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Sheep Replace Pronghorn: An Environmental History of the Mono Basin Robert B. Marks¹

Environmental history examines the relationships of humans to the natural environment. It is concerned with understanding the environmental circumstances that condition the ways in which humans are able to obtain their subsistence, and the extent to which the ways they do so changes the environment. Sometimes humans have a very light, and ultimately sustainable, touch on the environment, and sometimes their environmental impact is heavy and not sustainable, threatening the environmental underpinnings of human societies. To gauge the history of human impact on the environment, a major task is reconstructing past environments. Written sources are useful, but when they are missing or silent, archeological and paleobotanical findings can be used. Much environmental history also involves the contact and confrontation of peoples with very different ways of relating to the environment and different technological and military powers, resulting in culture clash and environmental change.² In this article, I examine the ways in which the hunting-gathering people of the Mono Basin lived before their way of life and environment was overturned by the nineteenth-century arrival of Euro-American settlers with vastly different ways of interacting with the environment.

For several millennia, the Kutzadika^a people have continuously inhabited the Mono Basin. They are arguably the aboriginal people there, and linguistically related to some 23 food- and area-named Northern Paiute groups in the western-most Great Basin and southeastern Oregon.³ Until about the last 150 years, the Kutzadika^a (a native name that translates as ‘eaters of brine fly pupae’) gathered and hunted, and knew the ecology of the basin so thoroughly that the plants and animals in the basin were able to provide the Kutzadika^a adequate food supplies to support themselves. Trade and exchanges with related peoples in the Yosemite Valley, Big Meadow (Bridgeport), Walker Lake (in what is now Nevada), and the Owen’s Valley supplemented their food supply and social contacts. This article examines the long-term relationship of the Kutzadika^a with a lesser-known food supply—the pronghorn antelope—and how changes to the ecology of the Mono Basin in the second half of nineteenth century deprived the Kutzadika^a of their access to pronghorn and other food sources. The driving force of that change was not unsustainable use by the Kutzadika^a—for their millennia-long presence in the Mono Basin points to a more sustainable use of resources there—but to the actions of Euro-American settlers, ranchers, farmers, and miners who came into the Mono Basin following the Gold (and silver) Rush, in particular their introduction of exotic plants and animals into Mono Basin ecosystems.

Figure 1. Mono Basin (Google Earth)

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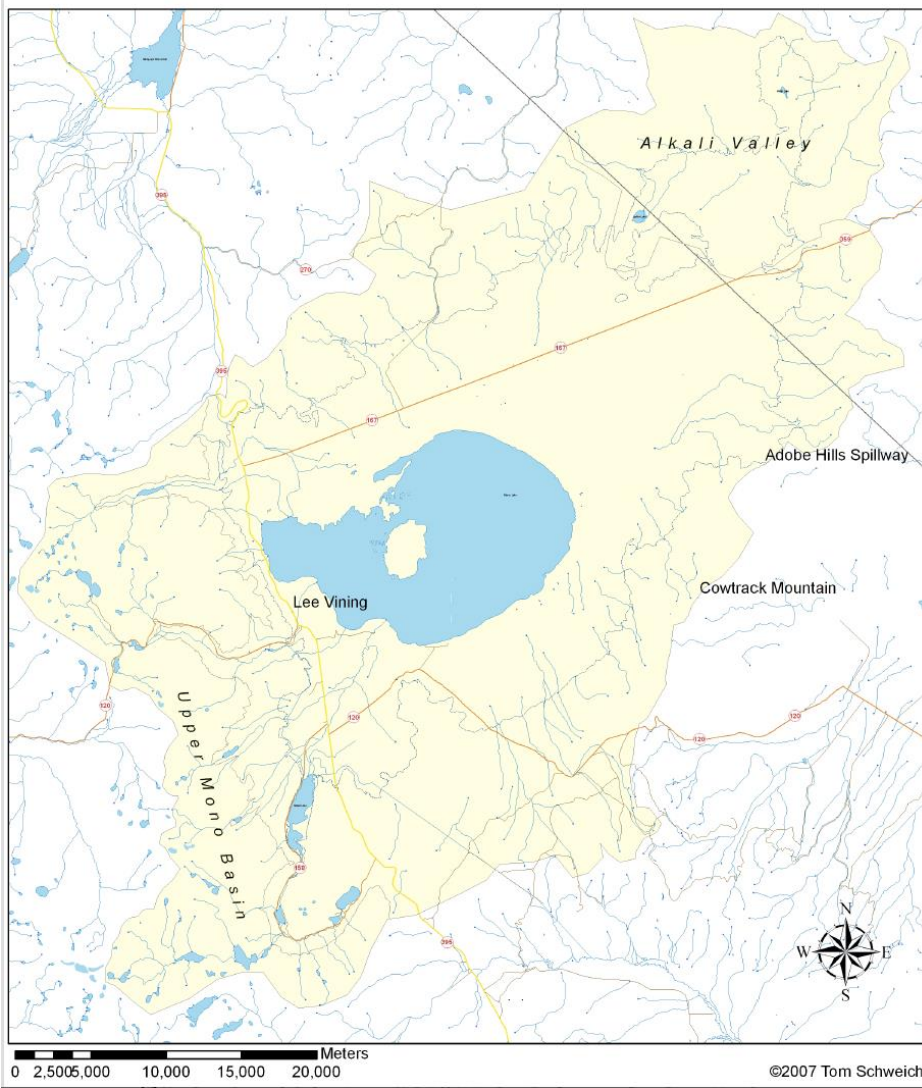
² Robert B. Marks, *China: An Environmental History* (Lanham, MD: Rowman and Littlefield, 2017).

³ Catherine S. Fowler, “Subsistence,” in Warren L. d’Azevedo, ed., *Handbook of North American Indians, Vol. 11 (Great Basin)* (Washington, D. C.: Smithsonian Institution Press, 1986), 64-97. See also Joseph Lent, “The Ever-Changing World of the Paiute,” *Eastern Sierra History Journal*, Vol. 1 (2020), Article 3.



Source: Google Earth

Figure 2. Mono Basin Watershed



Source: Tom Schweich. Used with permission.

The Mono Basin⁴

Lying at about 6400 feet above sea level in a high desert, the Mono Basin is composed of an ancient lake and its surrounding drainage system; it is located to the east of Yosemite National

⁴ For overviews, see the “Mono Basin” entry in Wikipedia, as well as Mary Hill, *Geology of the Sierra Nevada* (Berkeley and Los Angeles, CA: University of California Press, 2006): 323-333. For more detailed studies see David W. Winkler, ed. *An Ecological Study of Mono Lake, California* (Davis, CA: UC-Davis Institute of Ecology Publication, No. 12 June 1977); Israel C. Russell, *Quaternary History of the Mono Valley, California*. Extracted from the Eighth Annual Report of the United States Geological Survey, 1889 (Lee Vining, CA: Artemisia Press, 1984). Kevin Kuo, “Geology and Ecology of Mono Lake.” Paper written for Professors Michael Hamberger and John Rupp, GEOL-G190 (Summer 2013), accessed <https://sierra.sitohost.iu.edu/papers/2013/kuo.pdf> Nov. 11 2020; Tabitha Lukas, “The Role of Geology in Supporting Mono Lake’s Ecosystem.” <https://sierra.sitohost.iu.edu/papers/2003/Lucas.pdf> Accessed Nov. 10, 2020; David Carle, *Mono Lake Viewpoint* (Lee Vining, CA: Artemisia Press, 1992).

Park near the current town of Lee Vining and is on the western flank of the Great Basin, the area west of the Colorado Rocky Mountains and east of the Sierra Nevada Mountains. The Mono Basin is a “sink,” a depression formed at least 750,000 years ago by surface subsidence and bounded on its west by the Sierra Nevada Mountains and higher hills to the east, south, and north. The Mono Basin (and the Eastern Sierra in general) is in the “rain and snow” shadow of the towering Sierra Nevada mountains. While the amount of precipitation in the basin averages around ten inches per year, huge amounts of snow (averaging over 400” annually) can fall in the Sierra Nevada. Five streams carrying snow melt from the mountains empty into Mono Lake, which now measures 13 miles east to west, and about 8 miles north to south. Because there is no outlet, evaporation leaves behind salts and other minerals dissolved in the stream water, which over the millennia have concentrated, rendering the lake highly alkaline (“salty”)—more so than the oceans and only slightly less so than the Great Salt Lake. In recent times, the level of the lake has fluctuated because of both natural and human causes (Figure 3).

Figure 3. Recent Fluctuations of Mono Lake

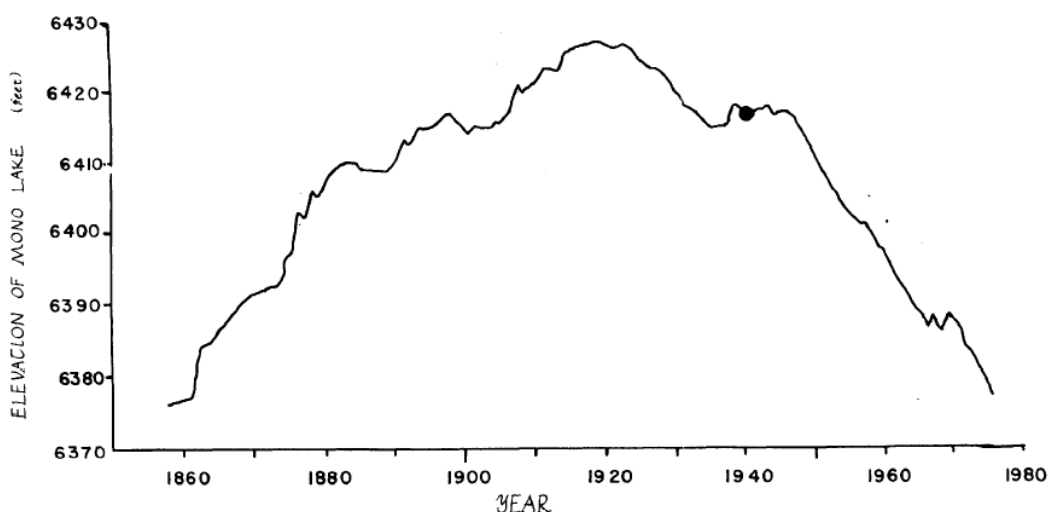


Figure 2-5. THE RECENT FLUCTUATIONS OF MONO LAKE. The dark circle at the year 1940 points out the lake elevation when diversions to Los Angeles began. (Taken from Harding, 1962)

Source: David W. Winkler ed., *An Ecological Study of Mono Lake, California* (Davis, CA: University of California, Dave Institute of Ecology Publication, No. 12: June 1977), 13.

Despite being highly alkaline, Mono Lake is not “dead,” but rather is a lively and unique ecosystem. Only one animal has evolved to be able live in the alkaline water, the brine shrimp (*Artemia monica*). These tiny creatures are about one-quarter of an inch long, and feed on the algae which grows in the lake during the spring and summer. The brine shrimp thrive on the algae, and because there are no competitors, each year trillions of brine shrimp are born, live, and

then die. They constitute a source of food for dozens of species of migratory birds. The other unique animal which depends on the lake is the alkali, or brine, fly (*Ephedra hians*), a species that inhabits the shores of the lake in huge numbers and has evolved in a life cycle that includes the ability to lay its eggs in the lake's waters near the shoreline. The eggs mature into larva which pupate and then emerge as alkali flies. These flies too are major food source for birds, and the pupae became a food source for humans too.

The area around the lake today is an environment largely defined as sagebrush scrub and alkali sink scrub, plant communities dominated by species that can live in the high desert environment.⁵ Slightly higher up in the hills are pinyon and juniper pine woodlands, and higher yet are Jeffrey pine forests. Riparian forests of aspen and willow line the lower reaches of mountain streams flowing into Mono Lake. All of these ecosystems support a variety of animals from insects to rodents, mammals, fish, birds, and their predators. In short, Mono Lake and its surrounding ecosystems support a large variety of plants and animals and constitute a lively if ultimately fragile environment.

Today, the area is designated the Mono Basin National Forest Scenic Area, within which is a California State Natural Reserve; both protected areas are now devoid of human settlements or development.⁶ Mono Lake and the basin are now a major tourist attraction because of the tufa, calcium carbonate towers that emerged into view as the lake level fell after 1941 with the Los Angeles Department of Water and Power began diverting most of the fresh water heading toward Mono Lake into a 300-mile long aqueduct watering LA.⁷

Two centuries ago, the people living in the Mono Basin had been there for millennia and had developed a particular relationship to their environment. Sometimes the environment would change in ways that would have forced the Kutzadika^a to adapt, such as by facing cooling climatic conditions.⁸ But the Mono Basin has undergone at least four significant anthropogenic environmental transitions leading to its current state.⁹ This article takes up the first of those transformations in the second half of the nineteenth century when Euro-American settlers moved into the basin and brought about significant environmental, demographic, and economic changes to the Mono Basin. To understand those changes, we need to understand first how the original

⁵ For an overview, see Helen Constantine, *Plant Communities of the Mono Basin* (Lee Vining, CA: Kutzavi Press, 1993). For a comprehensive list of plants, see Tom Schweich, ed., "Detailed Area Plant List for Mono Basin, Mono County, United States," <https://schweich.com/mlf0.html>, and his "Check List for Mono Basin, Mono County, United States," <https://www.schweich.com/checklistCAMnoMonoBasin.html>.

⁶ Mono Lake Tufa State Natural Reserve; Mono Basin National Forest Scenic Area.

[<https://www.parks.ca.gov/pages/514/files/MonoLakeFinalWebLayout2015.pdf>], accessed Jan 2, 2021

⁷ For that story, see John Hart, *Storm Over Mono: The Mono Lake Battle and the California Water Future* (Berkeley and Los Angeles: University of California Press, 1996).

⁸ Recent scholarship suggests that climatic changes affected hunter-gatherers less than settled farmers. J. Collette Berbesque, Frank W. Marlowe, Peter Shaw, and Peter Thompson, "Hunter-gathers have less famine than agriculturalists," *The Royal Society Biology Letters* 10 (1) Jan 2014: 20130853.

⁹ Those four are: (1) the transformation of land into a commodity and the introduction of exotic plants and animals in the second half of the nineteenth century, the topic of this article; (2) the transformation of water into a commodity and the maturation of the ranch and farm economy, 1900-1940; (3) the LA DWP diversion of nearly all fresh water from Mono Lake into the LA aqueduct, 1941-1994; (4) protection and restoration, 1994-present. I will take up these 20th-century phases in additional research and writing.

inhabitants of the Mono Basin secured their subsistence from the various ecosystems they found there.

Kutzadika^a and their sources of food.¹⁰

The people who inhabited the Mono Lake region called themselves Kutzadika^a; the name comes from one of their main sources of food and trade, the pupa of the alkali fly, which they called *kutzavi*. That was but one of the many and varied foods the Kutzadika^a gathered and hunted in the Mono Basin.

