

6.3 Impacts of Climate Change on the Bishop Paiute Tribe



Rising temperatures, flooding, drought, and wildfire are impacting the physical, cultural, and spiritual health of the Bishop Paiute Tribe, its habitats, and ecosystems.

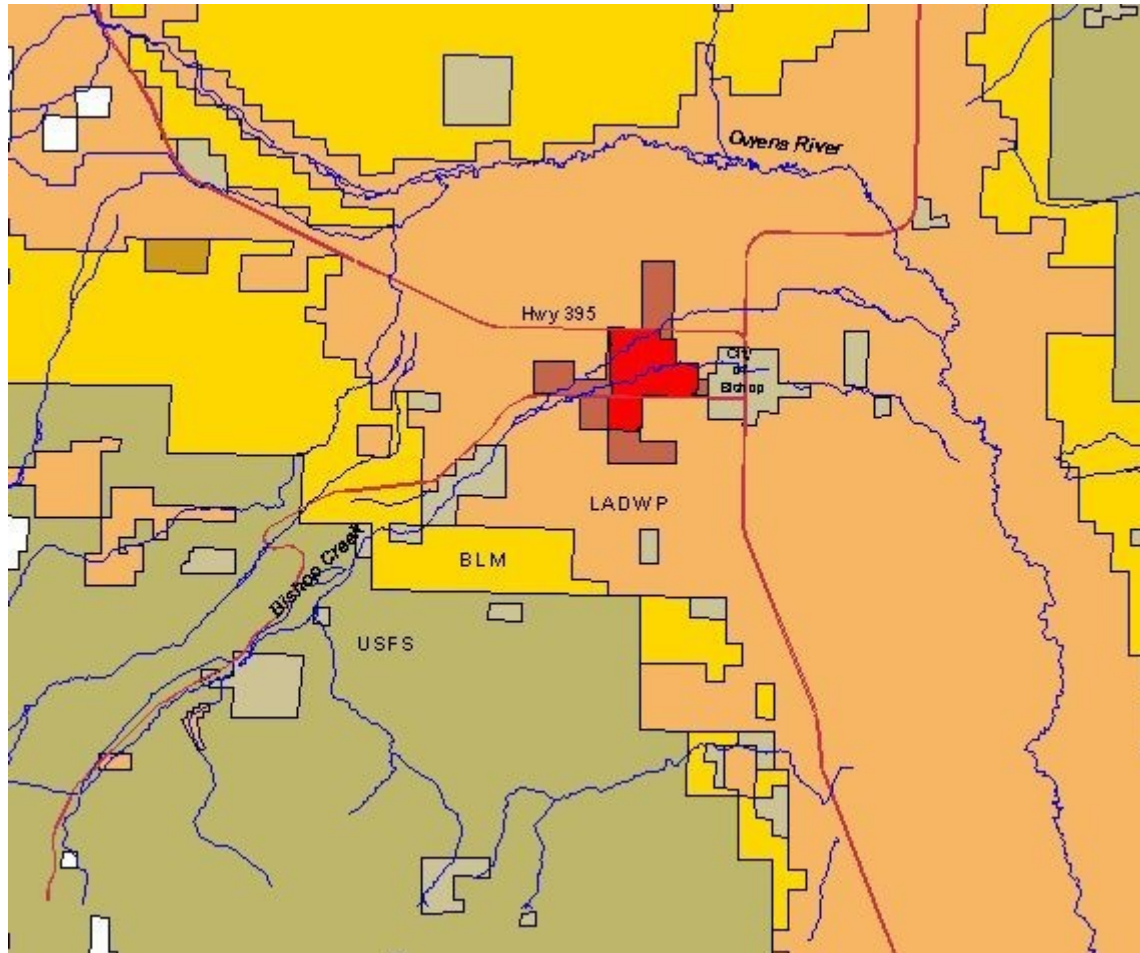
Background

The Bishop Paiute Tribe is a federally recognized Tribe living in Inyo County at the foot of the Eastern Sierra Nevada mountains in the Owens Valley, just west of the city of Bishop. They are the fifth largest Tribe in California with approximately 2,200 enrolled members and have one of the smallest land bases (875 acres). Payahuunadü, or land of flowing water, is one of the Paiute words for the Owens Valley and Eastern Sierra region of California.

The people of the Bishop Paiute Tribe are descendants of the “Nüü-Mü,” the original people of the Owens Valley who have lived in the area since time immemorial and whose ancestral lands encompassed over two million acres of the greater Owens Valley (BPT, 2018). In 1912, under pressure by the U.S. Government, the Bishop Paiute people entered into a treaty in which the U.S. Government reserved 67,120 acres of land in the Owens Valley named the Casa Diablo Indian Reservation for Indians of the area. However, the Paiute were never allowed to move to this Reservation. This treaty was broken in 1933 when President Franklin D. Roosevelt revoked the agreement (Executive Order 6206), and the lands were placed in watershed protection for the City of Los Angeles (OVIWC, 2021). In 1936, the City of Los Angeles and the federal government “traded” the 67,120-acre Casa Diablo lands for the 875 acres that now comprise the Bishop Paiute Reservation, which is shown in bright red in [Figure 6.3.1](#), below (BPT, 2021a).



Figure 6.3.1. Bishop Paiute Reservation (Bright Red) Within the City of Bishop (Brown).

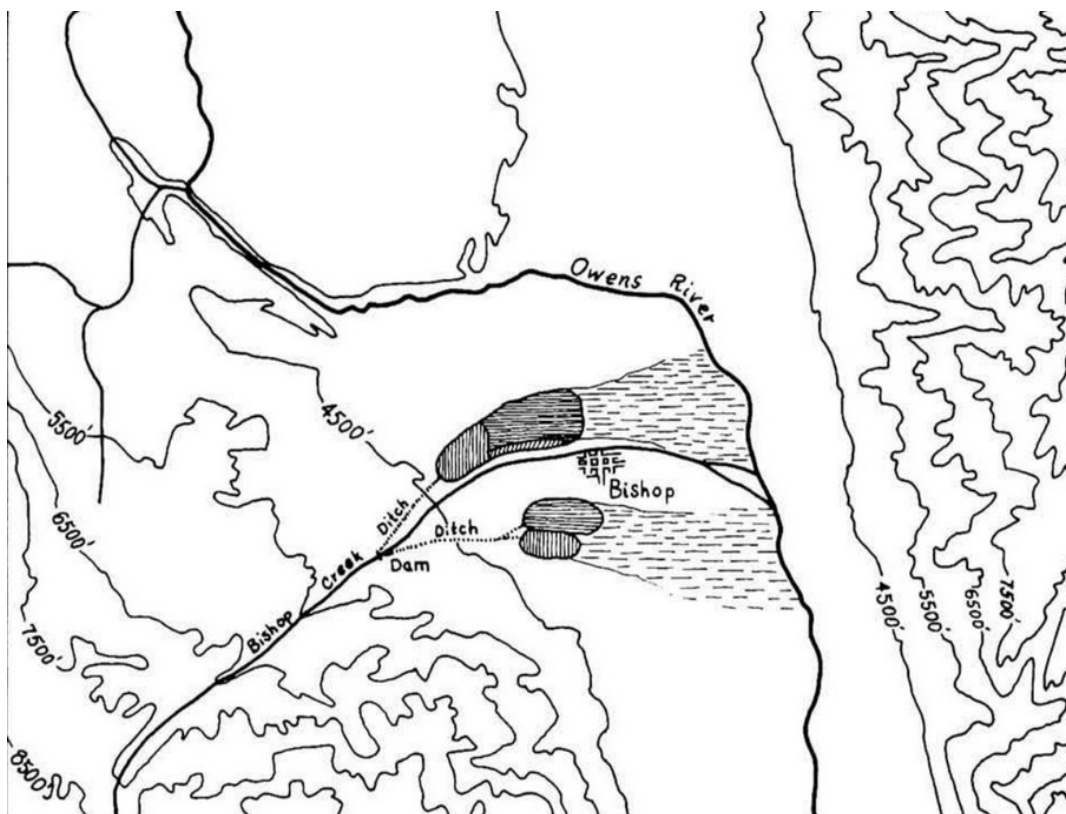


Source: BPTMO (2021)

Historically, the Paiute dug irrigation ditches that routed runoff from melting Sierra Nevada snow into the Payahuunadü. Unlike modern irrigation practices, the Paiutes did not channel the water onto farms or specific plots of land. Bishop Paiute Tribal Elder and water protector Harry Williams explained: “We looked at everything as a garden. The natives made this place bloom like a rose. The water was used to irrigate ‘wild’ seed plants” (Wei, 2016). Water was so important to the Tribe that they had an elected position called the Tuvaiju who oversaw irrigation. The Tuvaiju would use an irrigating tool known as a “pavado” to direct water into the ditch network in the Payahuunadü.



Figure 6.3.2. Drawing of Traditional Paiute Irrigation System at Pitana Patii, Near Present-Day Bishop, Owens Valley, California.



Source: Lawton et al. (1976)

The Paiutes' valley was divided by Bishop Creek into northern and southern plots. As is shown in [Figure 6.3.2](#) above, the Tribe created a dam system designed so that only one of the areas would receive water each year; the plots were purposefully alternated to conserve soil fertility. The irrigation helped the growth of grass nuts and tubers that made up a significant part of the native diet. The ditches also funneled native fish into areas where they were easy to catch. The irrigation canals distributed the water across the Payahuunadü (Wei, 2016).

Although the northern and southern portions of the Payahuunadü are hydrologically connected, they are also distinct. The current Bishop Paiute Reservation, along with the town of Bishop, are in the northern region of the Payahuunadü and part of the Bishop Basin, a sub-basin draining into the Owens River (Danskin, 1998). The flow of water



draining into this basin from surrounding mountains and hills is generally to the Owens River and south to Owens Lake. Natural vegetation communities, land use and habitat types in the Payahuunadü reflect the hydrological differences along the North-South gradient, with dense vegetation and agricultural lands concentrated in and around the Bishop Basin and an increasing dominance of salt-tolerant desert plants in the Owens Lake Basin in the south (ICPD, 2015). Reflecting their location in the upper portion of this watershed, environmental management efforts of the Bishop Paiute Tribe are unique from priorities in the southern Payahuunadü. Some of their current focus areas include vegetative fuels reduction (including trees), rain and snowstorm preparation and disaster claims, flooding, irrigation system, gardening and food growing (BPTMO, 2026).

