

*"A country of wonderful contrasts,  
hot deserts bordered by snow-  
laden mountains, cinders and  
ashes scattered on glacier-polished  
pavement, frost and fire working  
together in the making of beauty."*

John Muir

## Our Mission

The mission of California State Parks is to provide for the health, inspiration and education of the people of California by helping to preserve the state's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation.



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Discover the many states of California.™

### Mono Lake Tufa State Natural Reserve

1 Visitor Center Drive

Lee Vining, CA 93541

(760) 647-6331

e-mail: [mono.lake@parks.ca.gov](mailto:mono.lake@parks.ca.gov)

Front cover photo by Dick Erb

# Mono Lake Tufa State Natural Reserve

## Mono Basin National Forest Scenic Area



Photo by Jeff Sullivan

## Mono, An Ancient Sea

Mono Lake is a majestic body of water covering about 60 square miles: 13 miles east-west by 8 miles north-south. Estimated to be more than a million years old, Mono (*mō-nō*) is one of the oldest lakes in North America. Throughout its long existence, Eastern Sierra streams have fed Mono Lake with fresh water laden with salts and minerals carried down from the mountains. With no outlet, water can only leave the basin through evaporation, and the salts and minerals are left behind. As a result, Mono Lake is two and a half times as salty and eighty times as alkaline as ocean water.

You will notice a soapy or slippery feel to Mono Lake's water. The alkaline water is very cleansing. Mark Twain wrote of Mono, "Its sluggish waters are so strong with alkali that if you only dip the most hopelessly soiled garment into them once or twice, and wring it out, it will be found as clean as if it had been through the ablest of washerwomen's hands."

## Enjoying the Mono Basin

The **Mono Basin National Forest Scenic Area Visitor Center** is a great place to start your visit. The center is located ¼ mile north of Lee Vining, just east of Highway 395; it includes a variety of exhibits, films, and information about the natural and human history of the Mono Basin.

If you have time for only one stop, be sure to visit the **South Tufa Area**. This easily reached site offers spectacular views of the tufa towers and a one-mile, self-guided nature trail. South Tufa is a federal fee area, and national interagency passes are accepted.

At nearby **Panum Crater**, the youngest volcano in the Mono Crater chain, a trail leads to the dome and rim of the volcano.

On the north shore, just below Mono Lake County Park, the **State Natural Reserve boardwalk** provides access across Reserve wetlands to the lakeshore, an excellent spot for bird watching.

For visitors with limited time, the **Old Marina** is an easy stop along Highway 395 just one mile north of Lee Vining. It offers impressive views of wetlands and a small offshore tufa area. A 1.2-mile trail links this site with the Scenic Area Visitor Center.

**Interpretive Programs**—Naturalists lead walks May through October at South Tufa and other locations throughout the Basin. Ask at the visitor center for a current schedule of these programs.

**Camping**—There are no campgrounds in the Scenic Area or in the State Natural Reserve. However, several campgrounds are nearby (see symbols on map). Most charge a fee and feature designated sites and a maximum length of stay. Dispersed camping is allowed in limited locations of the Scenic Area above the elevation 6,417 feet (see map). Campfire permits are required for any open fires and use of barbecues or gas stoves. Permits can be obtained at the Scenic Area Visitor Center.



Children enjoying the lake

**Swimming** in Mono Lake is a memorable experience. The lake's salty water is denser than ocean water and provides a delightfully buoyant swim. Keep the water out of your eyes or any cuts, as it will sting. Carry fresh water to rinse off your body.

**Boating** provides a wonderful perspective on Mono Lake, but sudden winds can make it dangerous to venture far from shore. Canoes and kayaks most often launch at Navy Beach, where vehicles can unload boats close to the water. See the map page for boating restrictions.