Prior to the arrival of Euro-Americans in the Mono Basin in the second half of the nineteenth century, there were 200 and maybe up to 300 Kutzadika^a living in and around Mono Lake. They were hunter-gatherers and had a seasonal round of food gathering around the lake. They were not transients, passing through the Mono Basin on their way to or from somewhere else. They had been in the basin for millennia, developing, as anthropologist E. L. Davis put it, “an encyclopedic knowledge of the ecology of which they formed a part.”¹¹ Not surprisingly, their “traditional ecological knowledge” has been tapped by modern ecologists for recent habitat restoration projects.¹² As Paiute Historic Preservation Officer Joseph Lent puts it, “The entire landscape within Paiute country was rolled out like a monumental history scroll, and the people knew how to read it....The tie between the people and the land was...intimate.”¹³

Kutzadika^a food gathering followed the seasons (Figure 4).¹⁴ After winters spent to the east of the lake,¹⁵ out of the shadows of the massive Sierra Nevada mountains and close to warm springs, in spring the Kutzadika^a trekked the 15 or so miles to the western shore of the lake where freshwater streams emptied into Mono Lake. Here animals too gathered after the winter—marmots, pika, sagehens and mule deer. Of special interest to the Kutzadika^a, following a long winter without fresh food, were the greens to be found in the freshwater deltas and meadows—wild onion, watercress, and in drier areas the bulb of the Mariposa lily. With the arrival of summer, the Kutzadika^a moved camp to grassy meadows in the Sierra foothills where women harvested the seeds of grasses, and men hunted deer and bighorn sheep in the mountains. In July of alternate years, following the life cycle of the Pandora moth, they would camp in the Jeffrey pine forests to the south to collect and preserve (by roasting) the Pandora moth caterpillars.¹⁶

¹⁰ “Kutzadika^a People: Living in Harmony with the Mono Basin.” *Mono Lake Newsletter*, Fall 1999.

¹¹ E. L. Davis, “Hunter-Gatherers of Mono Lake,” *The Masterkey* 36 (1962): 1, 23-28.

¹² Michele R. Slaton et al., “Traditional Ecological Knowledge Used in Forest Restoration Benefits Natural and Cultural Resources: The Interaction between Pandora Moths, Jeffrey Pine, People, and Fire,” *Natural Areas Journal*, Vol. 39 No. 4 (2019): 461-71.

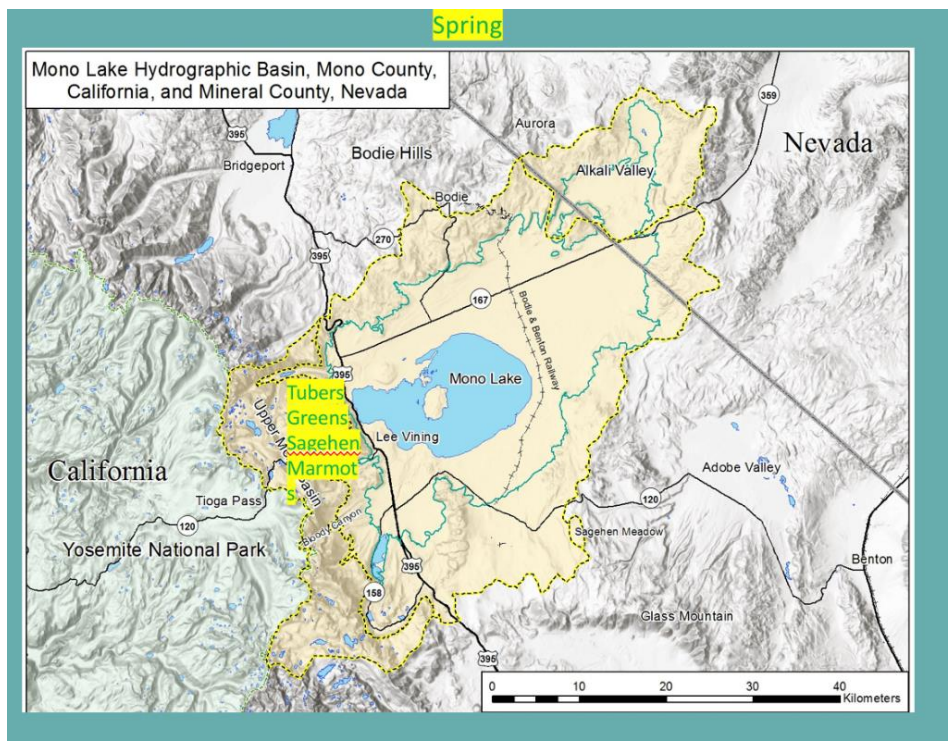
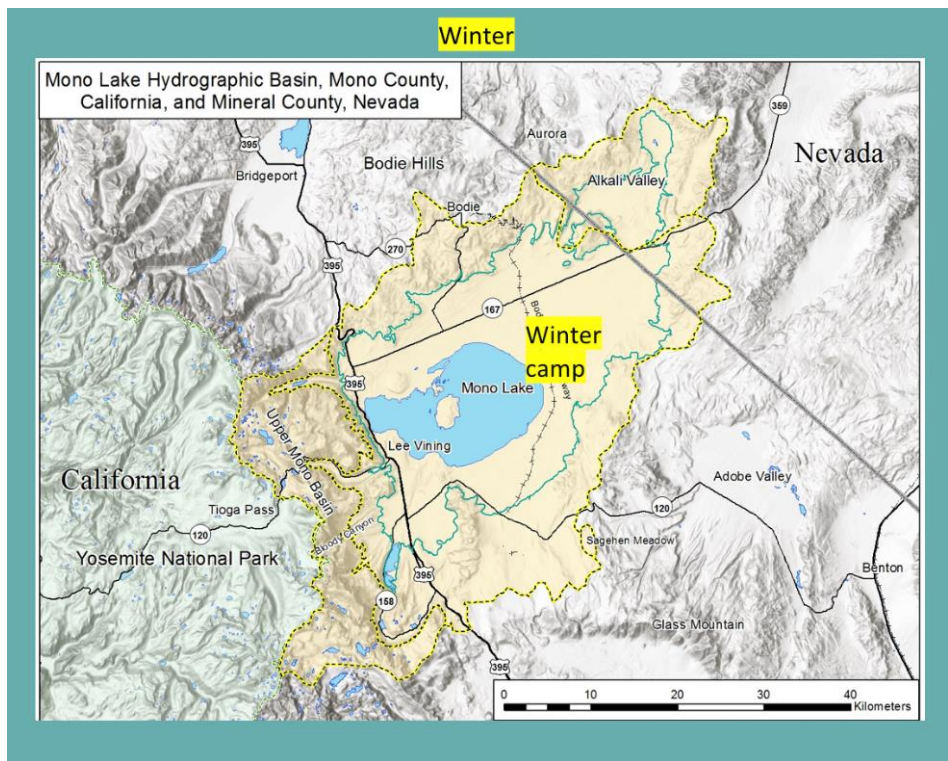
¹³ Lent, “The Ever-Changing World of the Paiute,” 1.

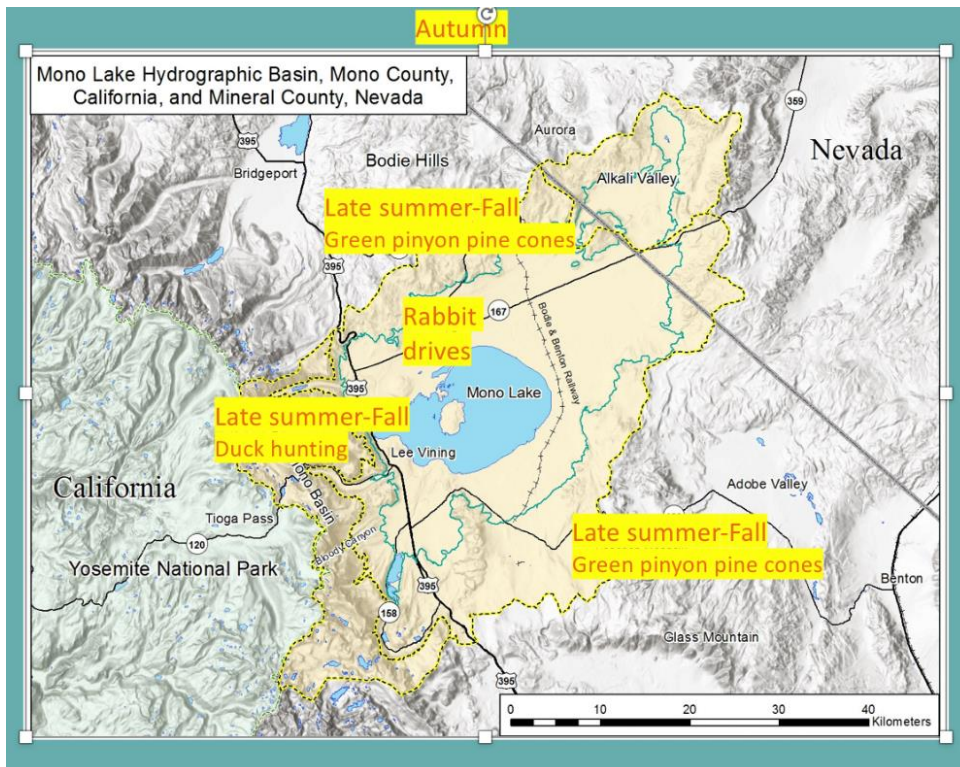
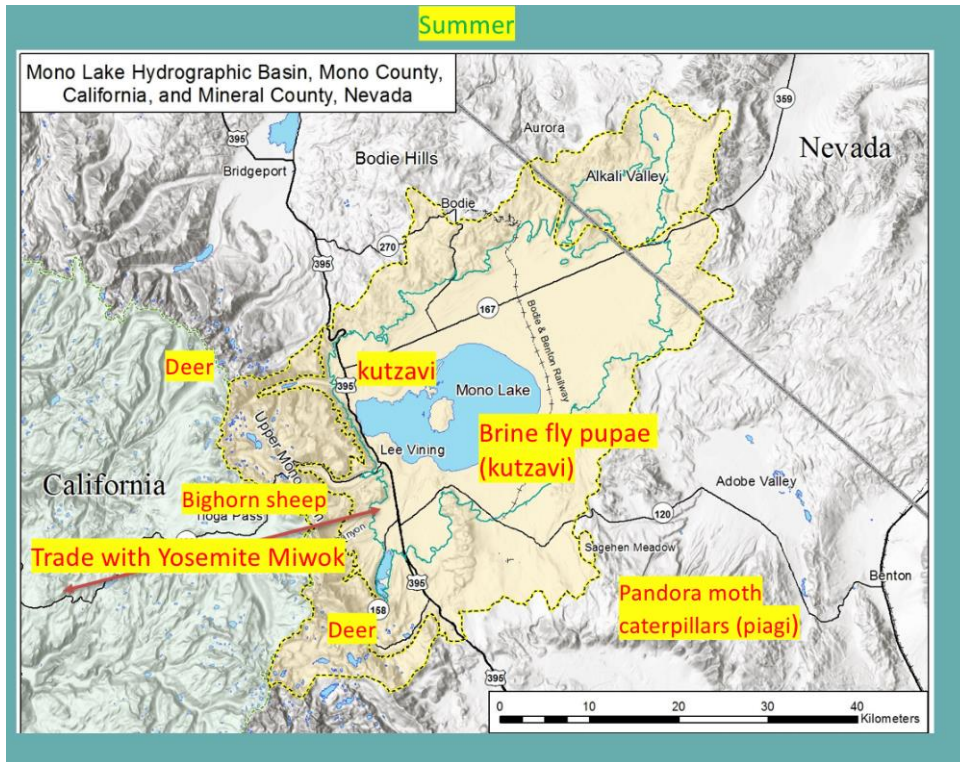
¹⁴ Richard Logan, “The Seasonal Round,” in E. L. Davis, “An Ethnography of the Kutzadika Paiute of Mono Lake, Mono County, California” (Department of Anthropology, University of California *Anthropological Papers* 75 June 1965): 29-37; Raymond Andrews, “Mono Lake Kutzadika^a,” print available at the Mono Basin Historical Society, Lee Vining, CA; and John Hart, *Storm Over Mono: The Mono Lake Battle and the California Water Future* (Berkeley and Los Angeles: University of California Press, 1996): 22-24.

¹⁵ Brooke S. Arkush, “Historic Northern Paiute Winter Houses in Mono Basin, California,” *Journal of California and Great Basin Anthropology*, Vol. 9, No. 2 (1987): 174-87.

¹⁶ Richard A. Weaver, and Mark E. Basgall, “Aboriginal Exploitation of Pandora Moth Larvae in East-Central California,” *Journal of California and Great Basin Anthropology*, Vol. 8, No. 2 (1986): 161-179.

Figure 4. The Kutzadika^a Annual Round of Food Gathering and Hunting





In late summer came the alkali fly-pupae (*kutsavi*) harvest on the shores of Mono Lake. Detaching themselves from the rocks, the pupae float to the surface and are pushed by winds to the shore where they piled up. Adult flies emerged from some of the pupae, and Kutzadika^a women scooped up huge numbers of the quarter-inch pupae which were then sun dried and stored in baskets or bags. The *kutsavi* were a major food source for the Kutzadika^a, seeing them over the winter and being traded to Sierra Miwok groups, especially those in the Yosemite Valley. The Miwok too had their own major food source in the acorns of the black oak,¹⁷ which they traded with the Kutzadika'a.

As mentioned above, Mono Lake itself produces abundant sources of food that support numerous bird populations, and they were hunted too. Today, those most often mentioned are three migratory species: California gulls, phalaropes, and grebes. Despite their vast numbers, the gulls probably were not major food sources for the Kutzadika^a. The grebes and phalaropes are small birds that stay pretty much on the water, and the California gulls nest on islands in the lake (in particular Negit and Poaha islands) protected from mainland predators, coyote and human alike. But migrating ducks and geese too gathered in huge numbers on Mono Lake. These are seen in smaller numbers today, but flocks of ducks in the millions had stopped over at Mono Lake; large flocks of geese too would have come ashore for the grasses. Catching or shooting ducks or geese with bow and arrow no doubt required considerable skill, but there is no reason to doubt that Kutzadika'a hunters had the requisite ability to add those to their diet. In addition to ducks, faunal remains of birds at Kutzadika^a sites include grebes and shovelers.¹⁸

Another major but more erratic food source was pine nuts from the cones of the pinyon pine tree. These did not produce annually but could skip a year. But when they did reproduce, the vast groves of pinyon pine in the hills around Mono Lake yielded nut-bearing cones. The Kutzadika^a then would camp among the trees, knock the green cones off with a stick, gather them into piles and then burn them to release the nuts. The nuts would be packed back down to their autumn encampments by the lake, with the remainder left in the pits to be reclaimed over the winter.¹⁹ The roasted pine nuts could be eaten immediately or stored, and like acorns were ground into a flour that could be baked or added to other ingredients to make soups and stews.²⁰

In Kutzadika^a oral histories, and the accounts of twentieth-century ethnographers, early- to mid-autumn was the time when sufficient food had been gathered to bring the whole community together for feasting, games, socializing, ceremonies, and songs. These oral histories also note that the autumn harvest gathering was a time for rabbit drives—needing large numbers of people to carry out such communal—and subsequent rabbit feasts.

¹⁷ Jefferson W. Haney, "Acorn Exploitation in the Eastern Sierra Nevada," *Journal of California and Great Basin Anthropology*, Vol. 14, No. 1 (1992): 94-109.

¹⁸ Brooke S. Arkush, *The Archeology of CA-MNO-2122: A Study of Pre-Contact and Post-Contact Lifeways among the Mono Basin Paiute* (Berkeley and Los Angeles: University of California Press, 1995): 65-68.

¹⁹ Jelmer W. Eerkens, Jerome King, and Eric Wohlgenuth, "The Prehistoric Development of Intensive Green-Cone Pinon Pine Processing in Eastern California," *Journal of Field Archeology*, Vol. 29, No. ½ (2004): 17-27.