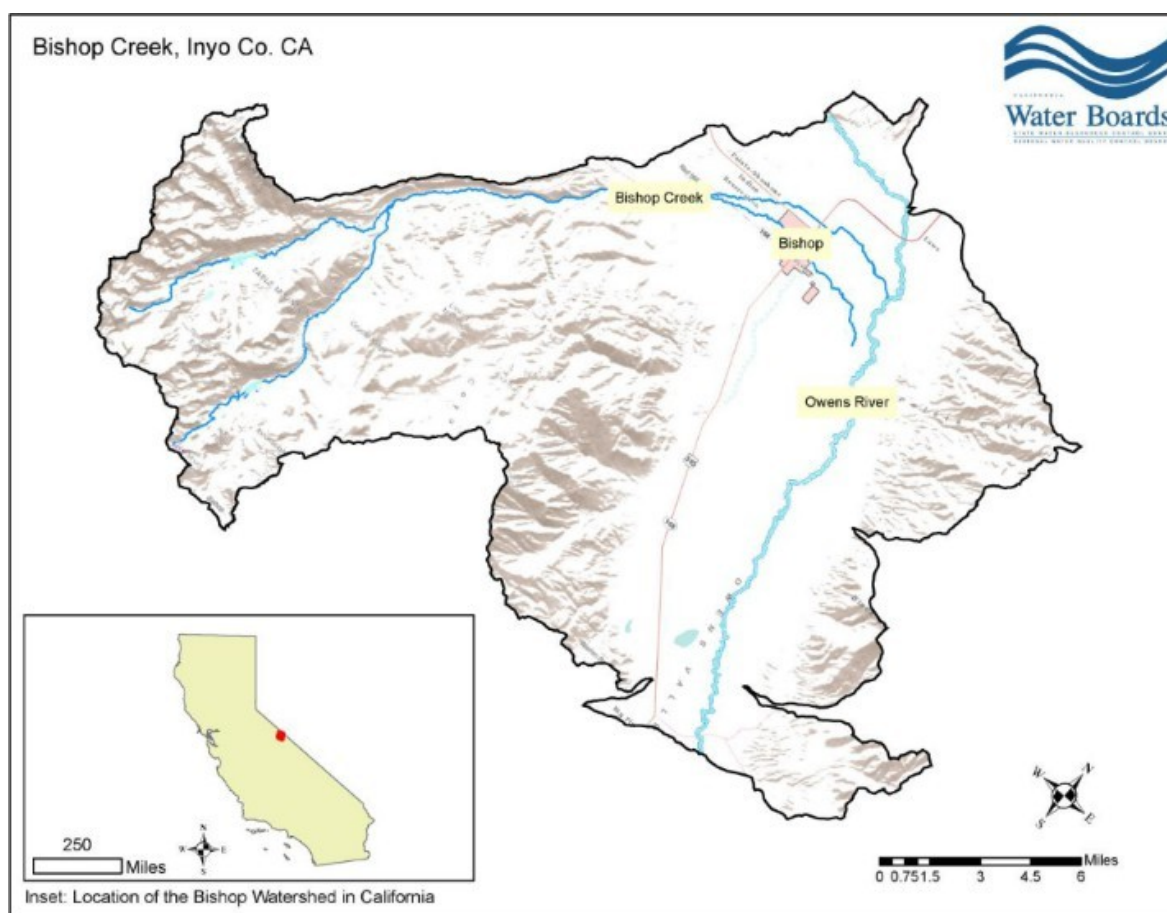
The Los Angeles Department of Water and Power (LADWP) owns most of the land immediately surrounding Bishop and the Owens River, and their ongoing control over land and water resources is of grave consequence to the tribes who have been there since time immemorial. The historical draining and subsequent re-watering of Owens Lake by LADWP is a significant environmental concern in the Payahuunadü. While Owens Lake is not a current programmatic focus of the Bishop Paiute Tribe Environmental Management Office (BPTMO), they continue to support and work together with the Lone Pine Paiute-Shoshone Tribe to their south whose water, lands and air quality are more directly impacted by LADWP's water extraction from Owens Valley. The Bishop Paiute Tribe were historically impacted by windblown particulate matter (PM) with diameter of 10 micrometers and less (PM10) coming off the dry lakebed, this now occurs only occasionally during storm events. The water and air quality issues driven by LADWP water exports and impact on the entire Owens Lake ecosystem have therefore been moved from the body of this report to the [Appendix](#). Bishop Tribal leaders and members are also engaged in ongoing water management efforts through their seats on the Owens Valley Indian Water Commission.

The current Bishop Reservation ecosystem is over the Bishop Cone, within the Bishop Basin, an area characterized by a shallow water table with depths ranging from 1 to 10 feet below ground level. Availability of groundwater substantially enhances vegetation coverage, including a variety of pasture grasses and several types of deciduous tree



species. As shown in **Figure 6.3.3**, below, both North and South Forks of Bishop Creek traverse the Reservation. Excluding relatively recent increases in bacterial levels in South Fork, stream water quality is excellent and supports a 5-mile-long riparian forest corridor providing a rich habitat for a variety of flora and fauna (BPT, 2018).

Figure 6.3.3. Bishop Creek and Surrounding Watershed, Inyo County, CA.



Source: LRWQCB (2020)

In 1988 the Bishop Paiute Tribe established the Conservation Open Space Area (COSA) in the southeast corner of the reservation. The COSA contains a wetland and serves as important habitat for native plants and animals. Furthermore, the COSA is currently being utilized to increase populations of threatened and endangered plants and animals, such as the Owens pupfish, Owens Valley Checkerbloom, and the Inyo County



Mariposa Lily.

Because the impacts of climate change do not start and stop at the Reservation borders, and because the culture of the Bishop Paiute Tribe is tied to all their traditional lands, this report covers both the changes seen on the Reservation lands as well as on traditional lands of the Bishop Paiute such as Volcanic Tablelands and Fish Slough. Petroglyphs within the Volcanic Tablelands are shown in **Figure 6.3.4**.

Figure 6.3.4. Petroglyphs at the Volcanic Tablelands.



Photo credit: Sarah Rea (2018)

Cultural and spiritual health

As the climate changes, the cultural and spiritual health of the Bishop Paiute Tribe are impacted. You cannot separate the health of the earth from the health of the Bishop Paiute Tribe. The Tribe has seen a loss of gathering areas and ceremonial locations, a reduction in traditional medicines and foods, impacts on culturally important fish



species, and a loss of the Bishop Paiute's traditional waters through both drought and groundwater pumping for export by LADWP and other commercial producers. The Tribe has observed pumping causing local streams and springs to dry up, which has a cascading and compounding impact on the surrounding insects, fish, mammals, and vegetation (BPT, 2020).

The Bishop Paiute Tribe has created a web of interconnected efforts aimed at responding to the complexities of climate change. They are protecting their natural resources with a combination of mitigation efforts, such as installing rooftop solar panels, increasing food sovereignty, and invasive plant removal, as well as adaptation strategies such as protecting tribal waters, providing cooling for elders, and educating Tribal members (Kapp, 2019).

Climate change impacts

Climate change has impacted wildlife, native vegetation, and culturally important foods such as pine nuts, acorns, fish, and wild game in the Bishop Tribal lands in the Eastern Sierra.

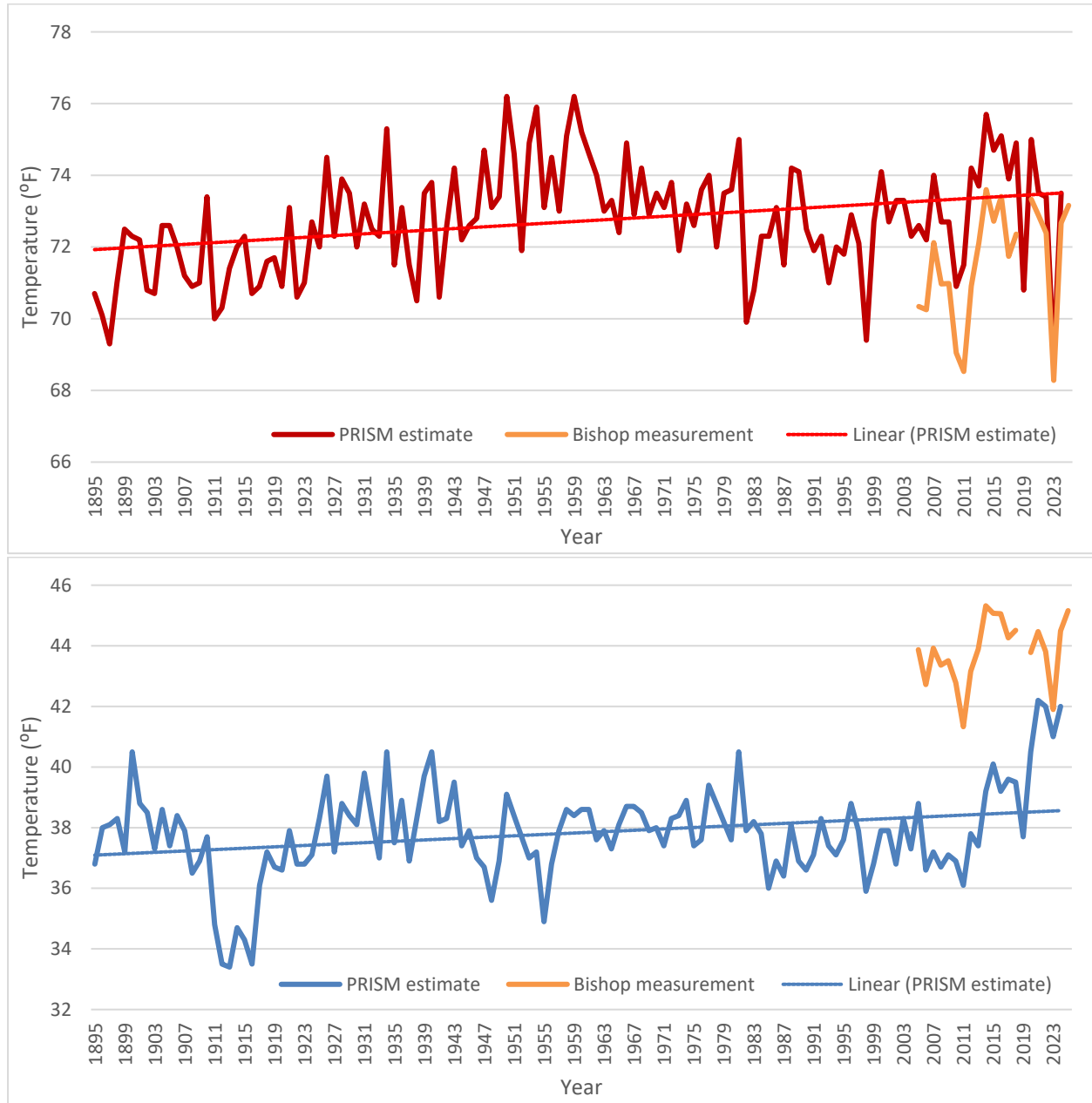
Elevated temperatures

Daytime and nighttime temperatures have been increasing in Bishop since 1895. Elevated temperatures affect human physical health, mental health, cultural and spiritual health, socio-economic health, and the plants and animals that are part of the Bishop Paiute's ecosystem. Elders, children, outdoor workers, and those with existing medical conditions are particularly susceptible to these impacts.

