - Boundaries and laws preventing hunting and gathering
 - Reductions and loss of traditional foods, hunting, fishing, gathering

Next Steps and Closing

OEHHA discussed next steps in their work incorporating tribal perspectives into the climate change indicators report. OEHHA will continue working with tribes around the State to inform future reports. Participants were invited to remain in communication with OEHHA, sharing any additional thoughts as well as connecting OEHHA with others whose perspectives should be included.

Appendix A: Themes from Premeeting Survey

- **Water:**
 - Decrease in snowpack and runoff
 - Drought
 - Reduction in glacier size
 - Decreased water levels in reservoirs
 - Wide-ranging impacts of changes in hydrology on plants, animals, infrastructure, water quality, subsidence, flooding, desertification, dust off of Mono Lake, etc.
 - Possibility of water export (including groundwater pumping) due to reduced snowmelt, in turn damaging the buffer that groundwater has provided in drought years (impact of water changes elsewhere on the Eastern Sierra)
- **Cultural Health Impacts:**
 - Loss of traditional gathering areas
 - Impacts on ceremonies, including relationship between seasons and tradition and ceremony
 - Lack of resources for traditional crafts like basket weaving, regalia making
 - Discoveries of tribal sensitive areas due to changes such as flooding, wildfires, surface water levels
 - Unable to interact with nature and care for the land and animals as ancestors did – impacting cultural duty to care for nature and the spirit world
 - Impact of changes in both access to homelands combined with changes in climate harming culture and heritage
- **Climatic changes:**
 - Increased severity of weather events and fire season
 - Shifting and unpredictable seasons
 - Fire: combination of longer, hotter summer and wind storms
- **Food:**
 - Shortened growth seasons (e.g. elderberry)
 - Fish dying due to water temperature increase
 - Boundaries and laws preventing hunting
- **Vegetation:**
 - Change in vegetation to dominance of sagebrush
 - Impacts on forests and woodlands of drought and disease (in turn contributes to fire)
- **Animals:**
 - Decline in culturally important species
 - Increase in invasive species
 - Changes to migrations
 - Disruption in the food sources of animals
 - Fish dying due to water temperature increase
- **Air:** air quality changes due to overlapping of fire events (traditionally summer events) with windblown dust from a stormfront that would traditionally be a fall/winter event
- **Economic impacts:** due to lack of foods, fiber, medicines, and access restrictions

Appendix B: List of Participants

First Name	Last Name	Affiliation	Position
Danelle	Gutierrez	Big Pine Paiute Tribe of the Owens Valley	Tribal Historic Preservation Officer (THPO)
Noelani	In The Woods	Big Pine Paiute Tribe of the Owens Valley	Youth Employment Program
Sally	Manning	Big Pine Paiute Tribe of the Owens Valley	Environmental Director
Noah	Williams	Big Pine Paiute Tribe of the Owens Valley	Water Program Coordinator
Brian	Adkins	Bishop Paiute Tribe	Environmental Director
Monty	Bengochia	Bishop Paiute Tribe	THPO
Emma	Ruppell	Bishop Paiute Tribe	Air Quality & Meteorology Specialist
BryAnna	Vaughan	Bishop Paiute Tribe	Water Quality Program Coordinator
Malinda	Dumisani	CalEPA Office of the Secretary	Special Asst., Tribal Affairs
Gracie	Dick	Coleville Tribe	Cultural Monitor
Malka	Kopell	California State University Sacramento, Consensus & Collaboration Program	Facilitator
Julia	Van Horn	California State University Sacramento, Consensus & Collaboration Program	Facilitator
Sean	Scruggs	Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation	THPO (via email)
Mel	Joseph	Lone Pine Paiute-Shoshone Tribe	Environmental Director
Charlotte	Lange	Mono Lake Kutzadika'a	Chairperson
Jocelyn	Sheltraw	Mono Lake Kutzadika'a	Cultural Preservation Association Chair
Christina	McDonald	North Fork Rancheria of Mono Indians of California	Environmental Director
Tamara	Kadir	OEHHA	Sr. Environmental Scientist
Bennett	Lock	OEHHA	Environmental Scientist
Carmen	Milanes	OEHHA	Section Chief
Laurie	Monserrat	OEHHA	Sr. Environmental Scientist
Karen	Randles	OEHHA	Sr. Environmental Scientist
Lauren	Zeise	OEHHA	Director
Bill	Leonard	Southern Sierra Miwuk Nation	Chairman
Clay	River	Southern Sierra Miwuk Nation	Managing Director
Robert	Gomez	Tübatulabal Tribe	Chairman
Victoria	Christensen	Washoe Tribe of Nevada and California	Executive Assistant
Herman	Fillmore	Washoe Tribe of Nevada and California	Culture/Language Resources Director
Emily	Luscombe	Washoe Tribe of Nevada and California	Environmental Programs Coordinator

Appendix C: Notes gathered post listening session

Email correspondence with Sally Manning, Environmental Director, Big Pine Paiute Tribe

Downslope migration of pinyon and other conifers

Conifers are observed to be moving down in elevation in places in the Eastern Sierra. As the warm air from basins (in the low parts of valleys) rises up in the evening, cold air from the mountains, which is heavier, moves down the mountain slopes. In the mornings, if you happen to be in one of these low spots, you know it is colder than the lower nearby slopes. Some call this phenomenon a temperature “inversion.” It is like a pool of cold air sitting in a low spot on the land.

A scientist continuously measured temperatures in some small-ish basins in the White Mountains. What he found is that the “pool” of cold air at night seems to be smaller than it used to be. That is, at night and before sunrise, warm air extends farther down into the basin than it used to. This new bathtub ring of warm air may be one reason conifers are more successfully recruiting downslope. Cold temperatures may have once prevented such recruitment, but now that it’s warmer lower more of the time, the young trees can survive.

Because trees moving “down” is counterintuitive to climate change people who only see warmth moving up in elevation, his explanation of the smaller pool of cold nighttime air probably is a result of climate change.

Woodland Densification

Woodland “densification” is occurring. Densification means: more trees or more tree canopy cover per unit of ground area. While if you like pinyons, a denser stand of conifers may be considered a good thing, it actually threatens the plant community because more closed canopy can support bigger (more catastrophic) fires. A lightning strike that years ago burned a single tree may now burn the whole stand. If that happens, the woodland community may be replaced by cheatgrass or other species, not the conifers that burned. Densification may be happening because of higher CO₂ in the air.