²⁰ Jefferson W. Haney, "Acorn Exploitation in the Eastern Sierra Nevada," *Journal of California and Great Basin Anthropology*, Vol. 14 No. 1 (1992): 94-109.

These stories and traditional accounts of the annual round of food gathering and hunting typically end with the Kutzadika^a preparing their winter abodes with stored foods on the eastern side of the lake, setting the stage for the next season round of life to begin when another spring finally arrived. But more recent archeological work has highlighted another little-discussed source of food for the Kutzadika^a assembled for the autumn harvest festivities—pronghorn (antelope).

Pronghorn Antelope

Early Euro-American settlers called these animals “antelope,” in part because of apparent similarities with African antelope. In California, numerous places are named “Antelope Valley,” giving some idea of their ubiquity in earlier times. But the pronghorn are a separate species (*Antilocapra Americana*), and evolutionary biologists know that they are indigenous to North America. Archeologists and anthropologists have followed the biologists’ lead and now call these animals pronghorn, or pronghorn antelope.

Figure 5. Pronghorn



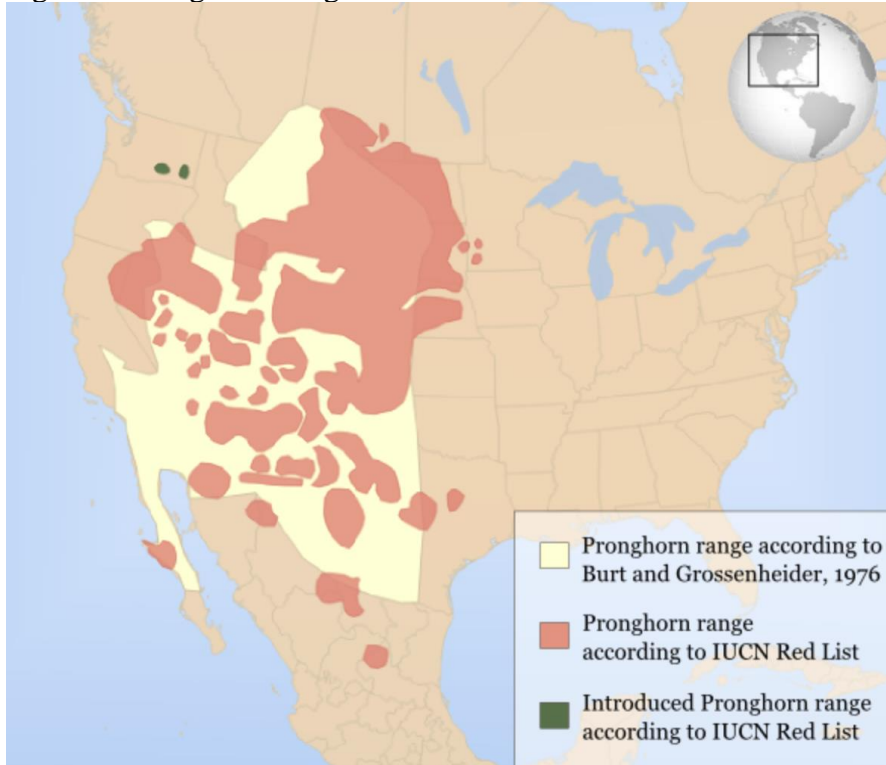
Source: <https://www.nature.org/en-us/get-involved/how-to-help/animals-we-protect/pronghorn/>

Pronghorn are migratory ungulates (grazers); adult males stand 2.5-4 feet tall and weigh about 90-140 pounds, with mature females growing to the same height but weighing from 75 to 105 pounds. They evolved in North America a million or so years ago when there were very fleet-footed predators. To survive, they developed the ability to run at speeds up to 60 miles per hour, which is the fastest of any current North American land animal.

Figure 6 shows the historic and current range of pronghorn. Estimates of prehistoric herds ranged from 20-40 million, and in the Great Basin alone there were an estimated 250,000-350,000.²¹ Archeological evidence, largely from the Great Plains, suggests that pronghorn have been hunted for at least 5000 years. And as I’ll discuss more below, there is firm evidence of pronghorn in the Mono Basin and neighboring areas, and that they were hunted on a regular basis.

²¹ For example, the entry for “Pronghorn” on the Yellowstone National Park web page estimates 35 million in prehistoric times, and 500,000 currently. [<https://www.nps.gov/yell/learn/nature/pronghorn.htm>], accessed Jan 3, 2021. However, many there were in the Great Basin, the question is whether native peoples’ hunting of them was sustainable on an annual basis. The available scholarship suggests that it was. Brian Hockett and Timothy W. Murphy, “Antiquity of Communal Pronghorn Hunting in the North-Central Great Basin,” *American Antiquity* 74 (4) (October 2009), 708-734. Brooke S. Arkush, “Aboriginal Exploitation of Pronghorn in the Great Basin,” *Journal of Ethnobiology* 6(2) (Winter 1986), 239-255.

Figure 6. Pronghorn Range in North America



Source: <https://en.wikipedia.org/wiki/Pronghorn#/media/File:PronghornRange.png>

Given their speed, it must have been exceedingly difficult for a single hunter or even a group of hunters, armed with bow and arrow or atlatls and darts, to kill pronghorn. Like other predators, humans might have been able to pick off much slower old, infirm, or young pronghorn. Perhaps for this reason, and the numbers of pronghorn migrating through the Mono Basin, Kutzadika^a there and their kindred elsewhere in the Great Basin used a different method and technology for capturing and killing pronghorn: traps and communal hunts.

Communal Pronghorn Hunts²²

In the 1980s, a young archeologist working on his PhD dissertation, Brooke S. Arkush, did his fieldwork to the east of Mono Lake looking for evidence of pronghorn traps.²³ Such traps had been discovered further east near what is now Hawthorne, NV, and Philip Wilke, his Ph.D. advisor suggested that Brooke look in the Mono Basin area. He did, and there he found evidence

²² Patrick M. Lubinshi, "The Communal Pronghorn Hunt: A Review of the Ethnographic and Archeological Evidence," *Journal of California and Great Basin Anthropology*, Vol. 21, No. 2 (1999): 157-81.

²³ Brooke S. Arkush, *The Archeology of CA-MNO-2122: A Study of Pre-Contact and Post-Contact Lifeways among the Mono Basin Paiute* (Berkeley and Los Angeles: University of California Press, 1995); Brooke S. Arkush, "Communal Pronghorn Hunting in the Great Basin: What Have We Learned Over the Last Twenty-Five Years?" *Pacific Coast Archeological Society Quarterly*, Vol. 49, No. 3 (2014): 1-19.

of three pronghorn traps and an early historic wild horse catch pen that was modeled on prehistorical pronghorn trap designs.

It turns out that native peoples throughout the Great Basin and into the Great Plains had used pronghorn traps for many centuries (see Figure 7).

Figure 7.

THE COMMUNAL PRONGHORN HUNT

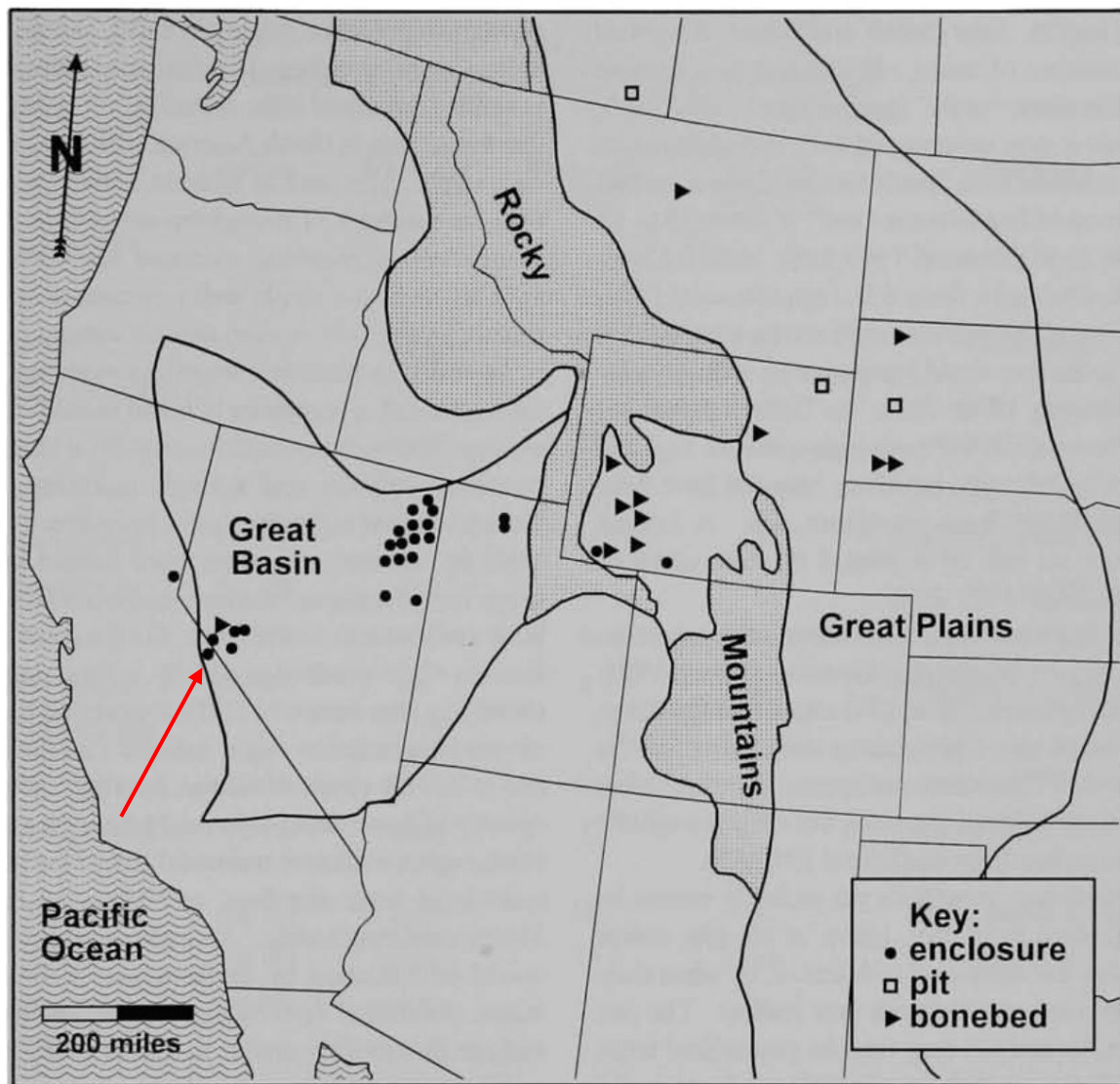


Fig. 3. Distribution of extant pronghorn traps and bonebed sites in western North America. The enclosures and pits are listed in Appendix 2 and the bonebed sites in Table 2.

Source: Patrick M. Lubinshi, "The Communal Pronghorn Hunt: A Review of the Ethnographic and Archeological Evidence," *Journal of California and Great Basin Anthropology*, Vol. 21, No. 2 (1999): 167.

This map was published in 1999 based on evidence that was then available; since that time many more pronghorn traps have been found in the Great Basin. The red arrow on Figure 7 shows the

location of the traps found in the Mono Basin on the western edge of the Great Basin. Figure 8 shows the locations of additional pronghorn traps found more recently in areas near the Mono Basin.²⁴

Figure 8. Additional Pronghorn Traps Near the Mono Basin

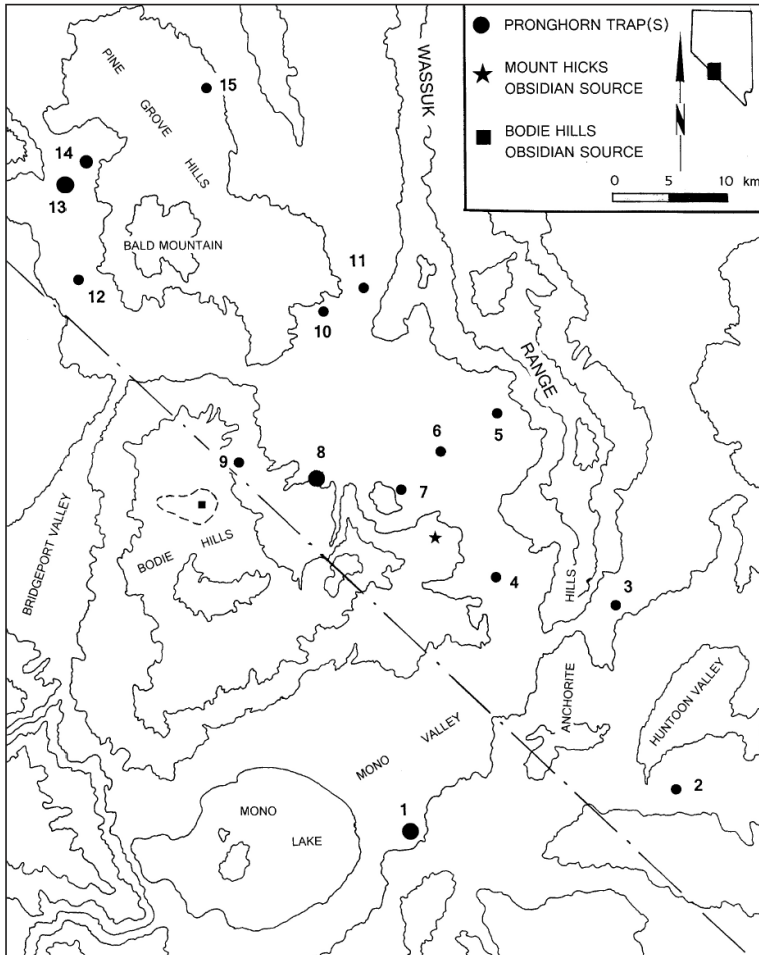


Figure 5. Locations of pronghorn traps and obsidian sources in the Wassuk Range/Mono Lake area. Numbered sites are as follows: 1) East Mono Basin Complex (3 traps); 2) Hunttoon; 3) Little Whisky Flat; 4) Alkali Lake; 5) Borealis Mine; 6) Mud Spring; 7) Aurora Crater; 8) Tunna Nosi Complex (7 traps); 9) China Camp Complex (2 traps); 10) Aldrich Grade #2; 11) Aldrich Grade #1; 12) Round Mountain; 13) Garden Canyon Complex (3 traps); 14) Wiley Ranch Complex (2 traps); and 15) Rockland. Some information used for compiling map courtesy of Clifford Shaw.