Continuous outdoor air temperatures measured by the Bishop Paiute Tribe's weather station are available for the last 20 years, 2005 to 2025. These measurements are plotted on the same graph as temperature estimates for the Bishop Reservation from PRISM Climate Group (Parameter-elevation Regressions on Independent Slopes Model) in [Figure 6.3.5](#). PRISM estimates that both the annual average daily maximum (daytime) temperatures and the annual average daily minimum (nighttime) temperatures have risen at Bishop at approximately the same rate of 0.1°F (degrees Fahrenheit) per decade, or 0.06°C (degrees Celsius) per decade over the past 130 years.



Figure 6.3.5. Average Daytime (Top) and Nighttime (Bottom) Temperatures on Bishop's Reservation from 1895 to 2025.



Top graph: average annual maximum or daytime temperature estimates from the PRISM model are shown in red. Actual temperatures observed at the Bishop station are shown in orange. Bottom graph: average annual minimum or nighttime temperature estimates from the PRISM model are shown in blue. Actual temperatures observed at the Bishop station are shown in orange. Source: PRISM Climate Group (2026)



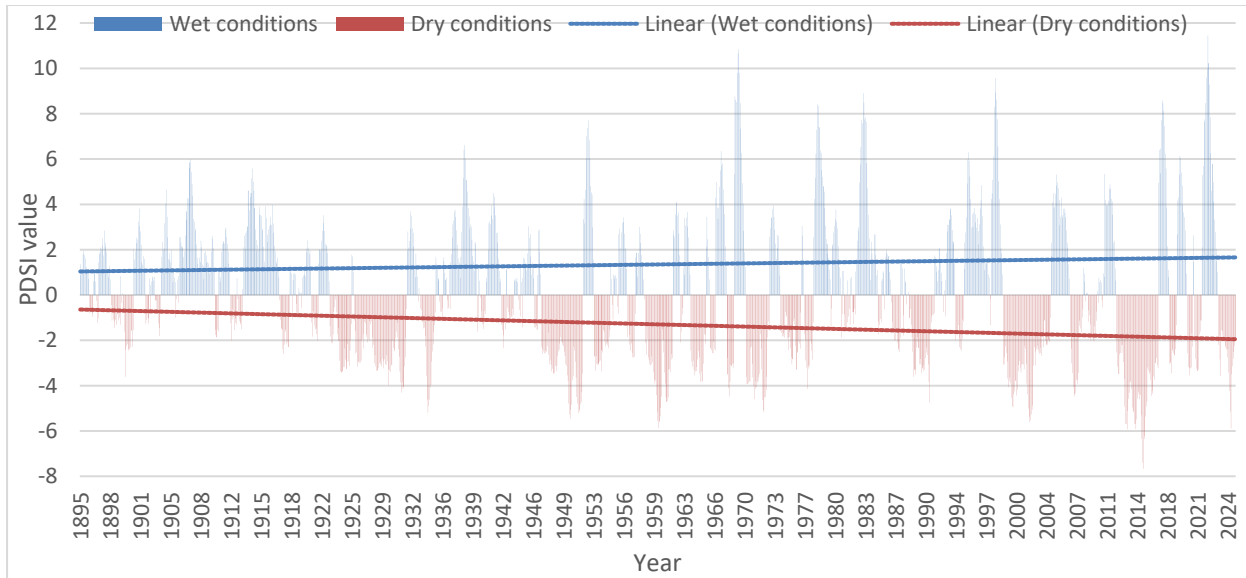
Warming temperatures are considered a high-risk exposure for the Bishop Paiute Tribe. The Bishop Paiute community may experience warmer daily minimum (i.e. night and early morning) temperatures than are recorded at the Valley floor due to a seasonal inversion layer: a layer of warmer air that sits above cold dense air under stable conditions for many hours. Data from the Tribal station demonstrate that annual average minimum (nighttime) temperatures have been increasing and have been 4.81°F (2.67°C) higher, on average, than PRISM estimates for the last 20 years ([Figure 6.3.5](#)).

Drought and flood

The severity of both drought and flood events is increasing in the Owens Valley. In just the last 12 years, Bishop experienced its two driest water years on record in 2014 and 2015, and its wettest water year on record in 2023. The 2023 water year brought a significant threat of flooding. Record-breaking snowpack in the Sierra Nevada led to increased snowmelt runoff during the spring and summer, necessitating a proactive and coordinated response from the Bishop Paiute Tribe and local agencies, including LADWP. This heightened runoff, combined with local precipitation, contributed to various instances of localized flooding on the Reservation. These events isolated Tribal members, including elders, in their homes for a brief period due to flooded driveways.

[Figure 6.3.6](#), below, shows the monthly Palmer Drought Severity Index (PDSI) value for Bishop from January 1895 to September 2025. PDSI values combine temperature and precipitation data to provide a measure of relative dryness (drought) on a scale from -10 (dry) to 10 (wet). Values below negative four (-4) are considered extreme drought, and values above four (4) are considered very wet conditions. While both drought and flood conditions are intensifying over time, the overall trend for the region is towards increasing dryness.



Figure 6.3.6. PDSI at Bishop Reservation from 1895 to 2025.

Source: Abatzoglou et al. (2026)

Table 6.3.1, below, shows the same trend by comparing two time periods: the first 65 years of the record, and the most recent 65 years. There have been twice as many years of extreme drought and more than twice as many years of very wet conditions in the last 65 years as there were previously. These years of extreme conditions are shown in parentheses. While Bishop used to have more wet years than dry years, they now have more dry years than wet years. The arrows next to the numbers in the second row are to emphasize the direction of change over time.

Table 6.3.1. Number of Wet and Dry years at Bishop.

Water years	Dry years (Extreme drought)	Wet years (Very wet conditions)
1896 to 1960	28 (2)	37 (3)
1961 to 2025	35 ↑ (4 ↑)	30 ↓ (7 ↑)

Source: Abatzoglou et al. (2026)



The impacts of drought are intensified in the Owens Valley due to ground and surface water pumping by LADWP to supply water to Los Angeles (ICWD, 2021a). No matter how much snow or rain falls in the Eastern Sierra, differing by year due to the latitudinal position of the jet stream, the water needs of Los Angeles remain and will increase as populations increase, further burdening the Owens Valley. As detailed in the history of the Bishop Paiute, water holds a strong cultural significance for the Paiute people. A lack of water impacts the survival of plants and animals, which hold cultural importance to the Tribe.

Impacts to groundwater

The Bishop Paiute Tribe has a different groundwater situation from other tribes in the Owens Valley due to their position within the Bishop Cone, as explained in the Background section. While their Reservation lands are not as impacted directly by water shortages resulting from LADWP groundwater extraction as other tribes to the south, surrounding areas within the ancestral homelands of the Tribe are experiencing notable changes. For example, the Fish Slough area 10 miles north of Bishop, within the Volcanic Tablelands, is facing the compound impacts of climate change and excessive groundwater pumping.

Fish Slough, a critical habitat for endemic and endangered species, has endured decades of climate variability. However, recent studies indicate that the annual recharge and outflow relationship at Fish Slough is now "weak." Other factors, likely human-induced, such as groundwater pumping are playing a more significant role in the depletion of springs, such as the Northeast spring drying up (Albano et al., 2024).

The BPTMO is concerned that the drying of Fish Slough, driven by both climate variability and human-induced factors, will have far-reaching consequences. If the drying trend continues, not only will this critical ecological area suffer, but so too will the communities that live downwind of the Tablelands. As Fish Slough becomes increasingly arid, dust storms are likely to intensify, carrying loose sediments, including fine particulates, toward the town of Bishop and the Bishop Paiute Reservation. Residents could face increasing risk of health impacts, such as respiratory illnesses, due to exposure to wind-driven PM10 which already arrives occasionally from Owens



Lake to the south and may now also come from the north.

The interplay of climate change and unsustainable water management is not only altering the ecological integrity of Fish Slough but also posing direct risks to public health in nearby communities. Addressing these challenges requires coordinated action to mitigate groundwater depletion, restore habitat resilience, and protect the well-being of both the environment and the people who depend on it.

Impacts on vegetation

Culturally important plants

Climate change impacts in the Bishop Tribe's ancestral lands in the Eastern Sierra have negatively affected native vegetation, including culturally important medicines and foods through mechanisms such as drought and phenological shifts. The Bishop Paiute Tribe has long been attuned to seasonal variations related to planting and stewardship of plants. A former employee for the Tribe reported, *"Several Elders have noted changes in harvest times for traditional foods. Community members have also mentioned changes in seasons such as out of the ordinary weather patterns, warmer fall weather and colder spring weather"* (Kapp, 2019).

In addition to the overall decline in the quality and abundance of native vegetation due to climate changes, the Bishop Paiute have seen a decrease in culturally important food species such as "wai" (Indian Ricegrass), tule, acorn and pine nut (BPT, 2020). In addition to the decreased availability of acorns, the Bishop Paiute Tribe and other Eastern Sierra tribes reported a change in the taste of the flour made with local acorns.

Drought in the Eastern Sierra, along with beetle infestations by the mountain pine beetle (*Dendroctonus ponderosae*), has caused an increase in tree mortality. As trees in Eastern Sierran forests become stressed by drought, their vigor and defense mechanisms weaken, making them more vulnerable to attack. Bishop staff monitor trees along the valley. They assess pinyon trees using signs that indicate if a tree is in poor health and will soon die by biological factors such as black fungus, mistletoe, and Pinyon Needle Scale. High temperatures exacerbate already stressed conditions for tree survival in areas like The Glass Mountain Range, approximately 50 miles north of



the Bishop Reservation (BPT, 2020). The buildup of dead trees combined with increased presence of invasive perennial weed and shrubs increase the fuel load and fire risk in these areas.