## Conservation Success

In 1941, the City of Los Angeles began diverting streams that feed Mono Lake. The diversion of those streams caused Mono Lake to drop more than 40 feet, exposing about 17,000 acres of "recessional" lands. Recessional lands are the exposed lakebed lands below the elevation of 6,417 feet above sea level, where the lake surface was in 1941 before diversions began. Concerns were raised about the lake's ecosystem, the effects of wind-blown alkali dust on Mono Basin air quality, and the aesthetics of a shrinking lake. Citizen groups—the Mono Lake Committee and the National Audubon Society—began legal efforts to protect Mono Lake.

On September 28, 1994, after 16 years of court battles, research and hearings, the State Water Resources Control Board issued an order to protect Mono Lake and its tributary streams. The effects of the order will ultimately raise the lake level by 17 feet to an elevation of 6,392 feet above sea level over the next 15-25 years. All parties involved agreed to accept this plan and implement it in a spirit of cooperation.

While the lake may be saved on paper, much remains to be done. Stream and waterfowl habitat restoration efforts are still underway, with input from U.S. Forest Service and Reserve staff and the Mono Lake Committee. The question today is not *whether* Mono Lake will be saved, but *how* it will be saved.

## Ecology of the Mono Basin

Mono Lake has been called a dead sea, but it actually abounds with life. Few organisms can tolerate Mono's salty, alkaline water, but these few species thrive in astronomical numbers.

The food chain begins with green algae, a microscopic one-celled plant. Algae uses decayed organic matter and sunlight to grow. In the winter, when the algae blooms, the lake may become pea soup green.

Two animals feast on the algae—the brine shrimp and the alkali fly.

Alkali fly females can actually walk into the lake in an air bubble and lay their eggs on pieces of rock or tufa. An egg becomes a larva and then a pupa before the adult fly finally emerges. The pupa stage of the alkali fly was collected by the local Kutzadika'a Paiute Indians and used as a food source and trade item.

The half-inch-long brine shrimp can be seen in Mono Lake from April through October. At the height of the summer season, an estimated eight to twelve trillion swim in Mono's waters. As winter approaches, the adult brine shrimp begin to die off, but not before they lay eggs that will overwinter in the lake-bottom mud. The eggs hatch out as the lake water warms in the spring. Mono's shrimp (*Artemia*

*monica*) are a unique species that has adapted to Mono's special conditions.

Mono's shrimp and flies provide a plentiful food supply for more than eighty species of migratory birds that visit the lake each spring and summer. Particularly notable bird species include three migrants—Wilson's and red-necked phalaropes and eared grebes—and two nesting species—California gulls and snowy plovers.