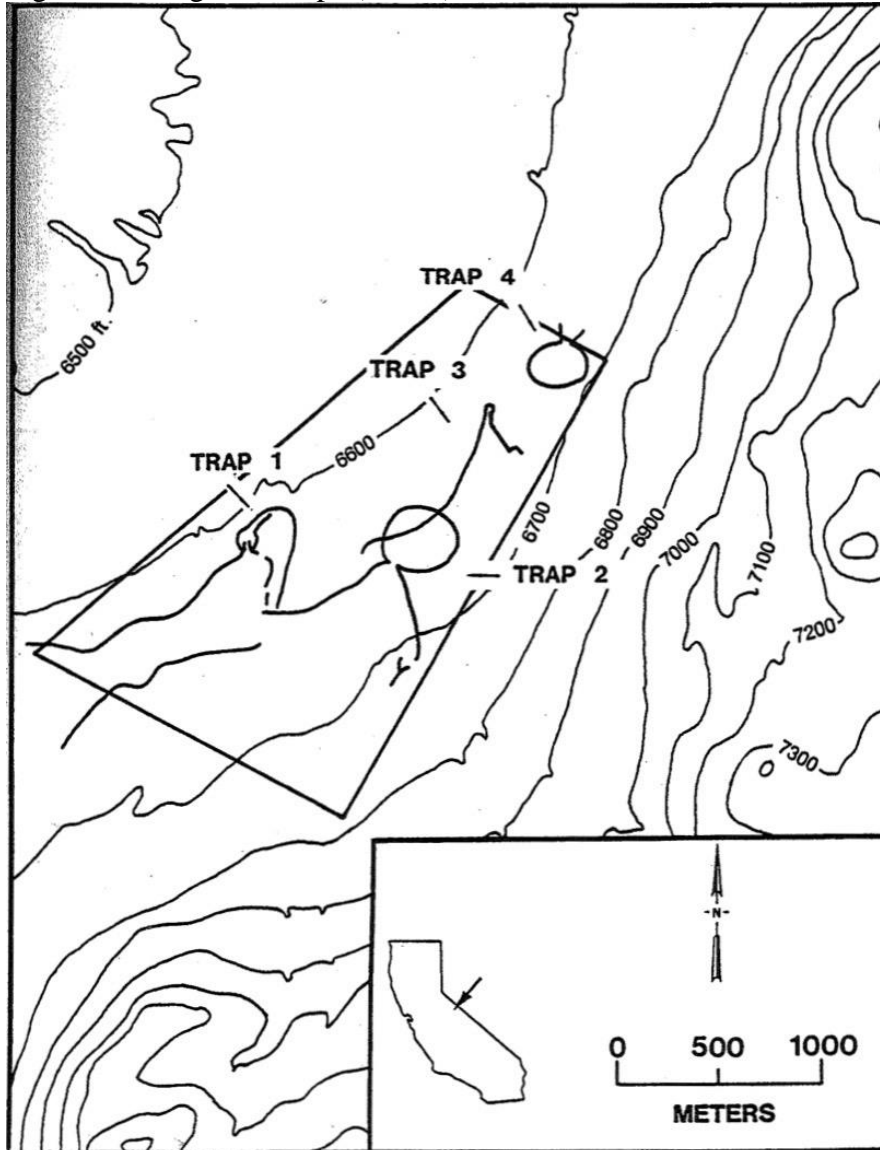
Source: Brooke S. Arkush, “Communal Pronghorn Hunting in the Great Basin: What Have We Learned Over the Last Twenty-Five Years?” *Pacific Coast Archeological Society Quarterly*, Vol. 49, No. 3 (2014): 8.

So, what is a “pronghorn trap,” and what does it tell us about pronghorn and the Kutzadika^a in the Mono Basin? Figure 9 shows the location on the eastern side of Mono Lake of the three traps that Dr. Arkush uncovered. They are located about 2.5 miles east from the current shoreline, on a

²⁴ The ubiquity of the pronghorn traps throughout the Great Basin raises the question of whether there were numerous instances of invention of the traps, or the technique spread from one area of invention to the others. To my knowledge, that question has not yet been posed, let alone answered, by the archeologists studying the traps.

juniper-covered bench at 6500-6600 feet above sea level. Figure 10 is a more detailed view of Trap 2 which I'll spend more time exploring.

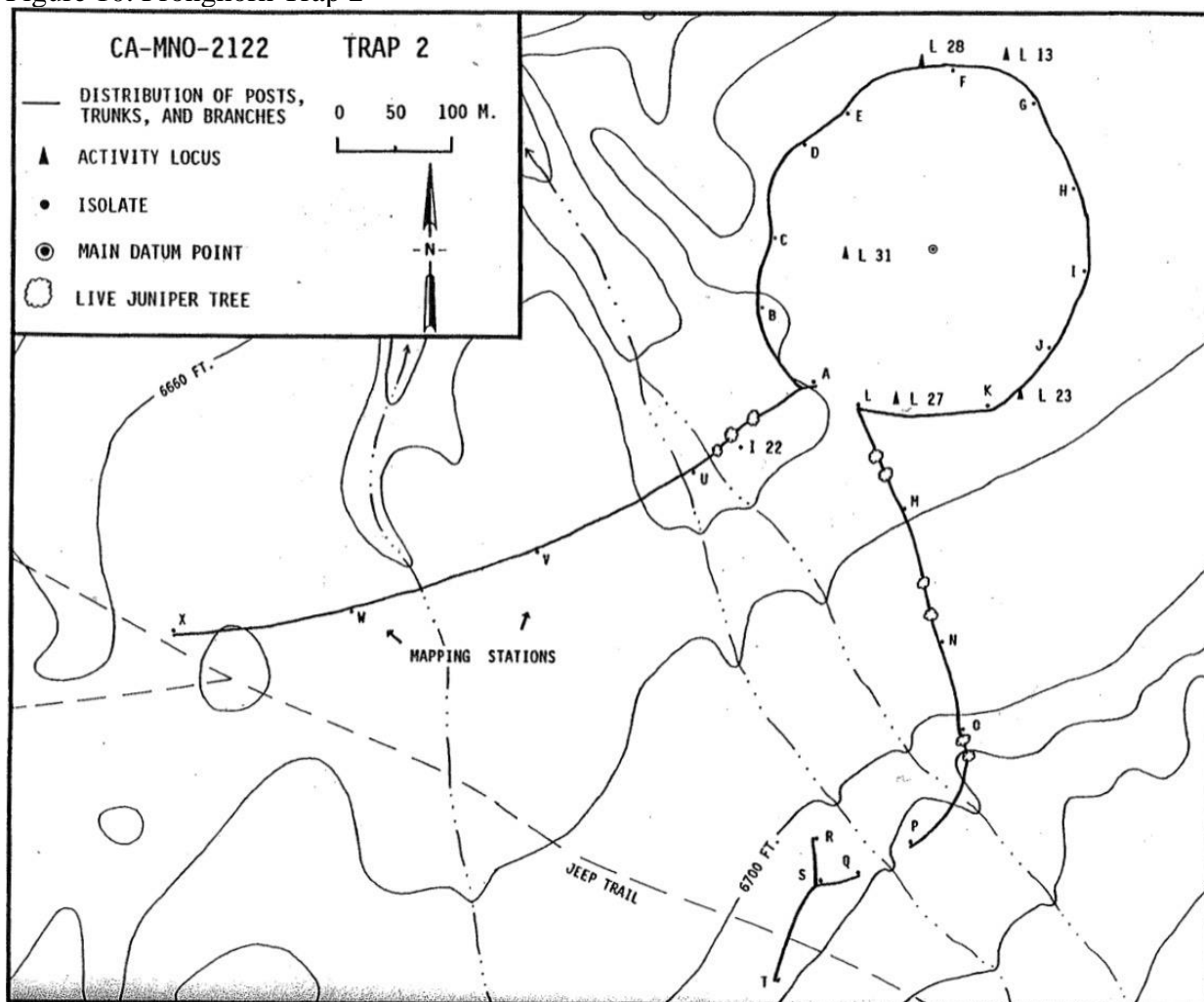
Figure 9. Pronghorn Traps (1, 2, 4)



3. Map showing general area of CA-Mno-2122, and location of four drive traps. The trapezoids

Source: Brooke S. Arkush, *The Archeology of CA-MNO-2122: A Study of Pre-Contact and Post-Contact Lifeways among the Mono Basin Paiute*. Berkeley: University of California Press, 1995: 95. Trap 3 is a historical feral horse trap used between about 1880 and 1920. Used with permission.

Figure 10. Pronghorn Trap 2



Source: Brooke S. Arkush, *The Archeology of CA-MNO-2122: A Study of Pre-Contact and Post-Contact Lifeways among the Mono Basin Paiute*. Berkeley: University of California Press, 1995: 100-101. Used with permission.

The first thing to say about all of these traps is that they take advantage of one peculiarity of pronghorn antelope and their ability to flee predators at 60 mph: although exceedingly fast, they prefer not to jump over obstacles such as fences. That's interesting and significant: another ungulate the Kutzadika^a hunted was the mule deer which among its other survival capabilities could jump vertically 6-8 feet high, easily enough to clear most obstacles. One can imagine Kutzadika^a hunters closely observing the behavior of pronghorn and deer and trying to figure out how to take advantage of any weaknesses they observed. The solution that emerged for killing pronghorn and adding them to their basket of subsistence foods was the pronghorn trap.

The scale of these traps was large. Trap 2 is composed of two wings each 600-800 meters in length, funneling into a corral that was about 250 meters in diameter. The wings were constructed with juniper trees as posts, either living or cut and anchored in the ground, 50-100 meters apart. In between the juniper posts, the builders constructed a 4-to-5 foot fence composed of sagebrush.

One has to be impressed with the planning and engineering needed to construct a trap like this, the knowledge of the prey and its environment, and the commitment to repair and maintain the traps over centuries of use. Arkush used time sensitive artifacts to estimate date ranges for Traps 1, 3, and 4, and radiocarbon dates on hearths associated with the Trap 2 corral to date that structure. The earliest (Trap 4) may go back 1500 years to about 500 CE. That trap probably was used off and on, after which it was covered by tephra from the 1350 volcanic eruption of Panum Crater, just a few miles south of Mono Lake. After that, Kutzadika^a built Trap 2 which was used from about 1350 to 1450 CE. They built additional traps that they used until at least the late nineteenth century – Trap 1 seems to be the youngest pronghorn trap within this complex, dating between about 1600 and 1800 CE, and was then used in the decade or so around 1900 to capture mustangs. In other words, the archeological record shows that Kutzadika^a continuously used these pronghorn traps for at least 1400 years.

So how were the traps used? Mostly doing so required the entire community. Remember that the Kutzadika^a gathered for an autumn feast? That would have been the time to plan and then execute a pronghorn hunt; possibly the singing and dancing was led by a shaman preparing for hunting and killing pronghorn.²⁵ The Kutzadika^a would have had to have had lookouts (boys?) observing the pronghorn herd moving into a position where they could be driven in between the two (camouflaged) wings of the trap. Archeologist Arkush speculates that fast young men and boys would have been used, running, waving their arms, and yelling, to get the pronghorn running into the trap. Men armed with spears and bows and arrows hid behind the sagebrush fence of the corral; others stood by the neck of the corral, ready to close it off when the herd was flushed inside. We would assume that the killing and butchering of the pronghorn would have occurred shortly after they were corralled.

We can infer some other things about the communal pronghorn hunt. If there were 200 or so Kutzadika^a who lived in family groups, each of those families needed to have some assurance that their participation in the hunt—and in the labor to build, repair, and maintain the traps over the centuries—would yield at least one pronghorn per hunt. The pronghorn herds that were captured thus likely numbered at least 30-40 individuals. The hunts also occurred on an annual, maybe semi-annual, and at times biannual basis. And given the centuries-long use of the traps, the Kutzadika^a had to be aware of what was a sustainable yield that they could take to ensure that the pronghorn reproduced, and the herds returned year after year. Does that also mean that some prime-aged males, females and even fawns sometimes were not killed but released? That gets somewhat complicated because there is some evidence—pronghorn fetus and adolescent bone fragments—that suggests both pronghorn drives in the late spring, and that pregnant females were killed.²⁶

²⁵ In Shoshone areas, according to Julian Steward, “these drives were managed by a shaman who had received special supernatural power in a vision to charm antelope. During one to several nights of singing and shamanizing prior to the drive this man was believed to capture antelopes’ souls, rendering them docile and stupid.” Julian H. Steward, *Basin-Plateau Aboriginal Sociopolitical Groups* (Washington, DC: Smithsonian Institution Bureau of Ethnology Bulletin 120, 1938), 34.

²⁶ Arkush, *The Archeology of CA-MNO-2122*, 69.

The existence of pronghorn herds migrating through the eastern part of the Mono Basin means that the ecosystem had to include plants that these grazers consumed. In the fall, there is little doubt that they grazed on what is now called bitterbrush but was called “antelope brush” by nineteenth-century Euro-American settlers. But pronghorn were there in the spring and summer too. Today, the ecosystem of the eastern part of the Mono Basin is dominated by sagebrush with little evidence of other plants the pronghorn could have consumed; it is now, in a word, degraded compared with centuries ago. Arkush thinks that the ecosystem once supported herds of pronghorn because it was more diversified and had plants that pronghorn ate, in particular vetches, buckwheat, bursage, and phlox.²⁷ Joseph Lent thinks additionally that plants that natives called posita (Native, or Indian clover *Trifolium amoenum*), mahavita (Wild hyacinth *Dichelostemma capitatus*), and maybe even taboose (*Cyperus esculentus*) may have grown in the Mono Basin, if not in the drier part east of Mono Lake.²⁸ More evidence of a greener and more diverse ecosystem capable of supporting pronghorn herds will be cited below.

Figure 11. Google Earth Photo of Mono Lake with Pronghorn Superimposed on Location of the Traps



Did Kutzadika^a Cause Environmental Change in the Mono Basin?

The pronghorn traps provide clear evidence that by 1900 the Kutzadika^a had lived continuously in the Mono Basin for at least 1400 years, and most likely for millennia prior to that.²⁹ Some

²⁷ Brooke S. Arkush, “Communal Pronghorn Hunting in the Great Basin: What Have We Learned Over the Last Twenty-Five Years?” *Pacific Coast Archeological Society Quarterly*, Vol. 49, No. 3 (2014).

²⁸ Joseph Lent, personal communication, November 3, 2020.

²⁹ Lent, “The Ever-Changing World of the Paiute.”

think that the Kutzadika^a thus pursued a sustainable approach to their environment.³⁰ Each year they gathered and hunted enough to maintain and reproduce their population. Marriage ties with neighboring peoples also may have regulated their population size and consumption of resources. No doubt their numbers rose or fell over time depending on climate change or other changes to the environment that affected the food supply. We also know that they were close observers of their environment, and understood when, how, and perhaps even why certain plant and animal species would become available for them to harvest.

Other similar gathering and hunting peoples took actions that altered their environment to increase the availability of favored foods and achieve other objectives—they were ecosystem managers. Archeological work on the pre-Columbian Americas reveals vast swaths of prairie and forest (including what we now call the Amazon forest) being cleared by fire, and large amounts of “agro-forestry,” or the cultivating of trees and bushes—like the black oaks in Yosemite Valley—for their foods.³¹ Fire kept the country open, facilitating hunting, improving visibility, and keeping down dangerous animals such as rattlesnakes. The Sierra Miwok of the Yosemite Valley—with whom the Kutzadika^a traded and intermarried—also periodically burned their forest floor, not to encourage the growth of grass but to kill off undergrowth that would have competed with the growth of black oak, their source of acorns.³² In the Mono Basin, Kutzadika^a used fire in their rabbit drives.³³

The two largest documented uses of fire were to create plant material for basket making, and for enhancing food production, although direct evidence that Kutzadika^a used fire for these purposes is lacking. But the prevalence of these uses elsewhere, even among people with whom the Kutzadika^a had trade and social relations, strongly suggest that they used these techniques too.³⁴ Basket making, a celebrated activity among Kutzadika^a women, required the gathering and use of long and straight willow shoots and grasses.³⁵ And it turns out that firing or pruning were the best ways to encourage the growth of plant material that would be used in basket making.³⁶ Fire

³⁰ “Kutzadika^a People: Living in Harmony with the Mono Basin.” *Mono Lake Newsletter*, Fall 1999.

³¹ Charles C. Mann, *1491: New Revelations of the Americas Before Columbus*, second edition (New York, NY: Vintage Books, 2011), front piece map.