Conditions for invasive species

Sporadic heavy rains in the winter and spring increase the growth of vegetation which then dries and becomes fuel in the hot summers (BPT, 2020). The increase of perennial weeds, shrubs, and other flashy fuels have increased the fire danger over time. Invasive species in the Table Lands, including Russian thistle and cheat grass, were brought in by the grazing animals and now are transferred by people visiting sites.

Wetlands provide some of the richest habitat on the Bishop Reservation, supporting many species of plants and animals. There are approximately 25 acres of federally designated wetlands located in the eastern section of the Reservation (BPT, 2021b). One observable way the area has changed in the last 20 years is that much of the alkali meadow portion of the wetlands has been invaded by perennial pepperweed (*Lepidium latifolium*). This plant, not native to Owens Valley, has proved extraordinarily difficult to control. It propagates by seeds that are spread by animals and by water, and has very deep roots (BPT, 2021b).

At the COSA, land disturbance caused by trail construction created the opportunity for invasives, including all the species mentioned above in this section, to become established. During wet periods, water breaches a ditch that flows west to east North of the COSA and floods into the COSA, carrying perennial pepperweed with it. Pepperweed is also taking over certain sites at Fish Slough with no known eradication treatment. Chemicals and mechanical methods have only contained it in certain areas.

Impacts on wildlife

Climate change impacts threaten the Bishop Paiute's access to traditional foods such as fish, game, and wild and cultivated crops. These resources have provided sustenance as well as cultural, economic, and community health for generations.



Owens pupfish

Figure 6.3.7. Owens Valley Pupfish.



Photo credit: Joe Ferreira, CDFW

Source: Tasoff (2024)

The Bishop Paiute have cared for and been nourished by desert fish including the Owens pupfish (**Figure 6.3.7**, above) since time immemorial. The Owens pupfish (named for its playful nature) is a 2-inch long, silver-gray fish that turns a bright fluorescent blue during spawning season. Historically, the pupfish was a staple food item for the Paiute people in the Owens Valley, who caught the fish by the hundreds and dried and stored them. The Tribe continues to try to protect and care for these threatened fish but their habitat continues to shrink due to climate change, land use practices, and extensive water development. Owens pupfish are listed as endangered under both the federal and state Endangered Species Acts and are a California fully protected species, which is the state's highest level of legal protection (BPTMO, 2024).

The historic range of the Owens pupfish is shown in orange in **Figure 6.3.8**, below. As of 2021, Owens pupfish were limited to a few areas designated with dark blue dots and a newly designated area called the River Springs Lake Ecological Reserve north of the region shown. In 2024, a 10-year Safe Harbor Agreement was signed between the Tribe, U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife, protecting the rights of landowners to disrupt pupfish habitat for the overall goal of increasing their habitat and population (BPTMO, 2024). With this agreement in place,



Source: CDFW (2020a)

Freshwater mussels

Figure 6.3.9. Freshwater Mussels in a Canal Dredge Pile.



Source: Klingler (2021)

Shell mounds of freshwater mussels (*Anodonta nuttalliana*) and surveys on the Bishop Paiute lands including the creeks and Owens Lake indicate the historic use of mussels as a food source. Mussels are no longer found in Owens Lake, but they have been found in the Bishop Creek canal, which diverts water from the Owens River for use by LADWP, as recently as 2014 (Blevins et al., 2017; Howard et al., 2015). Freshwater mussels have also been seen in LADWP dredge piles (Klingler, 2021). The shells in **Figure 6.3.9**, above, are from different age classes, indicating that mussels were reproducing in the recent past. Due to reduced numbers they are no longer used as a source of food for the Paiute people (Bengochia, 2021).

Owens Tui Chub

The Owens Tui Chub (*Siphateles bicolor snyderi* or *Gila bicolor snyderi*) is endemic to the Owens Basin, Mono and Inyo Counties. It was a food source for the Bishop Paiute people but is now found in only six sites, including the COSA, all created for the



preservation of the species on the Bishop Paiute lands. The COSA Tui Chub are hybridized. The Toikona Tui Chub is the original species and is now only found in isolated conservation areas to prevent hybridization (CDFW, 2020c).

Owens speckled dace

The Owens speckled dace (*Rhinichthys osculus ssp.*) fish historically occupied most small streams and springs in the Owens Valley. By the 1980's the stream-fed ponds and springs that the Owens speckled dace lived in were depleted or destroyed by the construction of and pumping for the LA aqueducts, and they were extirpated from most of their historic range. The COSA on the Bishop Paiute lands is one of three remaining, isolated habitats for these culturally important fish (Mussmann, et al. 2020).

Game species

The Paiute still hunt both large and small game and have noticed a decline in culturally important species. Rabbits, especially black-tailed jackrabbits and cottontail rabbits, used to be plentiful in the area. The Tribe has seen a decline in both species. As the area has suffered from drought and desertification, food on which the rabbits depend has become less available (Bengochia, 2021).

Mule deer are a culturally important species for the Bishop Paiute Tribe. Mule deer are in decline across the west, their migration patterns and food availability impacted by drought and other aspects of climate change (Aikens et al., 2020). In 2017, 120 mule deer that were migrating to their winter grounds in the Valley ran into persistent snow and ice sheets, not normally found in the area, and slid to their deaths. This type of event has only happened twice before that the Tribe knows of and never on this scale (Brown-Williams, 2017).

In 2020 the Bishop Paiute Tribe entered into an agreement with the California Department of Fish and Wildlife allowing the Tribe to take 16 deer for cultural education purposes. This agreement was the first of its kind and it recognizes the Tribe's authority to protect wildlife resources (CDFW, 2020b).

Additional impacts on wildlife

Some of the other impacts to wildlife the Tribe is experiencing include:



- declining numbers of native fish overall, such as Owens pupfish, Owens Tui Chub, Owens speckled dace, Owens sucker, and Toikona Tui Chub,
- increasing stream temperatures,
- increasing bacteria levels (*E. coli*, cyanobacteria) in surface waters on the Reservation and associated adverse effects on local wildlife,
- decrease in bird species such as yellow-headed black bird, red-winged black bird, eagles, and swallows,
- decline in numbers of bats,
- increasing observations of beaver activity which the Tribe is currently researching.

The Tribe has also observed increases in non-native species that have the potential to take the place of native species as the climate of the Owens Valley warms and dries, such as:

- Barred Owl,
- Black Witch moth (native to Mexico),
- Bullfrogs and mud snails,
- Rainbow trout, largemouth bass, catfish, and perch.

The Bishop Paiute lands provide habitat for many threatened or endangered species such as Western Meadowlark (*Sturnella neglecta*), Owens Valley vole (*Microtus californicus ssp. vallicola*), a myriad of insects and spiders, and many other animals. The Northern Harrier (*Circus cyaneus*) and Red Shouldered Hawk (*Buteo lineatus*) are year-round residents, breeding in Owens Valley and foraging in meadows. As discussed earlier, the meadows that these species rely upon are threatened by climate change impacts that continue to lower the water table.

Wildfire

The incidence of large forest fires in the western United States has increased since the early 1980s (Wehner et al., 2017). Fire season in California starts earlier and ends later each year (CAL FIRE 2021). Since 2007, there have been 23 fires over 100 acres in size within 30 miles of the Bishop Paiute Tribe Reservation ([Table 6.3.2](#), below). The Reservation is in an area designated as a High Fire Severity zone (BPT, 2018).



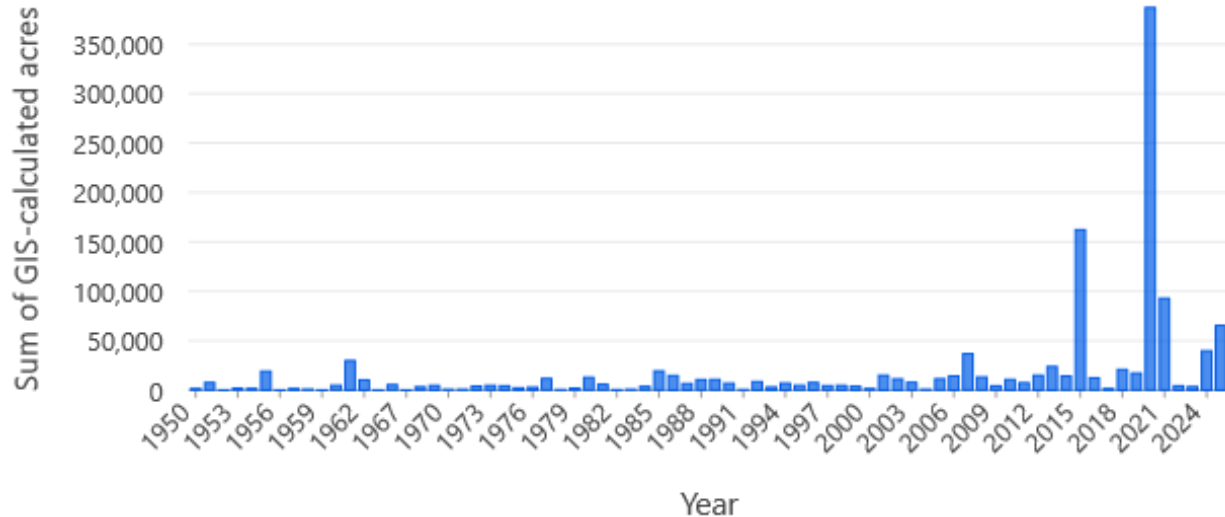
Table 6.3.2. Fires Over 100 Acres in Size Within 30 Miles of the Bishop Paiute Reservation, 2007 to 2025.