³² Lynn Gassaway, “Native American Fire Patterns in Yosemite Valley: Archeology, Dendrochronology, Subsistence, and Culture Change in the Sierra Nevada, *SCA Proceedings*, Vol. 22 (2009): 1-19.

³³ As John Muir observed after visiting Mono Lake and observing the Kutzadika^a in August 1869: “Occasionally a grand rabbit drive is organized and hundreds are slain with clubs on the lake shore, chased and frightened into a dense crowd by dogs, boys, girls, men and women, and rings of sage brush fire, when of course they are quickly killed. The skins are made into blankets.” John Muir, *My First Summer in the Sierra* (New York, NY: Penguin Books, 1987; first published in 1911), p. 227. I doubt Muir actually witnessed a rabbit drive, for being the astute observer of nature and all its various species, he would have known that the rabbits being chased were jack rabbits; the cotton tails that also call the Mono Basin home find shelter and hide in place instead of running when threatened.

³⁴ M. Kat Anderson, *Tending the Wild: Native American Knowledge and the Management of California’s Natural Resources* (Berkeley and Los Angeles: University of California Press, 2005), 187-208.

³⁵ Craig D. Bates and Martha J. Lee, *Tradition and Innovation: A Basket History of the Indians of the Yosemite-Mono Lake Area* (Yosemite National Park: Yosemite Association, 1993). See Also Sharon E. Dean et al., *Weaving Legacy: Indian Baskets and the People of Owens Valley, California* (Salt Lake City: University of Utah Press, 2004), 1-15.

³⁶ Bates, *Tradition and Innovation*, 41. M. Kat Anderson, “The Use of Fire by Native Americans in California,” in Jan W. Van Wagendonk et al. eds., *Fire in California’s Ecosystems* (Berkeley and Los Angeles: University of California Press, 2018), Chapter 19, pp. 383-85.

was also used to enhance the growth of selected food plants, especially the seeds of native grasses and wildflowers. Evidence suggests that seeds of the blazing star and pigweed were broadcast after brush had been burned off. The result may have been a concentration in some places of certain beneficial grasses and flowers, lending the landscape a “patchy” appearance.³⁷

Like other native peoples, then, Kutzadika^a most likely used fire to alter the environment and landscape of the Mono Basin to increase those foods and raw materials necessary for maintaining their lives. The maintenance of these landscapes thus required regular input of time and resources; they weren’t just passing through but living there continuously for centuries. That is the definition of sustainability: even with human activity, the annual flows of solar energy and plant nutrients in the Mono Basin were adequate for plants and animals to maintain their populations without being depleted. Kutzadika^a undoubtedly alter their environment, but in ways that were sustainable over long periods of time.

That sustainability also explains why the Kutzadika^a remained in the Mono Basin year-round. Most hunter-gatherer societies were highly mobile, following game from one place to another, and searching long distances for the right stone from which to make tools. It was rare for hunter-gatherers to settle in one place for a long time. And yet the Kutzadika^a in the Mono Basin were there for millennia. They ranged west into the mountains to hunt deer or bighorn sheep, and they trekked across the Sierra to trade with the Miwok in Yosemite Valley. They also had abundant sources of obsidian nearby from which to fashion weapons and tools.³⁸ So the Mono Basin was home. And the reason was that there they found predictable sources of protein- and fat-rich foods, pronghorn included, to sustain their population, small though it was.

Nonetheless, the pronghorn disappeared, and the communal hunts came to an end toward the end of the nineteenth century. Was the reason unsustainable overhunting by Kutzadika^a? No, the cause was environmental change brought about by the introduction of sheep (*Orvis aries*) into the Mono Basin.

Sheep in the Mono Basin

Some of the first Euro-American settlers in the Mono Basin around 1860 probably brought sheep with them, possibly purchased from settlers in the Big Meadow (now Bridgeport) area to the north, or in the Owens Valley to the south. One memoir records a herding of sheep 300 miles away from Bakersfield up the “long trail” through the Mojave Desert and up the Owens Valley.³⁹ How many sheep there were initially is not known, but about 1900, according to the 1908 history of Mono County, there were around 200,000 sheep in the basin. Of those, 35,000 “belong” in the county, the rest being brought in from Nevada and neighboring counties, and so “large bands of sheep range” along the eastern shore of Mono Lake during the summer. Additionally, the flocks

³⁷ Lucy Diekman, Lee Panich, and Chuck Striplen, “Native American Management and the Legacy of Working Landscapes in California,” *Rangelands* (June 2007), 47-48.

³⁸ Ryan T. Brady, “Obsidian Source Distribution and Prehistoric Settlement Patterns at Mono Lake, Eastern California.” *Journal of California and Great Basin Anthropology*, Vol. 31, No. 1 (2011): 3-24.

³⁹ Lily Mathieu La Braque, *Man from Mono* (Lee Vining: Mono Basin Historical Society, 2015), 9.

of sheep were shepherded to “excellent grazing ground” in the mountains and valleys, “there being over twenty different varieties of brush and fattening grasses for them to feed on.”⁴⁰

As large as the 200,000 number for sheep in Mono Basin around 1900 is, that was a reduction from previous decades. According to the 1908 Mono County history, “Formerly stock grazing used to be carried on in the county on a much larger scale, the county deriving much revenue from this source. Some years ago, however, the government established a forest reserve throughout considerable [range] of the mountain district, and, as a result, only limited number of sheep are allowed grazing privileges.” Still, as of 1908 “large bands of sheep range in [the eastern shore of Mono Lake] in the summer months.”⁴¹ How many sheep were grazing in the Mono Basin prior to their numbers being reduced is not known. But as we will see, the numbers of sheep had to have been sufficiently large to have caused noticeable environmental degradation by about 1880.

The rise and decline in the number of sheep in the Mono Basin can be approximately dated from observations by naturalist John Muir and geologist Israel Russell. In 1869, when Muir briefly visited the shores of Mono Lake, he noted that “antelope used to be abundant on the desert.”⁴² As we will see in more detail below, the reason for the decline of the pronghorn antelope was because sheep crowded them out. Geologist Israel Russell, doing field work in the Mono Basin in 1881, likewise saw a changed environment. “To one reared under more humid skies, [the eastern portion] of the Mono basin would appear a veritable desert, but that it is not really a desert is shown by the fact that it produces nutritious bunch grass among the clumps of sage brush.”⁴³ He also notes: “There was formerly sufficient wild grass in many portions of the basin to support considerable number of cattle and sheep; but, owing to overstocking, these natural pastures are now nearly ruined.”⁴⁴ As early as 1864, according to observations by another geologist, “There are some twenty settlers living on the shores of Mono Lake, most of whom are engaged in stock-raising and hay cutting...Most of the lands available for cultivation have been taken up.”⁴⁵

Based on these observations, my best assessment is that sheep were introduced to the Mono Basin no later than 1860, and their population increased dramatically during the 1860s and 1870s until they overgrazed the natural grasses and other edible plants, including those on the eastern shore of the lake. What was happening in the Mono Basin was part of a much larger problem of sheep that the US government confronted in managing and protecting the vast mountain ranges in California. What became the Sierra National Forest Reserve, established in 1889 along with three more forest reserves elsewhere in California, was established in large part to keep sheep out of the mountain valleys, the Mono Basin included.⁴⁶ Prior to its establishment, there were said to

⁴⁰ F. W. McIntosh, *Mono County California: The Land of Promise for the Man of Industry* (Mono County Board of Supervisors, 1908): 45, 84.

⁴¹ McIntosh, *Mono County*, 84.

⁴² Muir, *My First Summer in the Sierra*, 227.

⁴³ Israel C. Russell, *Quaternary History of the Mono Valley, California*, included in the Eighth Annual Report of the United States Geological Survey (Washington, DC: Government Print Office, 1889), 269-70.

⁴⁴ *Ibid.*, 278.

⁴⁵ J. Ross Brown, quoted in Fletcher, *Paiute, Prospector, Pioneer*, p. 37.

⁴⁶ 1933 Map of Mono Basin Property Ownership, Mono Basin Clearing House [https://www.monobasinresearch.org/historical/mono1933map.pdf].

be half a million sheep in the Sierra National Forest Reserve. Shepherders tore down notices posted to keep them out and trespassed without much concern for any consequences. If the 200,000 sheep that were in the Mono Basin around 1900 represented a decline from earlier, unregulated numbers, it would seem that Mono Basin sheep had accounted for a significant portion of the half million estimated to have been in the Sierra Forest Reserve.⁴⁷

That sheep were brought to the Mono Basin to forage in the summer may seem odd to those who have visited Mono Lake and see the basin as desiccated and capable of supporting only sagebrush and bitterbrush. But what we are seeing is the result of environmental changes brought about by the introduction of sheep into the ecosystem, and not an essential, unchanging feature of the ecosystem on the eastern shore of Mono Lake. Archeologist Brooke Arkush thinks the eastern shore had many more species of grass and other edible plants for grazing animals—to him, the presence of large numbers of pronghorn prove it.⁴⁸ And here is how John Muir, who visited Mono Lake in late August of 1869 described it: “The desert around the lake is surprisingly flowery. In many places among the sage bushes I saw mentzelia, abronia, aster, bigelovia, and gilia, all of which seemed to enjoy the hot sunshine. The abronia, in particular, is a delicate, fragrant, and most charming plant.”⁴⁹ And that was in the height of the dry summer. Another plant that sheep devoured, according to John Muir, was ceanothus, which was also growing in the Mono Basin.⁵⁰ Which of those plants sustained the pronghorn population is unclear, but what is clear is that the introduction of sheep—a voracious and indiscriminate grazer—mowed down edible Mono Basin plants. What remained and spread was a plant that neither pronghorn nor sheep ate—the big sagebrush, which dominates the Mono Basin plant community to this day. One could say that the aftermath of the sheep invasion was a sagebrush invasion. According to Julian Steward, “The greater part is without any food plants. However, Indian testimony indicates that many areas now occupied by rabbitbrush had much grass before the introduction of cattle and sheep.”⁵¹

A Plague of Sheep. The introduction of sheep (and other exotic species like cattle and horses) into the Mono Basin is part of a longer and larger global story called “The Columbian Exchange” about the impact the introduction of European plants, animals and pathogens had on New World environments and peoples, and the place that New World crops like maize, potatoes, tomatoes, and tobacco had on Old World agriculture and demography.⁵² This new paradigm for understanding the course of world history after the conquest of the Americas by Europeans has

⁴⁷ Anthony Godfrey, *The Ever-changing View, A History of the National Forests in California, 1891-1987* (Vallejo, CA: USDA Forest Service, 2005), 32-46.

⁴⁸ Arkush, “Communal Pronghorn Hunting in the Great Basin.”

⁴⁹ John Muir, *My First Summer in the Sierra* (New York, NY: Penguin Books, 1987): 228. First published in the U.S. in 1911.

⁵⁰ See “Key for Vegetation Classification,” Charles H. Lee, April 4, 1934, UC Riverside, Library, Water Resources Collections and Archives, Charles H. Lee papers, City of Los Angeles vs. Aitken et al. (Mono Basin Condemnation Suit) <https://calisphere.org/item/ark:/86086/n2x066ht/>, accessed December 21, 2020, p. 20.

⁵¹ Julian H. Steward, *Basin-Plateau Aboriginal Sociopolitical Groups* (Washington, DC: Smithsonian Institution Bureau of Ethnology Bulletin 120, 1938), 17. Steward also notes that grasses were not only food for sheep or pronghorn, but native peoples like the Kutzadika^a too. He references (p. 17) an 1881 source from Utah who “observed that by 1862, only 15 years after Mormons entered Utah, grazing had so reduced native seeds that Indians were starving.”

⁵² Alfred Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, CT: Praeger Publishers, 2003).

spawned a vast number of scholarly studies. The first to study sheep was historian Elinor Melville in articles and a book entitled *A Plague of Sheep*, documenting what happened in the sixteenth century after conquering Spaniards introduced sheep into Central Mexico.⁵³

Likening the introduction of sheep into the Mexican environment to the “virgin soil” plagues set off by Old World pathogens, Melville shows that from a few flocks of thousands of sheep in the early 1500s, sheep populations exploded to several million which depleted grasses that sheep fed on. The sheep population then collapsed to bring it into balance with the available food supply. In the process, the sheep caused immense and lasting environmental change in Central Mexico.

In some ways like the Mono Basin, Central Mexico was a semiarid high-altitude plain that was the core area of the Aztec empire centered around Lake Tenochtitlan. Sheep are grazing animals, and Melville argues that their introduction reduced the vegetative cover in the region, decreased the number of native grass species, and opened the way for the invasion of unpalatable (to the sheep) arid-zone plant species. In the case of Central Mexico, the invasion of former pastureland was by mesquite, a woody, inedible species. She also notes that the scholarly consensus that the removal of the native plant cover reduced the infiltration rate of rainfall and the consequent drop in the water table and the loss of spring flow contributing to the further desiccation of Mexico’s high desert.

These environmental changes, Melville argues, permanently changed the Valle del Mezquital. Today it is “the archetype of the barren, eroded regions of Mexico” with “high treeless hills” and lower slopes where only cacti and scrub grow. This degraded landscape, she says, is markedly different from that described by early sixteenth-century Spanish sources. Then it was a densely populated plain, well-watered with productive fields, native grasslands, forested hills and mountains, willow-lined rivers and streams, and vegetation that was far more biodiverse than at present. These environmental changes, she shows, came about because of the introduction of sheep.

Environmental Impact of Sheep in the Sierra. John Muir’s account of his “first summer in the Sierra” is a guide to what sheep could do to environments in the Sierra Nevada mountains. Arriving in San Francisco in 1868 and desiring to get into the Sierra Nevada to discover nature (which he defined as *sans* humans), he took a job as one of a group of five men and a dog shepherding a flock of 2000 sheep into the Sierras via the Yosemite Valley. They set out in early June, and returned on September 22, 1869, having gotten the flock as far as Tuolumne Meadows; Muir himself then clambered over Mono Pass, down Bloody Canyon, and to the shores of Mono Lake.

Most people read Muir’s book for his observations on the natural beauty and bounty of Yosemite Valley and the High Sierra. Fortunately, he also has much to say about the impact of sheep on the environment and ecosystems they foraged through. The point of taking the sheep into Yosemite was to get them to greener pastures where they could fatten themselves up before

⁵³ Elinor G. K. Melville, “Environmental and Social Change in the Valle del Mezquital Mexico, 1521-1600.” *Comparative Studies in Society and History*, Vol. 32 No. 1 (Jan. 1990): 24-53; Elinor G. K. Melville, *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico* (New York and Cambridge: Cambridge University Press, 1997).

returning to their corral (and shearing) in the San Joaquin Valley. While Muir was grateful to the ranch owner for taking him on and allowing him to observe and record his encounter with nature, he was not thrilled with the sheep or the sheep business. “The California sheep owner is in haste to get rich quick, and often does, now that pasturage costs nothing, while the climate is so favorable that no winter food supply, shelter pens, or barns are required. Therefore, large flocks may be kept at slight expense, and large profits realized, the money invested doubling, it is claimed, every other year. This quickly acquired wealth usually creates desire for more.”⁵⁴

Likening the sheep to “hoofed locusts,” he noted that there weren’t adequate grassy plains in the foothills to supply lasting pasture “for our thousands of busy nibblers. The main dependence is ceanothus brush [California lilac? *Ceanothus concha*] on the hills and tufted grass patches here and there, with lupines and pea-vines among the flowers on sunny open spaces. Large areas have already been stripped bare, or nearly so, compelling the poor hungry wool bundles to scatter far and wide....[A]lmost every leaf that these hoofed locusts can reach within a radius of a mile or two from camp has been devoured. Even the bushes are stripped bare.” Moving the flock to higher ground near the summit of the Merced and Tuolumne Rivers divide where they entered a mountain meadow, the sheep “were allowed to eat their way as slowly as they wished...Soon the two thousand paunches were bulged out with sweet-pea vines and grass.”⁵⁵

How much additional environmental damage did the grazing sheep cause in the High Sierra mountains? “On through the forest ever higher we go, a cloud of dust dimming the way, thousands of feet trampling the leaves and flowers, but in this mighty wilderness they seem but a feeble band...They cannot hurt the trees, though some of the seedlings suffer, and should the woolly locusts be greatly multiplied, as on account of dollar value there are likely to be, then the forests, too, may in time be destroyed.”⁵⁶ Certainly Muir recognized how environmentally destructive the flocks of sheep were, and could be, threatening even forests. By the time they drove the flock to Lake Tenaya, Muir observes that “the dusty, noisy flock seems outrageously foreign and out of place in these nature gardens...The harm they do goes to the heart....”⁵⁷ His antipathy to the sheep and the environmental damage they caused contributed to his efforts to establish the national forest reserves in California, and ultimately Yosemite National Park as well.⁵⁸

So, sheep being herded from lower elevation valleys to higher elevation meadows and grass lands in the High Sierra consumed nearly everything in their path. Sheep nibbled grasses and shrubs down to the ground, removing those plants as food sources for other animals. What those animals might have been in the wake of Muir’s herd of sheep in Yosemite Valley and the High Sierra we do not know.

⁵⁴ Ibid., 22.

⁵⁵ Ibid., 36, 56, 87.

⁵⁶ Ibid., 96-97.

⁵⁷ Ibid., 195.

⁵⁸ His antipathy to people in “wilderness” also contributed to views that led to the removal of native peoples from national parks. Mark David Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (New York: Oxford University Press, 1999).

But in the Mono Basin, the native animal species that the sheep invasion affected by devouring their food sources was the pronghorn antelope; hunting by Euro-American settlers also contributed to their extirpation. If John Muir had but 2000 sheep, and those did significant environmental damage, we might well imagine what over 200,000 sheep in the Mono Basin did. By 1880, the pronghorn traps that the Kutzadika^a used had fallen into disuse. Sheep replaced pronghorn, and Euro-American settlers displaced the Kutzadika^a from their land. The latter transformation is important to further our understanding of the environmental changes that came in the wake of Euro-American settlers moving into and taking over the Mono Basin.

Changes in the Land and the People

The sheep and cattle were introduced by the influx of Euro-American miners, ranchers, and farmers who came into the Basin in the 1850s following the California Gold Rush and the discovery of gold and silver in the hills to the north of the Mono Basin and to its west in the Sierra Mountains. Mining boom towns shot up in Bodie, Lundy, and further to the east in Aurora; in 1881 a 32-mile narrow gauge railroad was built around the eastern side of Mono Lake from a sawmill to Bodie. Thousands of miners, saloon owners, and others needed food and supplies, and the Mono Basin became one of the major suppliers. The “Bodie Boom” was about to transform the economy of the Mono Basin.⁵⁹ But first the land had to be transformed from the home of the Kutzadika^a into commodities owned, bought, and sold by Euro-American settlers. And the Kutzadika^a had to be removed.

Prior to the 1850s, a couple of trappers and explorers in the 1820s and 1830s had trekked through what is now Nevada and Utah and probably through the Mono Basin before they departed.⁶⁰ The first indication of the coming of a more permanent presence of Euro-Americans in the Eastern Sierra was the July 1852 expedition into the Mono Basin by US Lt. Treadwell Moore and his detachment of soldiers. Lt. Moore was stationed at Fort Miller on the San Joaquin River in the Central Valley when a report arrived that Indians in Yosemite Valley had killed three and wounded two white gold prospectors on the Merced River. Lt. Moore was dispatched to find and punish the Indians responsible. Heading into Yosemite Valley, he destroyed the food caches of the Miwok, and finding their villages abandoned, headed west into the higher elevations. Moore and his men found, surrounded, and captured 21 Miwok Indians—six men and the rest women and children. Moore executed the six men, and then pressed higher into the mountains following Chief Tenaya. He didn’t find Tenaya, but apparently followed the Miwok trail through Bloody Canyon down into the Mono Basin. We don’t know what he did there, but the Kutzadika^a camping near there must have seen him come and return.⁶¹

Within three years, surveyor A. W. von Schmidt was plotting through the Eastern Sierra, carrying his surveying equipment and a small (and largely unarmed) crew. Von Schmidt’s life and surveys have been thoroughly documented by David Carle and other historians and need not

⁵⁹ Thomas C. Fletcher, *Paiute, Prospector, Pioneer: A History of the Bodie-Mono Lake Area in the Nineteenth Century* (Lee Vining, CA: Artemisia Press, 1987): 52-54.

⁶⁰ For brief overview of the ventures of Jedediah Smith and Joseph Walker, see Fletcher, *Paiute, Prospector, Pioneer*: 9-17.

⁶¹ *Ibid.*:18-24.

be repeated here⁶² except to note that while surveying the Bridgeport area, on August 22, 1856, he traded local Indians a saddle blanket for some pronghorn meat.⁶³

Figure 12. Portion of the 1856 land survey conducted by A. W. Von Schmidt showing the Eastern Shore of Mono Lake (and Pronghorn Trap 2).

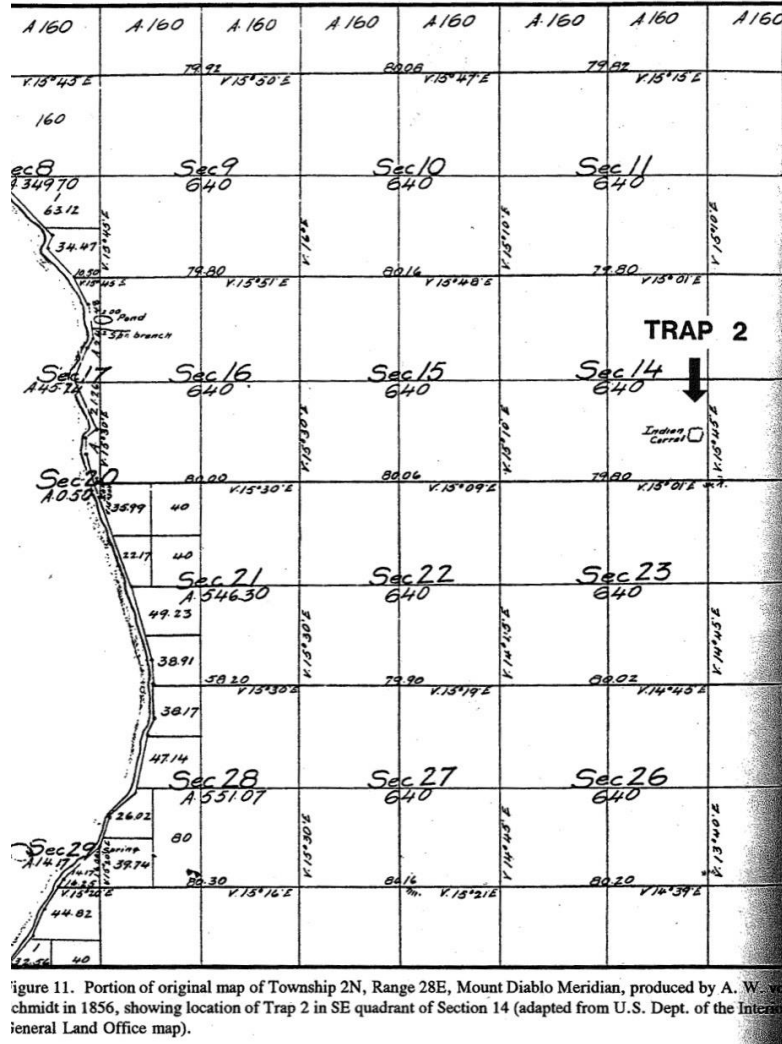


Figure 11. Portion of original map of Township 2N, Range 28E, Mount Diablo Meridian, produced by A. W. von Schmidt in 1856, showing location of Trap 2 in SE quadrant of Section 14 (adapted from U.S. Dept. of the Interior General Land Office map).

Source: Brooke S. Arkush, *The Archeology of CA-MNO-2122: A Study of Pre-Contact and Post-Contact Lifeways among the Mono Basin Paiute*. Berkeley: University of California Press, 1995: 102. Used with permission.

The most important point for the purposes of this study is that those surveys (von Schmidt’s “lines”; see Figure 12) laid down the basis for a legal framework by which land in the Mono Basin was divided, sold or transferred to Euro-American settlers, claimed as private property—with those claims enforced by US federal and California State civil, military, judicial, and police power. Those survey lines were an administrative net that said: “this land is ours.” Within a very

⁶² David Carle, *Putting California on the Map: Von Schmidt’s Lines* (Lee Vining, CA: Phalarope Press, 2018).
 David Carle, (2020) "Putting California on the Map: Von Schmidt’s Lines," *Eastern Sierra History Journal*: Vol. 1, Article 1. See also Fletcher, *Paiute, Prospector, Pioneer*: 24-28.
⁶³ Carle, "Putting California on the Map: Von Schmidt’s Lines," 4.

short period of time settlers began arriving, claiming the land with sheets of paper that said they were “Homesteaders,”⁶⁴ and displacing the Kutzadika^a who were living there. What happened is clearly revealed in the story of a Kutzadika^a leader who was known by the Euro-American settlers as Captain John.

Captain John’s Story.⁶⁵ As related in the memoir of Ella Cain, the daughter of early settlers in the mining town of Bodie, as a young man Captain John had been selected by the Kutzadika^a council to lead them in a more vigorous resistance to the arrival of the Euro-American settlers.⁶⁶ By the time Ella Cain met him in the early twentieth century, he had decades of dealings with the settlers. “The whites change everything for red man,” Cain quotes Captain John saying. “That is why Captain John live on sagebrush land, hear no running water, have no trees where birds can sing. John born over there...Indian then know where to get everything Indian need.”

But then homesteaders began to arrive, and everything began to change. “One day two big wagons pulled by...oxen, came to our place...A man got out and he came over with what you call paper in his hand. ‘You Captain John?’ he say... ‘Well John you no can read paper, but this land belong to me now. I come to live here. Government call it homestead. You move out John on other land. It is a big country around here. Indian know more about getting food than white man do. You won’t have hard time, John.’” Captain John and his family moved to land that became the Mattly Ranch.

“We stay there two winters, three summers when another white man come. He talk again much about government going to settle people on land. Tell about big white chief in Washington and how Indian have to do what white chief say. Then he tell me Government going to give this land to him because Indian don’t know how to make land grow things to eat...This time we move around Lake to another place but always had to get place where we have water. Then another white man come with paper. He say same thing. This time I feel very mad inside me, but what can Indian do? Then I move over here on this sagebrush land that no white man wants [on the north side of the Lake]. No grass, no trees, just a little water than runs down from ranch up there. Some times no water come and we have to go get it.”⁶⁷

Analysis of Captain John’s Story. There are many significant things that Captain John’s story points to. The first is that Euro-Americans made claims to Kutzadika^a land based on the Homestead Act of 1862. Signed by President Lincoln during the Civil War, the Act made available millions of acres west of the Mississippi River in 160 acre lots to any adult who had not taken up arms against the US (i.e. Confederates). Overall, the Homestead Act gave out certificates (see Figure 13) transferring 160 million acres (about 250,000 square miles) to Euro-American settlers, including those who came to the Mono Basin. For land that was classified

⁶⁴ Hannah Anderson, “That Settles It: The Debate and Consequences of the Homestead Act of 1862,” *The History Teacher*, Vol. 45 No. 1 (Nov. 2011): 117-37.

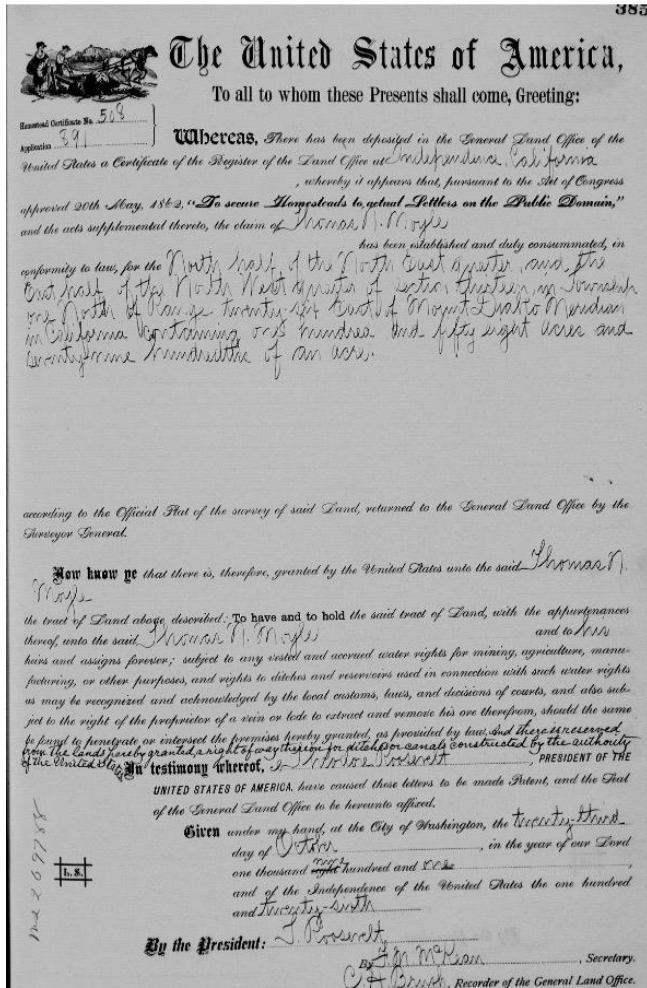
⁶⁵ The story of Captain John is drawn from Ella M. Cain, *The Story of Early Mono County: Its Settlers, Gold Rushes, Indians, Ghost Towns* (San Francisco, CA: Fearon Publishers, 1961): 117-22.

⁶⁶ That Captain John was the leader of the Kutzadika^a is confirmed by a note in the October 26, 1881 issue of the *Bodie Weekly Standard News*. Arkush, *The Archeology of CA-MNO-2122*, 58.

⁶⁷ General Land Office Records have an entry for Captain John receiving a land patent on April 21, 1920 for 80 acres to the north of Mono Lake in T03 R27E section 21. Those same records show he had a claim for 160 acres in northern California T27N R10E section 26 issued on October 2, 1907.

“desert,” settlers could claim—and get—title to 640 acres. Throughout the American West, the Homestead Act transferred land that native peoples had been using for centuries if not millennia, as had been the case of the Kutzadika^a. Memoirs of Euro-American settlers in Mono County in the second half of the nineteenth century identify nearly all of them as “homesteaders.”⁶⁸

Figure 13. Homestead Certificate of Thomas Moyle, October 23, 1901
160 acres to the southwest of Mono Lake, T01 R26, section 14.



Source: Bureau of Land Management, General Land Office Records
https://glorerecords.blm.gov/details/patent/default.aspx?accession=CA1390_385&docClass=STA&sid=yapezonb.s2t#patentDetailsTabIndex=1, accessed Jan 24, 2021.