Year	Fire	Acres Burned
2007	Inyo Complex (#1)	35,000
2008	Bluff	767
2008	Big Trees	125
2009	Fort	1,500
2009	Blackjack	271
2009	Forks	2,811
2011	Center	441
2011	Buttermilk	206
2011	John	5,800
2013	Windy Peak	681
2014	Bridges	113
2015	Round	6,537
2016	Rock Creek	123
2018	Pleasant	2,076
2019	Taboose	10,268
2020	Creek	379,842
2020	Beach	3,800
2020	Iris	125
2021	Calvert	258
2022	Airport	4,140
2025	Silver	1,611
2025	Sage	260
2025	Pack	1,974

Source: CAL FIRE (2026)

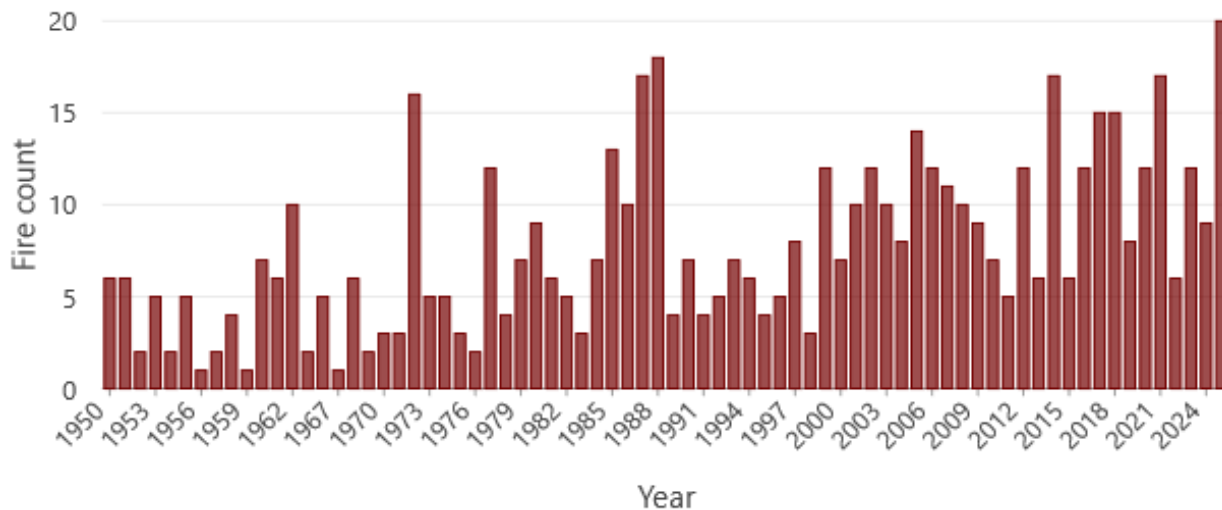


Figure 6.3.10. Sum of GIS-calculated Acres Burned Annually by Wildfires Within 100 Miles of Bishop's Reservation, 1950 to 2025.



Source: CAL FIRE (2026)

Figure 6.3.11. Number of Wildfires Within 100 Miles of Bishop's Reservation, 1950 to 2025.



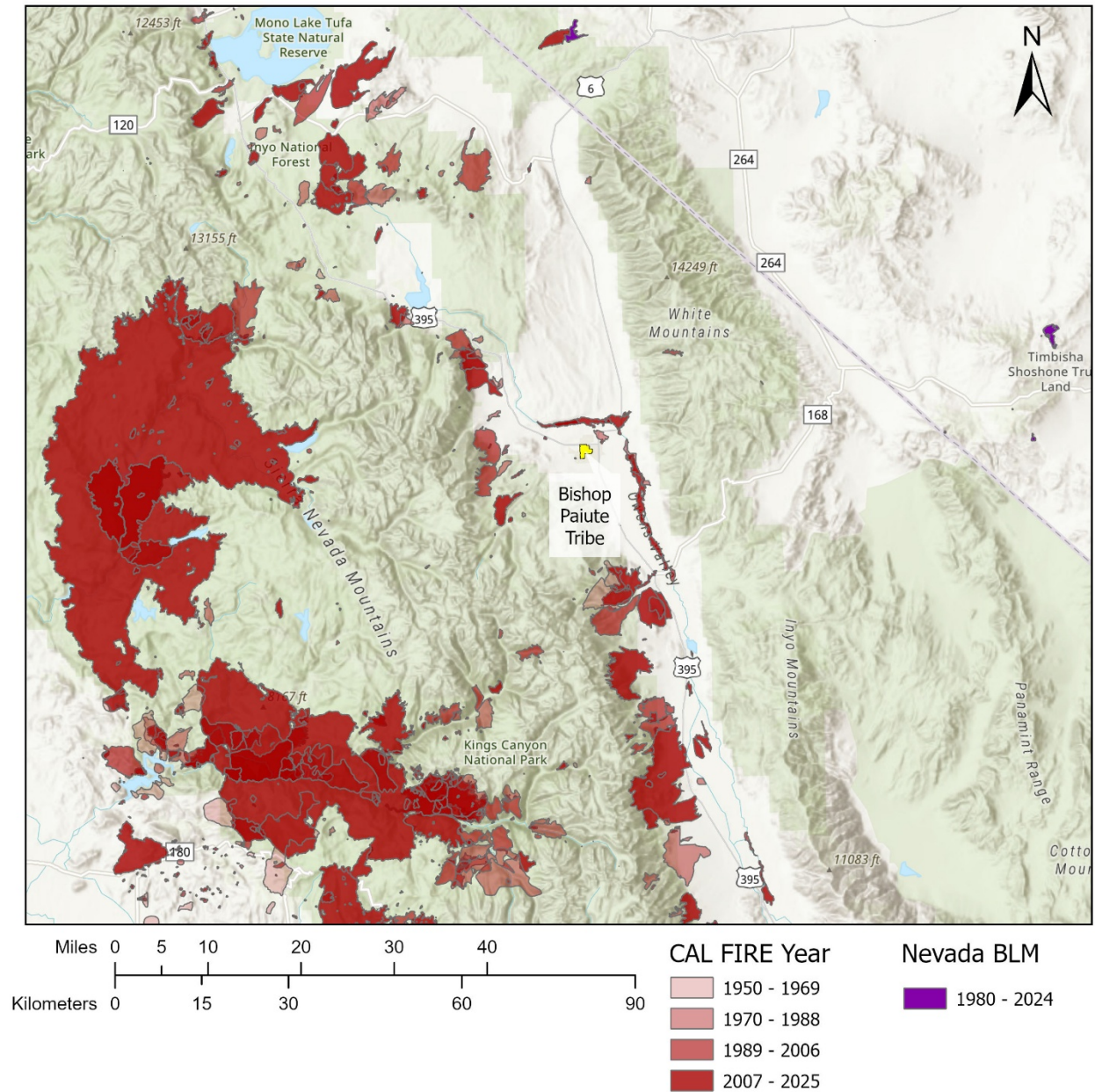
Source: CAL FIRE (2026)

Figure 6.3.10 (above, top) shows that the number of acres burned annually by wildfires in the region affecting the Bishop Paiute Tribe (BPT) has exponentially increased in the last 10 years. **Figure 6.3.11** (above, bottom) shows that the number of wildfires



impacting the BPT each year has also increased since 1950. The map in **Figure 6.3.12** shows fires that impacted the current Bishop Tribal lands from 1950 through 2025. More recent fires are shown in darker red, and the Bishop Paiute Tribe's Reservation is shown in yellow in the center.

Figure 6.3.12. Fires Impacting Bishop Paiute Tribe, 1950 to 2025.



Source: CAL FIRE (2026); BLM (2026); Esri, TomTom, Garmin, FAO, NOAA, USGS, ©OpenStreetMap contributors, and the GIS User Community.



While the Reservation itself has not been burned by large wildfires, there have been impacts to soil, riparian habitat, air, and water quality (BPT, 2018). Fires increase soil erosion, particularly in denuded watersheds. Wildland fires that eliminate forest areas affect soil and watershed value and are destructive to both terrestrial and aquatic habitat.

Years of drought, declining snowpack, over pumping of groundwater, and increasing temperatures, combined with more than a century of fire suppression and attendant changes in forest composition, have significantly increased fire severity, frequency, and size throughout the Eastern Sierra (Dettinger et al., 2018). The Tribe has noted that the build-up of dead trees in the National Forest area at Indiana Summit and an increase of weeds, shrubs, and other flashy fuels have increased fire danger for the Tribe (BPT, 2020).

Many mountain meadows below the elevation of 7,500 feet, including the meadows of the Eastern Sierra, are not truly natural but were influenced for millennia by tribal burning practices. Native people altered the size and composition of meadows through periodic burning. Setting fires in the areas surrounding the meadows discouraged the encroachment of more wet-tolerant vegetation. Periodic burning within the meadow boundaries influenced the species composition, density, and abundance of native plant populations. Certain meadow plants such as deergrass, yampahs (a genus of wild carrot) and clovers were favored and maintained through burning (Anderson, 2005). Burning was also used to increase foods such as wild onions and elderberries, and to clear out the underbrush to bring in new growth for the animals. The Owens Valley Indians also grew tobacco and burned the fields where the tobacco grew (Padilla, 2004).

Historically, the Paiute conducted cultural burns on their ancestral lands. The population of the Bishop area has grown over time and federal land agencies and LADWP control all the lands the Tribe used to steward, except the Reservation itself. On the Reservation, the reduction of agricultural lands and densification of homes and dwellings (2000 members live on just 879 acres) have created a matrix and distribution



of fuels that are unsafe to control with broadcast burns (BPTMO, 2026) The size of controlled burns on the Reservation are limited by discontinuous land use parcels and land assignments, proximity to hazards such as trees, buildings and power lines, and in some cases lack of staffing or a tribal fire department. Allowable burning on the Bishop Reservation is limited to 50-foot (ft) by 50-ft plots, 100-ft ditch lengths, and 4-ft by 4-ft piles with 10-ft clearances, by applicants volunteering to participate in the Tribe's burn permit rules. Burns can occur on the "yes" burn days during allowable burn hours as determined by the BLM, U.S. Forest Service, and GBUAPCD (the surrounding land agencies). The approved burn permit application, 2023 version, is online and approved by the Bishop Paiute Tribal Administration. Roughly 100 permits to burn excess vegetation are issued on the Bishop Reservation each year since the program's inception in 2003 to satisfy the Tribe's agreement with the Bishop Rural Volunteer Fire Department.

Wildfire smoke impacts

The topography of Owens Valley in part determines the wind patterns which deliver wildfire smoke to the Bishop area. Wildfire smoke on the Reservation is typically reflected in the Tribe's particulate monitoring data from the continuous monitoring station. These data, collected since 2004, are archived by the U.S. Environmental Protection Agency (EPA) and are publicly available.