Moreover, the idea that land was someone’s property extended to the birds and other animals that flew or walked over the land, as Captain John discovered one day when he was duck hunting on

⁶⁸ See especially Margaret Calhoun, *Pioneers of Mono Basin* (Lee Vining, CA: Artemisia Press, 1984), 4, 5, 9, 10, 11, 22, 24, 32, 36-37, 47, 57, 63. Where these records of homesteading are located needs to be determined. Calhoun (p. 22) says the land office for homesteading was in Independence, which is in Inyo, not Mono, county. The Mono County Court House in Bridgeport has 27 volumes of land registers covering the period from 1861 to 1902. As of this writing in December 2020, neither the Mono nor Inyo County courthouses are open to the public until the COVID-19 restrictions on access are lifted.

Mono Lake. A “man with a big star on his coat” told him to stop or be jailed. “What you talk?” I ask him. “You mean white man own all ducks, too?” Only sometimes. “Government knows how to take care of birds and fish. Indian he no understand. Government tell him when he can shoot birds and catch fish.” In other words, a new legal framework had been cast over animals too, setting “hunting seasons” and declaring it illegal to hunt at any other time. Just like the idea that Euro-Americans knew best how to use the land, they too knew best how to protect species from being overhunted, which is what they assumed the Indians would do.

The Best or “Highest Use” Doctrine. If it appears that the taking of Kutzadika^a land by waving a piece of paper in their faces appears at best brazen and at worst an illegal or immoral appropriation, there were assumptions and ideas behind that act going back to the early New England colonists that legitimized and legalized the taking of natives’ land. In an influential (or, one might say, using agrarian metaphors, “ground breaking” or “pioneering”) study of seventeenth- and eighteenth-century New England, William Cronon analyzed the ways in which the first colonists observed and interpreted Indians’ ways. Because these natives were mostly mobile, they tended not to acquire much surplus property. To the colonists they seemed “impoverished” because they did not appear to have much stuff, despite recognition by some colonists that they were in fact well supplied with everything they needed for life and livelihood. But that was a minority view. To most colonists, Indians were lazy; they moved so much and worked so little; they were “not able to make use of the one-fourth part of the Land;” they were “fettered by the chains of idleness, so as that they would rather starve than work.”⁶⁹

Cronon concluded that English colonists used the Indians’ way of life—mobile hunting and gathering—“as a justification for expropriating Indian land.” One Pilgrim “apologist” declared Indian land to be “spacious and void,” free for English taking. The English “improvement” to the land—in particular enclosing it with fences and farming it—was a “superior, civil right of ownership.” Cronon makes the sensible point that these ideas of land tenure were inherently Eurocentric and little more than “an ideology of conquest.”⁷⁰

Land ownership in the Americas, the colonists claimed, originated from grants of land from their sovereign, the English Crown, to a development company such as the Massachusetts Bay Company. A new town initially held all its land in common until it was surveyed for different types of land (forest, swamp, field, etc.) and then allocated to families to plant cornfields. “In these and later grants as well, the passage of land from town commons to individual property was intended to create permanent rights to it.” Private ownership, including being alienable to another, was considered “the best way to promote the fullest use of the land.” Land became a commodity, it was surveyed, deeds drawn up and a government bureau established to keep these records. Cronon calls this “an American innovation.” “More than anything else, it was the treatment of land and property as commodities traded at market rates that distinguished English [colonists’] conceptions of ownership from Indian ones.” Ownership followed from a religious “calling” to “improve” the land and the Biblical injunction to “fill the earth and subdue it.” Land became capital, and the “transformation” of the land from “unused” forest or prairie (i.e. lands that Indians actually used) into farmland or grazing land visibly increased the value of the land,

⁶⁹ Cronon, *Changes in the Land*: 54-55.

⁷⁰ *Ibid.*: 56-57.

its tax assessment, the wealth of the owner, and a growing market for the buying and selling of land.⁷¹ That was an “improvement.”

So, when Euro-Americans came into the Mono Basin and waved the Homestead certificates in the face of Kutzadika^a like Captain John and told them to get off the land, there were two centuries of American history, jurisprudence, and military power backing them up. There was also a long history of Indian removal, and of the threat and use of armed force against American Indians. Armed force had been used to remove Indian nations from southeastern U.S. states in the 1830s, and there was a long history of “Indian Wars” in the Great Plains from 1860 to 1890 that included specific acts of “eco-war” to destroy the ecological underpinnings of Plains Indians’ life, especially the bison herds upon which many tribes depended for food, clothing, and manufacturing materials.⁷²

Given the long history of conflict between Euro-Americans and native Indians in the United States, we need to ask if the removal of the Kutzadika^a from their Mono Basin lands was a peaceful process. At first appearance, it looks like there was no violence that accompanied the use of the Homestead Act paperwork for Euro-American settlers to take Kutzadika^a land. There were a few instances in the 1880s of Kutzadika^a confronting loggers from Bodie cutting down pinyon pine in the Bodie Hills, and on the other side of the lake, confronting workers from the Mono Mills (a lumbering and milling operation) cutting pinyon and Jeffrey pine; both of those forests supplied the Kutzadika^a with important foods. As far as can be determined, Kutzadika^a did not kill any Mono Basin settlers, nor did they take cattle or sheep that were destroying native grasses and changing the environment that sustained pronghorn and other animals.

That the Mono Basin was not the site of an “Indian War” does not mean that the process by which settlers moved in and replaced Kutzadika^a was peaceful. The threat of the use of armed force was there, along with the governmental, police, and administrative structures necessary to carry it out. There were at least three times when US armed forces had appeared in or near Mono Lake, and it is mostly likely that the Kutzadika^a knew of these incursions. Moreover, there were armed confrontations with Paiute-related people close by in Owens Valley to the south, at Walker Lake to the east,⁷³ and at Pyramid Lake near what is now Reno, Nevada.⁷⁴ More broadly, there was an ongoing war against Indians in California that had been raging since California became a state in 1850.

Wars against Indians in California, 1850-73. Pioneering research by Benjamin Madley documents not just the nearly constant three-decade war against California Indians in conjunction with the Gold Rush and the influx into California of large numbers of Euro-

⁷¹ Ibid.: 71-77.

⁷² On the 1830s removal, see Claudio Saunt, *Unworthy Republic: The Dispossession of Native Americans and the Road to Indian Territory* (New York: W. W. Norton, 2020). For the Great Plains, see Andrew C. Isenberg, *The Destruction of the Bison*, 20th anniversary edition (New York, NY: Cambridge University Press, 2020).

⁷³ Edward C. Johnson, *Walker River Paiutes: A Tribal History* (Salt Lake City, UT: University of Utah Printing Service, 1975).

⁷⁴ Ferol Egan, *Sand in a Whirlwind: The Paiute Indian War of 1860* (Reno, NV: University of Nevada Press, 1972).

American prospectors, but a 25-year war of extermination that Madley calls “an American genocide.”⁷⁵

Indeed, many of the ideas about the place of Indians in US society that had been articulated since colonial times were used to justify killing Indians in California. Ideas floated first in the 1820s that Indians in the former American colonies would go extinct if they remained in America led to President Andrew Jackson’s “Indian Removal Policy,” forcibly removing Indians to “Indian Country.” By 1850 and especially during the Civil War, the idea that Indians needed to be exterminated led to an “eco-war” against them in the expectation that they would then flee further west or north or be exterminated. In California, the recognition that Indians could not be removed to any place else led to incessant calls for them to be exterminated. As California Senator John B. Weller predicted on August 11, 1852 from the floor of the US Senate: California Indians “will be exterminated before the onward march of the white man...It has been the policy of the government to drive [Indians] to the West; but the white man is now in the West.”⁷⁶ With no place left in the United States to expel California Indians to, extermination became state policy.

Sen. Weller made his statement just a month after Lt. Treadwell Moore had executed the six Miwok men in Yosemite for allegedly stealing horses, and then descended through Mono Pass into the Mono Basin. Lt. Moore returned with tales about “gold!” in the Eastern Sierra. Weller’s statement also came but two years after a group of men from Oregon came into northern California in pursuit both of gold and of Indians, they claimed had massacred a preacher and his family in eastern Oregon. Miners claimed that they could not work their stakes in fear of Indians and began using any excuse they could to take up arms to kill any Indians they found. According to the March 11, 1850 *Daily Alta California*: “Early last spring...[complaints by miners] on the American River...were sufficiently strong to arouse the whole mining population to arms and unite them in the work of extermination.”⁷⁷

Historian Benjamin Madley presents a compelling narrative with mountains of evidence showing how the attacks on native California Indians spread through the goldfields of northern and central California during the 1850s before rounding the southern Sierra and extending into the Mojave Desert, over to the Colorado River, and up to the Owens Valley in the early 1860s. I cannot summarize Madley’s book here, but it surely deserves reading, especially by those who call California home. He shows without question that there was a 20+-year war against California Indians, supported by state and federal agencies, money, and troops, with the intent—and largely effect—of exterminating California Indians. The grim evidence is summarized in Figure 15.

Figure 15. Population of Native Peoples in California, 1780-1880

Date	Est. Population
1780	310,000
1850	150,000

⁷⁵ Benjamin Madley, *An American Genocide: The United States and the California Indian Catastrophe, 1846-1873* (New Haven, CT: Yale University Press, 2016).

⁷⁶ *Ibid.*, 212.

⁷⁷ *Ibid.*, 100.

1860	35,000
1870	7,000 to 30,000
1880	16,000 to 20,000

Source: Benjamin Madley, *An American Genocide: The United States and the California Indian Catastrophe*. New Haven, CT: Yale University Press, 2016: 3, 268, 347.

“By the summer of 1859,” Madley says, “most of the California Indians who had been living ten years earlier were now dead.” Of the estimated population of 150,000 California Indians in 1850, by 1860 there were only an estimated 35,000 remaining.

US Military Force in the Eastern Sierra. That is the brutal background for the appearance of miners, settlers, and US military forces into the Eastern Sierra, and the ensuing demographic and environmental transformations of the Mono Basin. As a conclusion to this section on the broader context of the wars against California Indians before continuing to analyze the Mono Basin, I want to summarize what Madley calls the First and Second Owens Valley Wars of 1862-63 and 1864-65 because of their proximity to, and likely impact on, the Kutzadika^a and their world in the Mono Basin.

In 1859, US Captain J. W. Davidson led a squadron of soldiers from Fort Tejon through the Mojave Desert into the Owens Valley looking for evidence that Indians there had stolen horses from whites in the southern Central Valley. He journeyed 600 miles, through the Owens Valley and up to what is now Round Valley. Finding few horses and no evidence of any stolen ones, Davidson returned to Fort Tejon after having demonstrated American military power by blasting some howitzer shells into Owens Lake, and telling the Paiute-Shoshone there that peaceful relations would remain as long as the trails remained open for prospectors, settlers, and ranchers to travel into the Owens Valley; he even suggested that the whole valley could remain theirs if they were peaceful.⁷⁸ After elements of Richardson’s report were published in the *Los Angeles Times* in 1860, describing the fertile land, plenty of water, mild climate, and plentiful stands of timber in the Owens Valley, settlers and miners flooded into the valley and started taking Indian land for their farms and cattle ranches.⁷⁹

During the summer of 1861, newly arrived ranchers in the southern Owens Valley allowed hundreds of their cattle to roam freely through Paiute-Shoshone land, destroying their irrigation ditches and disrupting their food supplies. The winter of 1861-62 was a hard, cold one, and Paiutes killed some cattle to survive. In retaliation, ranchers killed some Indians. Efforts to maintain the peace failed, and a Mojave Indian refugee called Joaquin Jim assumed the role of “war chief” with the aim of driving the ranchers and their herds away. In March 1862, the ranchers formed a vigilante group and chased a band of Joaquin Jim’s warriors north to Mono Lake where the vigilantes reportedly shot or drowned 15 of Jim’s fighters. Separate reports that

⁷⁸ Given Capt. Davidson’s role in the brutal 1850 killing campaign around Clear Lake, California, his benign actions in the Owens Valley are somewhat puzzling. See Madley, *An American Genocide*, pp. 103-20.

⁷⁹ Philip J. Wilke and Harry W. Lawton eds., *The Expedition of Capt. J. W. Davidson from Fort Tejon to the Owens Valley in 1859* (Socorro NM: Ballena Press, 1976).

Indians on the Owens River near Lone Pine had killed two whites brought another band of vigilantes there who killed 37 Paiute-Shoshone and burned down their village.⁸⁰

The first Owens Valley War was on. More vigilantes from central California and Aurora, Nevada arrived, followed by 250 US soldiers who soon operated from Fort Independence (it had been established on July 4, 1862). One cavalry man wrote that when the soldiers reached the foot of Owens Lake they were instructed “to kill all the Indians they saw.” The commander of Fort Independence resolved “to keep the Indians out of the valley and in the hills, so they have no opportunity of gathering and preserving their necessary winter supplies.” Intermittent cease fires and skirmishes continued until March 1863 when the army poured more men and arms into the valley. The new commander of Fort Independence closed off all escape routes for the Paiute-Shoshone and told them they had two weeks to surrender; the US troops would take no prisoners if they resisted. Some Paiute fled into the mountains; the rest surrendered. Of those, 908 were deported to Fort Tejon where the food and clothing they were promised were not delivered. Starving Paiute-Shoshone men fled the fort to return to Owens Valley where, in Madley’s words, “the slaughter continued.” All told, in the First Owens Valley War, vigilantes and US troops killed at least 311 Paiute-Shoshone Indians, setting the stage for the brief but definitive Second Owens Valley War, November 1864-January 1865.

The refugees from Ft. Tejon who had straggled back to their homes near Owens Lake struggled to survive in an environment transformed by the Euro-American immigrants and their stock. “The newcomers diverted water from indigenous aqueducts, shot the game animals, and felled pine-nut bearing trees,” the latter essential food sources for the Owens Valley Paiute as they were for the Mono Basin Kutzadika^a. Faced with starvation in another cold winter, the Indians began taking and butchering immigrant ranchers’ cattle. A band of Paiute-Shoshone then attacked the McGuire ranch lying between Little Lake and the Owens River, killing Mrs. McGuire and her son. In January 1865, vigilantes retaliated, slaughtering at least 100 Paiute-Shoshone men, women, and children on the eastern shore of Owens Lake. Then bands of vigilantes tracked down, hunted, and killed an additional 64 to 184 Paiute-Shoshone Indians in the Owens Valley. The second Owens Valley war was over.⁸¹

But more than that one war was over, according to Madley. “[T]he Owens Valley killing campaign marked an end of sorts. No vigilante operation would ever again kill such large numbers of California Indians.” Why? “With the removal or destruction of most California Indians, the California genocide was ending. There remained few free California Indians left to hunt and kill.”⁸² The 1870 California census counted but 7,241 Indians. Many more may have been hiding in the mountains, others began concealing their Indian identities—as a survival strategy—and more than a thousand orphaned Indian children were placed into Euro-American settler households.

Kutzadika^a Choices. As Euro-Americans began moving into the Mono Basin around 1860—there were already 20 or so farm/ranches by 1864 and nearly 40 by 1900 (see Map 1)⁸³—the

⁸⁰ Madley, *An American Genocide*, 310-12.