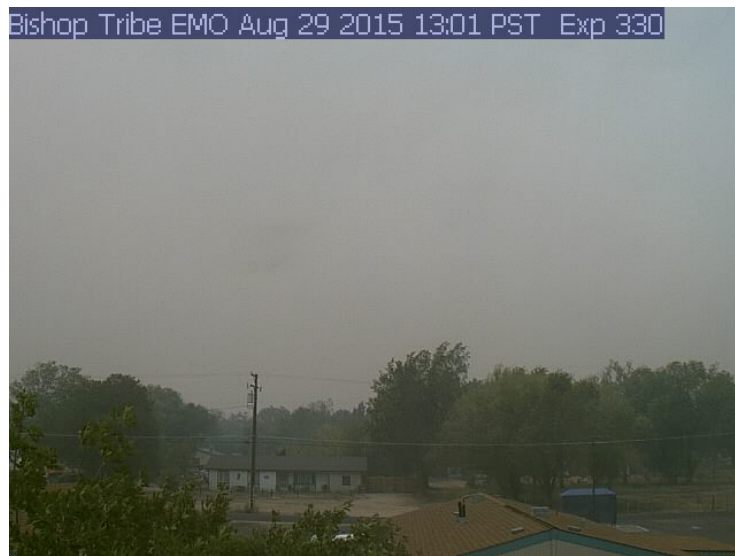
In 2006, the Bishop Tribal Council adopted the CA state standards for PM10 and PM2.5 (less than 2.5 micrometers in diameter) for twenty-four-hour (24-hour) periods. One purpose of the air quality monitoring program is to determine whether and when the Tribe's Air Quality Standards for PM10 and PM2.5 are exceeded in a 24-hour, midnight-to-midnight period. Short-term exposures to PM2.5 have been associated primarily with worsening of respiratory diseases, including asthma and chronic obstructive pulmonary disease, leading to hospitalization and emergency department visits (CARB, 2021).

Another direct impact of smoke is visibility. Visibility was limited to less than 1 mile during the worst hours of the 2015 Rough Fire, as captured by the Tribe's west-pointing visibility camera in [Figure 6.3.13](#), below. Twenty-four-hour average PM2.5 concentrations at the Reservation during the 2015 Rough Fire exceeded the Tribal



standard of 35 micrograms per meter cubed ($\mu\text{g}/\text{m}^3$) for four consecutive days and were the highest hourly PM_{2.5} concentrations recorded by BPT yet. On 32 of the 35 days that it took to reach containment of the fire, smoke was visible at 6 miles; on the worst days, smoke was visible within 1 mile and obscured 6-mile landmarks. Wind roses demonstrate that unlike storm fronts bringing dust, air mass shifting even in the non-predominant wind direction may play a role in regional wildfire smoke distribution.

Figure 6.3.13. Visibility on the Worst Day of the 2015 Rough Fire.

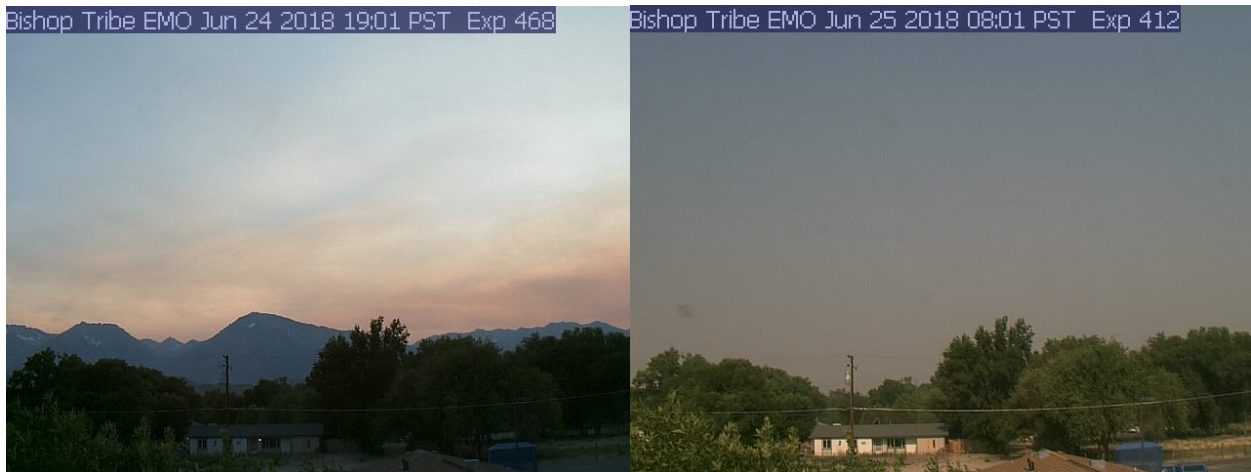


Source: BPTEMO (2026)

During the 2018 wildfire season, 22 separate air quality standard exceedances occurred across 13 days on the Reservation, including the Tribe's first 24-hour values in the "Unhealthy" AQI range for PM₁₀ due to combined wildfire effects. **Figure 6.3.14**, below, is an example of the overnight effect of smoke settling in the valley during the Lions Fire.



Figure 6.3.14. Smoke Settling Over the Owens Valley During the Lions Fire, June 24 and 25, 2018.



Source: BPTEMO (2026)

Figure 6.3.15. Photo of the 2018 Pleasant Fire.



The Pleasant Fire, a cold-season fire, burned along the Owens River just northeast of Bishop and the Reservation. Source: BPTEMO (2026)

In October 2019, the wildfire season overlapped with the autumn storm season, and the smoke combined with dust from an early storm gust front caused a PM₁₀ 24-hour exceedance ($50 \mu\text{g}/\text{m}^3$) on the Reservation.

In 2020, during the historic Creek Fire (and SQF or Sequoia Complex), there were 39

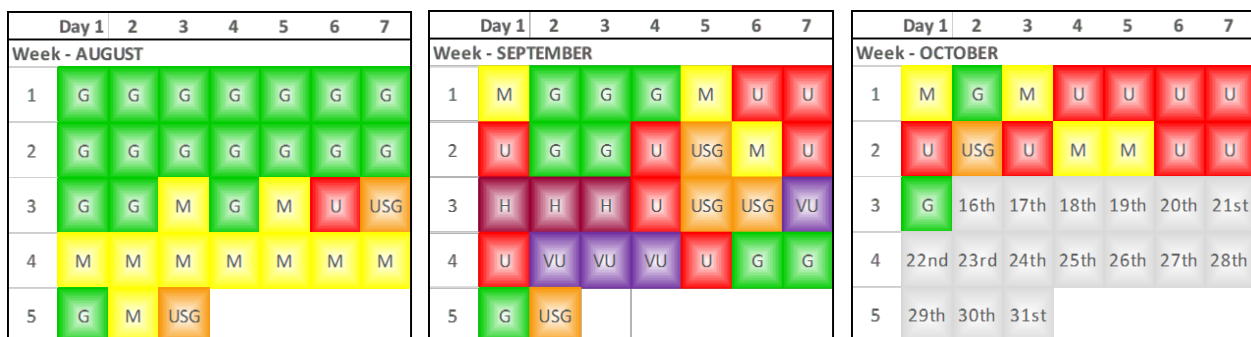


days with single or combined exceedances on the Reservation. The highest PM10 levels reached the upper limit of the monitor. There were more than 17 days of “Unhealthy” air, four days of “Very Unhealthy”, and three days of “Hazardous” air. Fire danger in the 2nd half of 2020 was declared so high that the public were not allowed to enter most areas of Inyo National Forest after sweeping closure announcements by federal forestry managers. The persistence of warm, stagnant conditions well into October 2020 and nighttime inversions contributed to the duration of smoke levels.

Figure 6.3.16, below, shows the Air Quality Index (AQI) chart made in mid-October for this smoke event (based on PM concentrations recorded at the Tribe’s air monitoring station).

In 2021 there were 12 wildfires ranging in size from the 25-acre Pine Fire to the 963,306-acre Dixie fire that caused wildfire smoke exposure to the Tribe (BPT, 2021c). The 24-hour standards for both PM10 and PM2.5 were exceeded in August, September, and October on the Reservation, with both values exceeding 100 µg/m³ in August and September.

Figure 6.3.16. AQI for the Reservation Based on Bishop Paiute Tribe's Air Monitoring Station, August through October 2020.



The calendar days shown here are color-coded according to the following AQI categories as defined by the U.S. EPA: Good (green), Moderate (yellow), Unhealthy for Sensitive Groups (orange), Unhealthy (red), Very Unhealthy (purple), and Hazardous (maroon). More information on this index can be found at www.airnow.gov/aqi/aqi-basics/. Source: BPTMO (2026)



Figure 6.3.17. Image of the 2022 Airport Fire.



The Airport Fire, as captured from Tribal headquarters with a southeast-pointing air visibility camera, was an example of a rapidly suppressed nearby grassfire. Source: BPTMO (2026)

Most recently, the Garnet Fire, which started on Labor Day weekend 2025, doubled in size during the first week and reached just short of 60,000 acres by the middle of September. By September it was mostly contained according to details from Sierra National Forest daily reports. Like previous fires on the west side of the Sierra Crest, West winds and diurnal air shift patterns brought smoke to the Reservation area during the first and second weeks of September, with heavier smoke during the night and early morning hours (BPTMO, 2026). On Sunday, September 7th, 2025, the 24-hour midnight-to-midnight AQI based on PM_{2.5} was “Unhealthy”/red, and going into the first hours of September 8th, there were some hours of “Very Unhealthy”/purple at the 24-hour scale on a rolling average basis. Air Resource Advisors for U.S. Forest Service who are assigned to selected fires create daily smoke forecasts and sometimes use the BPT air monitoring data as part of their determinations. **Figure 6.3.18** below is an excerpt from one of their Smoke Outlooks for September 9th, 2025.



Figure 6.3.18. Smoke Outlook for Bishop Region, September 9, 2025.



Source: BPTMO (2026)

Other air quality impacts

On the Bishop Paiute Reservation, impaired air quality due to PM₁₀ is episodic. The 2018 PM Trends Analysis demonstrated that the highest PM₁₀ one-hour (1-hr) concentrations were associated with winds or storm fronts. Wind-driven PM₁₀ episodes may reach the Reservation from the Owens Dry Lake, nearby barren areas, or from as far as Mono Lake shore.

The majority of sub-exceedance PM_{2.5} concentrations, based on comparison to the Tribe's 24-hour midnight-to-midnight daily average standard, are driven by winter inversions trapping residential woodsmoke. Smoke from cold-season wood burning for home heating is an area-wide phenomenon which includes the Reservation. Many



Valley residents heat their homes with wood or pellet stoves. Backyard and wood burning are a staple cold-season activity which supports fuels reduction and home heating on the Reservation. BPTMO has coordinated backyard burning permits for residents with the Bishop Rural Volunteer Fire Department since 2003. Efforts were recently furthered by the Tribe's own wood splitting yard program, initiated in 2024, and Hazardous Fuels Reduction activities (active previously in 2001, 2009, and again since 2019; mostly via CAL FIRE). Typical fuels on Tribal residence properties include willow coppices, fallen branches, tree stumps, and leaves from trees such as locusts and large cottonwoods and some conifers, field grasses, invasive weeds, and riparian vegetation.

Summary

Climate change impacts the culture, lives, environment, and health of the Bishop Paiute Tribe. The Bishop Paiute people continue to work to protect and enhance the natural resources and habitat of the Owens Valley. Because climate change is deeply affecting the environment and altering and disrupting the ecosystems within and around the Owens Valley, the Bishop Paiute community is actively working to understand, adapt to, and mitigate the effects of climate change and other impacts to their lands. Their goal is to continue to manage and protect their traditional lands and limit the impact climate change is having on the Bishop Paiute people's right to hunt, fish, and gather from their land—something that is integral to their culture, well-being and livelihood.

For more information contact:



Bishop Paiute Tribe Environmental Management Office
50 Tu Su Lane
Bishop, CA 93514
(760) 873-3584
<http://www.bishoptribeemo.com>

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Appendix

*The following information was included in the main body of the previous version of Impacts of Climate Change on the Bishop Paiute Tribe (2022). As discussed in the **Background** section of this report, the Bishop Paiute Tribe is not as directly dependent on the Owens Valley groundwater basin as other tribes to their south. While it does not comprise one of their greatest direct climate change concerns currently, they are still involved in conversations and agreements that affect Owens Valley groundwater as part of the broader region. They work to support the Lone Pine Paiute-Shoshone Tribe to their south, who faces more direct impacts to land, water, air, and correspondingly the health of their culture and people, due to LADWP water extraction. Therefore, this section is included in the Appendix.*

Owens Lake water management background

Owens Lake held water continuously, and at times overflowed to the south, for at least 800,000 years prior to 1913 (Smith et al., 1993). In 1913, the Los Angeles Department of Water and Power (LADWP) began pumping Owens Lake, which at the time spanned 108 square miles (approximately one third the size of Lake Tahoe), to provide water to Los Angeles. By 1926, the lake was dry (Reheis et al., 1995). In 1970, a second aqueduct that mainly pumps groundwater from the Owens Valley for use in Los Angeles was added. Water export prior to state-ordered control measures in the 1990s intensified the effects of periods of low or no precipitation in the Eastern Sierra.

Prior to the 1997 State Implementation Plan, Owens Lake produced 94% of the inhaled PM10 in the Owens Valley (US EPA, 2017). Currently, lakebed levels are modulated in response to Air Pollution Control District control measures. **Figure 6.3.A-1** and **Figure 6.3.A-2**, below, show the Lake as it has been in recent years; partially inundated. In the 2016 State Implementation Plan Supplement, the district divided the region into two areas. The northern area, encompassing the Bishop Paiute Reservation, is in attainment of PM10 standards while the southern area containing Owens Lake is in nonattainment (Owens Valley Planning Area). Bishop does not suffer from the same degree of PM10 pollution as its southern neighbors, except during occasional wind-driven dust events.



Figure 6.3.A-1. Image of Water in Owens Lake As Seen From an Air Quality Camera on January 26, 2026.



Owens Lake has been partially filled since 2017. Source: GBUAPCD (2026)



Figure 6.3.A-2. Aerial Image of Owens Lake.



This image shows an aerial view of Owens Lake published in 2025. The inundated area changes over time. Circle markers are for National Ambient Air Quality Standards PM10



monitoring stations around Owens Lake. Hatch markings indicate an area 3 km from the 3,600 ft elevation regulatory shoreline. Source: NASEM (2025)

Cumulative impacts to the Owens Valley ecosystem

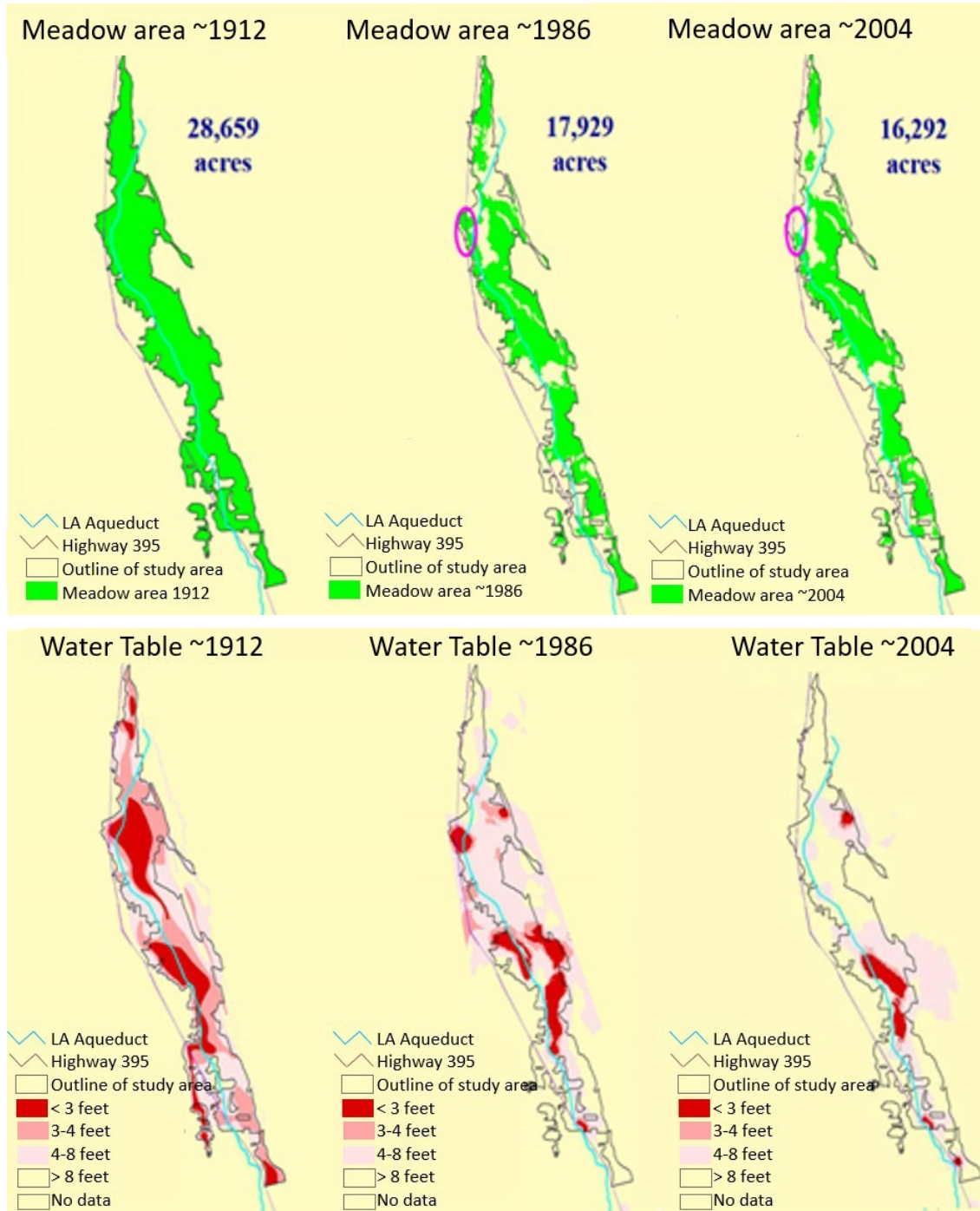
Ecosystems which tribes in the Payahuunadü depend on have suffered from water deficits during years of low precipitation exacerbated by the anthropogenic drought caused by pumping of the Owens Valley groundwater for use in Los Angeles. The entire region experienced a 6-year drought (1987–1992), during which annual precipitation was below the 50-year median of 7.12 inches (USGS, 1998). Elmore et al. conducted a 16-year study which documented an increase in the depth to the groundwater table—associated with increased groundwater pumping—and analyzed changes in vegetative cover. The study found plant cover to be correlated with groundwater depth, indicating that pumping exacerbates drought impacts to vegetation in the Owens Valley (Elmore et al., 2006).

As the Owens Valley climate continues to change, becoming warmer and dryer, the Valley meadows are disappearing, and the Tribe is seeing a desertification of the area. The Tribe knows that with sufficient water in the area, the meadows and grasses would thrive again (Bengochia, 2021). As shown in [Figure 6.3.A-3](#), below, reductions in meadow vegetative cover have occurred alongside dropping water table levels. In 1912, a former United States Geological Survey (USGS) hydraulic engineer created maps showing ground water depths and vegetation types (Lee, 1912). Digitized versions of these maps are used here to compare ground water and meadow ecosystems. The maps in [Figure 6.3.A-3](#) allow a comparison of the area occupied by meadows in 1912, 1986, and 2004. The 1912 map shows the baseline of the grasslands. The 1986 and 2004 maps, based on monitoring by LADWP, show substantial grassland loss within the area known as Blackrock 94, which is highlighted in pink and shown in a photograph in [Figure 6.3.A-4](#).

Due to groundwater pumping, water tables have gotten deeper and areas with shallow groundwater (less than 3 feet) have decreased substantially. The lack of groundwater corresponds to the lack of meadow in the same area.