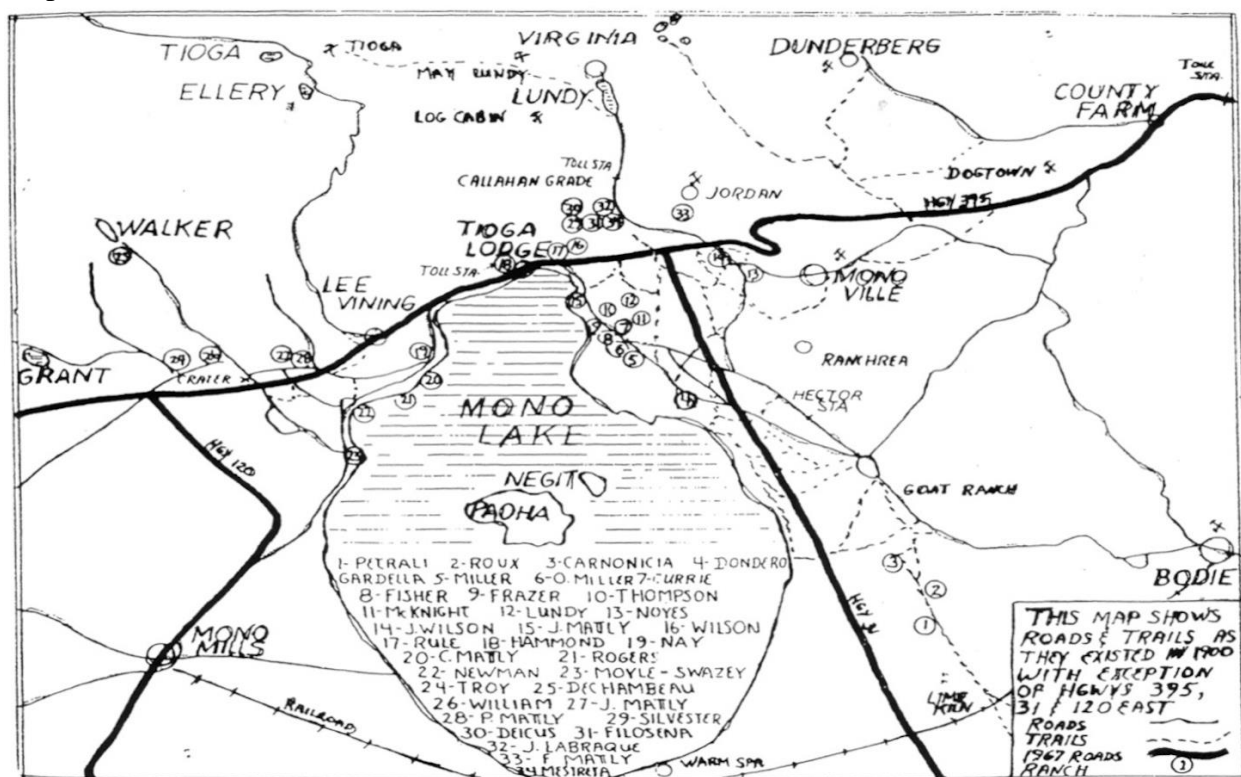
⁸¹ *Ibid.*, 313-29.

⁸² *Ibid.*, 329-30.

⁸³ Calhoun, *Pioneers of Mono Basin*, map facing page 1.

choices facing the Kutzadika^a were limited. Armed resistance no doubt appeared futile, as the experiences of their neighbors to the north in Nevada, the east in the Walker Valley, and especially to the south in the Owens Valley, surely taught them. They could fight, lose, and become a statistic in the 1870 California census. Euro-Americans with their militaries, vigilantes, courts, sheriffs, surveyors, and land registration bureaus had a firm handle over the land in Mono Basin. And they were busy transforming the land into an export-oriented agricultural economy to support booming mining towns.

Map 1. Euro-American Ranches in the Mono Basin, ca. 1900



Source: Margaret Calhoun, *Pioneers of Mono Basin* (Lee Vining, CA: Artemisia Press, 1984), map facing page 1.

That does not mean that the Kutzadika^a could not, or would not, resist as best they could from a position of weakness. Being overwhelmed does not mean that they were powerless. Political scientist James C. Scott made that point in two important books.⁸⁴ Overt acts of resistance by conquered people enter the historical record because those who win have not just military power, but the power of writing and recording those rebellions and the defeat of their enemies. But there are countless other ways to resist, often on a daily or more episodic basis less likely to enter the historical record. To be sure, there were at least two incidents where Kutzadika^a confronted Euro-American miners and mill owners cutting down the pinyon and Jeffrey pine that were essential to their food supply. According to a November 7, 1877 story in the *Bodie Weekly Standard News*, “Men chopping wood on the eastern side of Mono Lake, for the mining

⁸⁴ James C. Scott, *Weapons of the Weak :Everyday forms of Peasant Resistance* (New Haven, CT: Yale University Press, 1985); and *Domination and the Arts of Resistance: Hidden Transcripts* (New Haven, CT: Yale University Press, 1990).

companies of Bodie, have been threatened by the Paiute Indians in that vicinity who swear...that they will shoot every 'white squaw' among them if they do not quit work, clear out and leave the aborigines in sole possession."⁸⁵ Kutzadika^a—both men and women—would appear at or near Mono Basin ranchers' homesteads and glare at them, putting a bit of fright in them.⁸⁶ How many other forms and incidences of daily resistance the Kutzadika^a put up are not recorded. But we do know that when they were hired to work at Euro-American sawmills in Lundy Canyon or at Mono Mills, they often disappeared when the pinyon pine cones were ready for harvesting, leaving the mills in a lurch for labor, and possibly enhancing their bargaining power within the context of the newly emerging wage labor system. Certainly there are recorded acts of kindness that the Euro-American settlers showed to individual Kutzadika^a and their families. But those—and their recording in settler memoirs—must be set against the background of the larger loss of Kutzadika^a land to Euro-American settlers. Large numbers of Kutzadika^a likely also fled into the mountains.⁸⁷

The fact is that in the forty years from 1860 to 1900, the access of Kutzadika^a to their sources of subsistence in the Mono Basin were systematically denied—the result of a slow-motion eco-war, if you will. Although the ranches appear simply as circled numbers on hand-drawn Map 4, many were of considerable size. To the southwest of the lake were two ranches owned by the Farrington brothers; W. J had 2200 acres, and Arch had 4500 acres on which they raised cattle and grew hay. The Conway ranch northwest of the lake was over 1000 acres. Three Mattly brothers owned 1100 acres; another Mattly brother owned an additional 480 acres. Below them along Rush Creek was the 320-acre Drake ranch.⁸⁸

These ranches combined farming with livestock, and the land had to be transformed to support both. According to Margaret Calhoun's memoir, her father first fenced his homestead. "Nearly all of the...property was covered with sage brush which had to be broken down and then grubbed out...The land was...ploughed with a hand plough drawn by two horses...When a piece of ground was ploughed, it next had to be leveled with a Fresno or Slip Scraper drawn by two horses. The field was then fertilized with cow manure and watered. After all that was done, [alfalfa] seed was scattered by hand." They got two crops of hay, some of which was baled and exported to Bodie.⁸⁹ Other farmers grew wheat and barley, and almost all planted potatoes, carrots, and other vegetables stored in root cellars for the winter. The environmental effects of those farms can be still seen today in the exotic grasses that still grow on the abandoned ranches (Figure 14).

To grow their crops and raise their livestock for export, homesteaders began to transform the hydrology of the Mono Basin. They diverted water from the streams running into Mono Lake into ditches distributing water to ranches, tapped springs for gardens, and dug wells to supply household needs. Israel Russel's 1881 geological survey of the Mono Basin also shows Grant

⁸⁵Quoted in Fletcher, *Paiute, Prospector, Pioneer*, 73.

⁸⁶ For example, see Calhoun, *Pioneers of Mono Basin*, 30-31.

⁸⁷ The October 29, 1892 edition of the *Bridgeport Chronicle* observed: "Indians Scarce. A large number of out Indians having crossed the mountains, Indian help is very scarce in town, and the few remaining are as independent as 'hogs on ice.'" Arkush, *Archology of CA-MNO-2122*, 57.

⁸⁸ McIntosh, *Mono County California*, 86-88.

⁸⁹ Calhoun, *Pioneers, of Mono Basin*, 22-24

Lake which supplied water to cattle ranchers.⁹⁰ Whether this hydro-engineering work was done by the individual homesteading families, or with some kind of cooperative agreements and input of labor and capital is not clear. Certainly, homesteading families took care to attend to their own needs, but working out a system of water rights undoubtedly had to have happened. Fresh water was scarce in the Mono Basin, and uncontrolled scrambling for it would have proven ecologically and socially destabilizing. It may go without saying, but it needs to be said, that Kutzadika^a were not involved in determining water rights in the Mono Basin.⁹¹

Figure 14. Photo of the Conway Ranch from the lookout above the Mono Basin along US 395.



Source: The author; photo taken December 10, 2020.

⁹⁰ Russell, *Quaternary History of Mono Valley*, Plate XVII, “Hydrographic Basin of Mono Lake,” 272.

⁹¹ The story of how Mono Basin water—in particular that coming via the Lee Vining, Mill, and Rush Creeks—became a commodity like land is beyond the scope of this paper and belongs in an environmental history of the Mono Basin in the twentieth century. Suffice it say here that the Cain Irrigation Company began acquiring water rights in the Mono Basin in 1902, and by 1923 controlled 80 percent of the water rights there. Part of that story is revealed in a 1923 proposal to sell those water rights to the City of Los Angeles. “Proposal of Cain Irrigation Company, the Southern Sierras Power Company, the Nevada-California Power Company for the Sale of Certain Properties to the City of Los Angeles,” Nov. 23, 1923 [<http://s3-us-west-2.amazonaws.com/uclidcnuxeo-ref-media/d2030f7c-86ae-4749-a7e7-0525e45f048b>], accessed Dec. 29, 2020.

The homesteads around Mono Lake included fenced portions for some of their animals and cropped land, as well as significant amounts of unfenced pasture. However they were physically structured, all of these ranches, being the private property of the owners, restricted Kutzadika^a from access to the food and water resources that Mono Lake had provided them.

Certainly, the plague of sheep on the lake's eastern shore removed pronghorn antelope from the basin. Whether the sheep destroyed the pronghorn grazing land or simply displaced them is not clear. But pronghorn were extirpated and have never returned to the eastern shore of Mono Lake where the pronghorn traps were, suggesting that the plants upon which they depended also never recovered after the sheep were gone.⁹² Also gone with Kutzadika^a access to the deltas and meadows along the fresh-water streams flowing into Mono Lake—Rush Creek, Lee Vining Creek, Mill Creek—was their access to the fresh greens and grasses they had gathered in the spring. Fresh water springs also dried up.⁹³ How long did the Kutzadika^a have access to the lakeshore in summer to collect the pupae of the brine fly? That is not clearly understood. But we do know that their access to waterfowl was cut off by sheriffs or game warden.

Among the food sources that apparently continued to be available for some time were rabbits on the north shore in those places where the absence of ranches allowed some rabbit drives to continue. In the Jeffrey pine forests, Kutzadika^a could continue to collect *piagi*, the Pandora moth caterpillar.⁹⁴ One of the Kutzadika^a major sources of food and trade—the pine nuts from pinyon pines—continued to be available. Indeed, Kutzadika^a traded those nuts with the Euro-American settlers for some of their foods, and for pots and tools such as needles and axes. But the main trading partner of the Kutzadika^a—the Sierra Miwok in Yosemite Valley—by 1890 also lost access to their main crop, the acorns from the black oak, after Yosemite National Park officials prevented Miwok from firing the valley that preserved the stands of oak by suppressing undergrowth and unwanted tree species.⁹⁵ By then, it may have been that the Kutzadika^a supply of alkali fly larvae, one of the major trade items with the Miwok, had also declined or disappeared.

⁹² Today there is a herd of about 150 pronghorn in the hills north of Bodie, not survivors of the extirpation from the Mono Basin, but reestablished in the late 1940s and early 1950s with animals transported from Lassen County in northeastern California. “Pronghorn Antelope Captures Successfully Completed, *California Department of Fish and Wildlife News*, March 20, 2014. I thank Jim Parker for bringing this article to my attention.

⁹³ The timing and cause of the drying up of springs in the Mono Basin is not clear. The grazing of sheep and cattle may have contributed to it, but so too might the diversions by the Los Angeles Department of Water and Power of fresh water that started in 1941. Another possible cause was the 1906 San Francisco earthquake. According to Lilly La Braque, “For several weeks after the quake, Mono Lake rose 30 feet or more, covering fences, pastures, and finally the ground floor of our house. A large spring or source of water had evidently opened in the lake's bottom.” Lily Mathieu La Braque, *Man from Mono* (Lee Vining, CA: Mono Basin Historical Society, 2015), 34. To raise the water level 30' on a lake the size of Mono—over 100 square miles, or 64,000 acres—would have required a huge amount of water.

⁹⁴ Richard A. Weaver and Mark E. Basgall, “Aboriginal Exploitation of Pandora Moth Larvae in East-Central California,” *Journal of California and Great Basin Anthropology*, Vol. 8 no. 2 (1986): 161-79.

⁹⁵ Linn Gassaway, “Native American Fire Patterns in Yosemite Valley: Archeology, Dendrochronology, Subsistence, and Culture Change in the Sierra Nevada,” *SCA Proceedings*, Vol. 22 (2009); Jefferson W. Haney, “Acorn Exploitation in the Eastern Sierra Nevada.” *Journal of California and Great Basin Anthropology*, Vol. 14, No. 1 (1992): 94-109.

With access to their food supplies cut off, the Kutzadika^a who remained in the Mono Basin had to adapt to survive. Mostly that meant working for wages in the new capitalist economy on the ranches, farms, mines, and sawmills the Euro-American settlers built; sending children to missionary or county schools; intermarrying; and learning and adopting settler customs. Mostly, those transformations and their consequences belong to a twentieth-century history.⁹⁶

Conclusion

The Mono Basin ecosystem was able to support pronghorn antelope prior to 1900. For at least 1400 years, Kutzadika^a developed and used a technology—the pronghorn traps—to capture pronghorn and add them to the annual (or bi-annual) round of food gathering and hunting in the Mono Basin. Evidence thus suggests that the Kutzadika^a regulated both their hunting and gathering of food from the Mono Basin to ensure that those resources would be sustainable for generations to come, and their own population size, to keep both in balance with the available resources.

That way of life slowly came to an end in the second half of the nineteenth century, as sheep replaced pronghorn, and Euro-American settlement at or near most of the fresh water sources in Mono Basin prevented Kutzadika^a from foraging and living in the more productive ecozones of their homeland. The removal of Kutzadika^a from their lands and their replacement by Euro-American settlers was affected by the 1862 Homestead Act and land surveys, and enforced by state and federal laws, courts, and the threat of armed force. Land became private property with littoral and riparian rights to water in streams and Mono Lake, effectively cutting off Kutzadika^a access to their sources of food, and setting in motion environmental changes that transformed the Mono Basin into a food and natural resource-exporting economy owned and controlled by Euro-American settlers, not one for sustaining the Kutzadika^a.

And because land had become alienable private property, when the Los Angeles Department of Water and Power came looking for additional sources of Eastern Sierra water in the 1910s to slake the thirst of the growing population and economy of Southern California, they could buy land and water rights from ranchers and developers without having to first remove the Kutzadika^a.⁹⁷ That was already done for them.

⁹⁶ For an overview, see Arkush, *The Archeology of CA-MNO-2122*, 63-64.

⁹⁷ Albeit with pressure and subterfuge. See Hart, *Storm Over Mono*, 38-40.