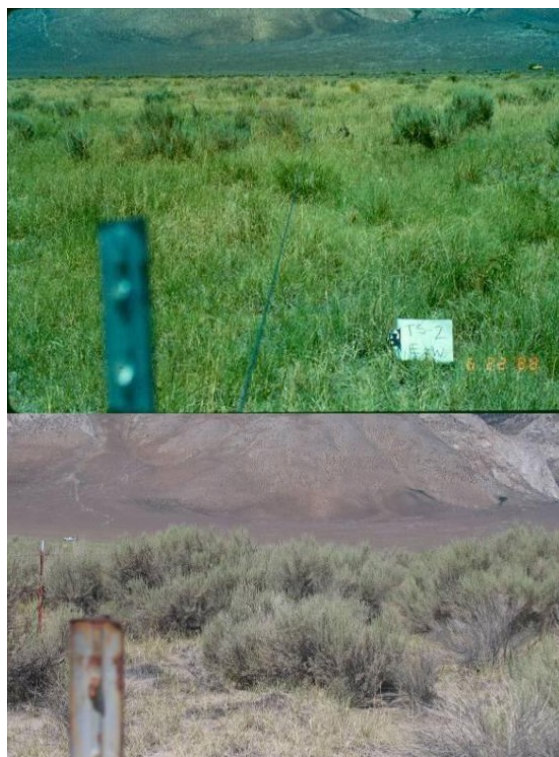
Figure 6.3.A-3. Changes in Owens Valley Meadows (Top) and Depth to Groundwater (Bottom).



Top: areas occupied by meadows are in green and Blackrock 94 is circled in pink. Source: Manning (2012); digitized maps from Lee (1912)



Figure 6.3.A-4. Blackrock 94 Area in June 1988 (Top) and June 2007 (Bottom).



In 1988 the area had 33% vegetation coverage, dominated by green grass with 4% shrubs. By 2007 vegetation coverage was reduced to 15% in the same area, consisting of around 11% shrubs and around 3% grass. Source: Manning (2012)

Maps more recent than 2004 showing data that can be compared to [Figure 6.3.A-3](#) are not currently available. This is partly due to changes in the methods of data collection. It is noteworthy to mention that some groundwater data recently collected from County of Inyo Water Department suggests that from 2021 to 2022 the average basin groundwater table was reduced by an average of approximately 2 feet (ICWD, 2021b). The Owens Valley is a closed basin that has been drained over the past 100 years and the continuation of pumping is leading to a reduction of vegetation diversity including culturally important plants in the Payahuunadü.

Though it is generally rare in California, alkali meadow is a major vegetation type in Owens Valley, and on the Bishop Paiute Reservation. The Owens Valley has 67% of



the alkali meadow in California. In the 1980s, LADWP biologists mapped at least 70,000 acres of Valley floor as dominated by California native grasses, supported by Owens Valley's naturally shallow groundwater (Davis et al., 1998). These meadows are home to species of cultural importance and conservation concern, both plants such as the Owens Valley checkerbloom and the Inyo County star tulip, and animals such as Owens Valley vole, northern harrier and red shouldered hawk (Elmore et al., 2006).

Meadows are a biodiverse habitat that sustain common as well as rare species. Owens Valley meadows are dominated by one or both native perennial grass species: saltgrass (*Distichlis spicata*) and alkali sacaton (*Sporobolus airoides*). Both are hardy species, with roots growing to approximately 2 meters. Other common grasses in meadows include Beardless wildrye (*Leymus triticoides*), Baltic rush (*Juncus balticus*), scratchgrass (*Muhlenbergia asperifolia*), basin wildrye (*Leymus cinereus*), and, to a lesser extent, alkali cordgrass (*Spartina gracilis*). Irises, lilies, and broad-leaved herbaceous plants intermingle with the grasses.

Other meadow species include:

- Alkali mallow (*Malvella leprosa*)
- Fish Slough milk vetch (*Astragalus lentiginosus ssp. Piscinensis*)
- Hall's meadow hawksbeard (*Crepis runcinata ssp. Hallii*)
- Inyo County star-tulip (*Calochortus excavatus*)
- Nevada blue-eyed grass (*Sisyrinchium halophilum*)
- Owens Valley checkerbloom (*Sidalcea covillei*)
- Saltmarsh bird's-beak (*Cordylanthus maritimus* Nutt. ex Benth.)
- Stinkweed (*Cleomella*)
- Wild licorice (*Glycyrrhiza lepidota* Pursh)
- Yerba mansa (*Anemopsis californica*)

Native shrubs include:

- Rabbitbrush (*Chrysothamnus nauseosus*)
- Nevada saltbush (*Atriplex lentiformis ssp. torreyi*)

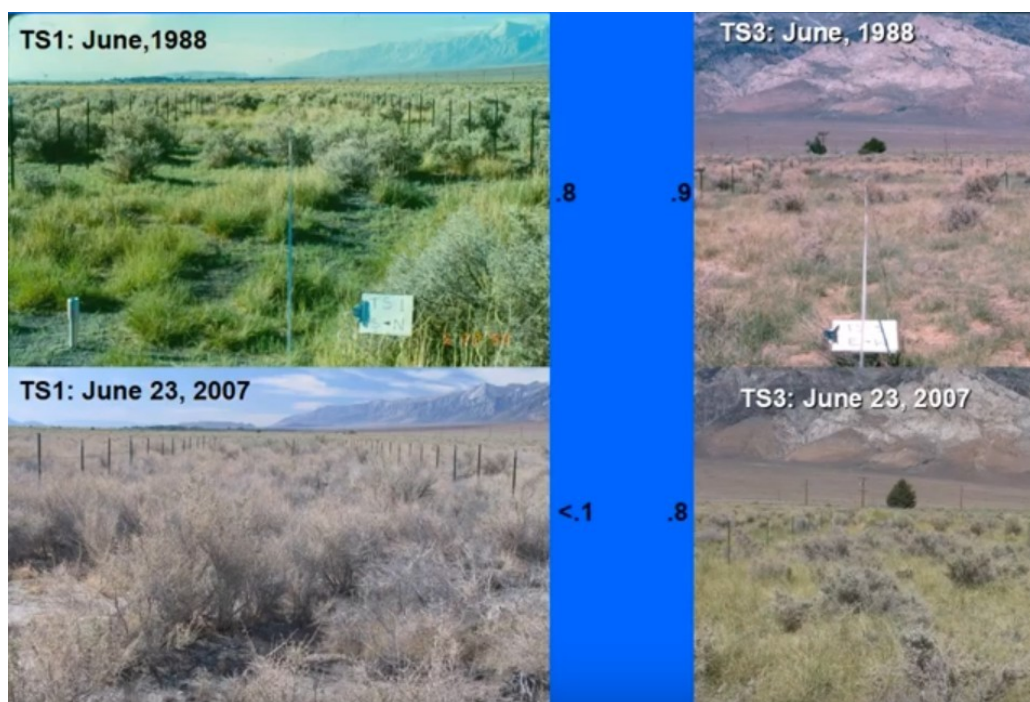


- Greasewood (*Sarcobatus vermiculatus*)
- Sagebrush (*Artemisia tridentata*)

Of these species, the annual species *Malvella*, *Cleomella*, *Cordylanthus* are less tolerant of changes to water and are more likely to be lost as meadows are deprived of water. The Bishop Paiute Tribe has translocated many of these species to the COSA to attempt to preserve them.

As non-native vegetation dominates, the Valley is less resistant to fire. The roots of meadow grasses have evolved to tap into the historically shallow (8 feet) ground water of the area, while the roots of the encroaching shrubs can burrow deeper for water. In early July 2007, the Inyo Complex fire burned over 35,000 acres including a vegetation study area. **Figure 6.3.A-5**, below, shows two sites in the study area (TS1 and TS3) in 1988, when the grass-to-shrub ratios were similar in both locations (0.8 in TS1 and 0.9 in TS3).

Figure 6.3.A-5. Study Areas TS1 and TS3 Pre-fire.

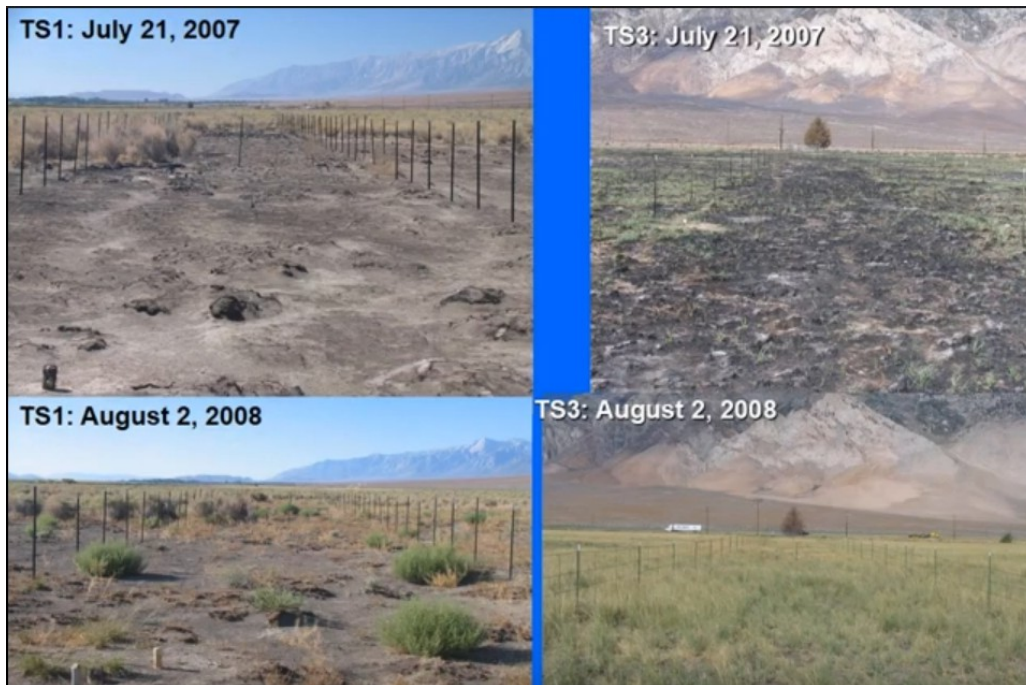


The numbers shown in the middle panel next to each photo are the grass-to-shrub ratios: for TS1, 0.8 in 1988, <0.1 in 2007; for TS3, 0.9 in 1988, 0.8 in 2007. Source: Pritchett and Manning (2009)



By 2007 site TS1 had been over pumped, and this anthropogenic climate change impact had promoted the growth of shrubs such as tumbleweed, resulting in a grass-to-shrub ratio of less than 0.1. In site TS3, an area that had been better managed and allowed more water, native grasses were nearly as abundant as they were in 1988. The top photos of **Figure 6.3.A-6**, below, show both the TS1 and TS3 areas soon after the Inyo Complex burned through the area. A year later (bottom photos) area TS1, which had been populated by non-native shrubs, still looked barren while area TS3, populated by native grasses, had nearly recovered.

Figure 6.3.A-6. Areas TS1 and TS3 After the Inyo Complex Fire.



Source: Pritchett and Manning (2009)