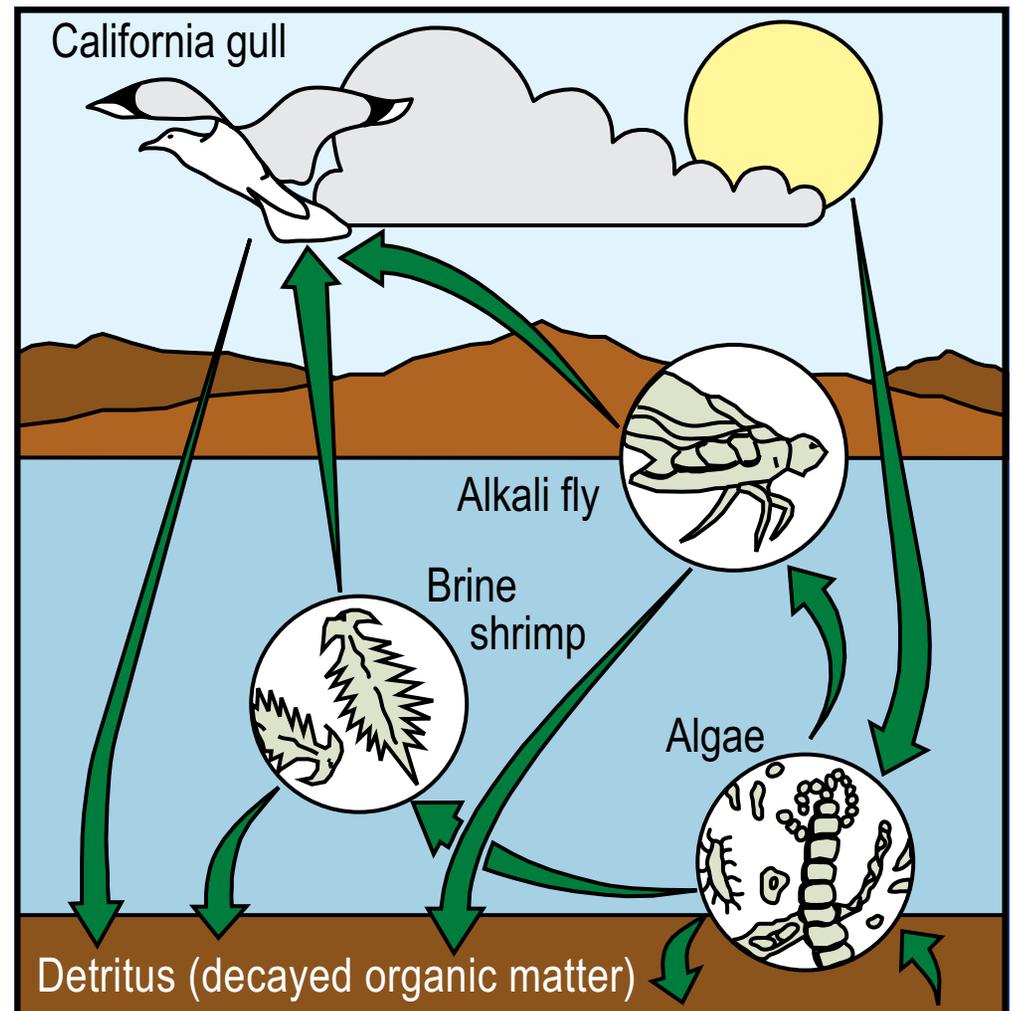
The small, graceful phalaropes are delightful to watch as they pick alkali flies off the surface of the lake or snatch them from the air. From 80,000 to 100,000 phalaropes visit Mono Lake in July and August. They winter in warmer South American climates.

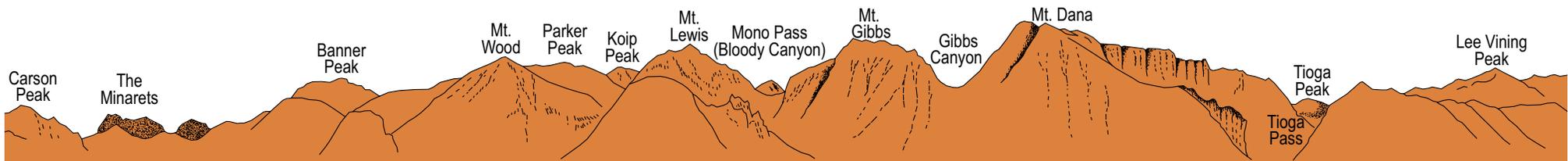
Eared grebes visit Mono Lake in astonishing numbers. An estimated 1.5 million of them make a spectacular sight during the fall migration from August through October. Grebes can be seen diving for food in the lake. They are never

seen on land, as their legs are designed for swimming rather than walking.

Nearly 50,000 adult California gulls fly to Mono Lake from the coast each spring to nest where food and island nesting sites are plentiful. Mono's colony is one of the largest in California as well as one of the largest and most important in the world.

Approximately 100 endangered snowy plovers nest along the windswept alkali flats of Mono Lake's eastern shore.





## Geology of the Mono Basin

Mono Lake's modern landscape has been shaped over millions of years by faulting and volcanic activity. For the last three to four million years, the whole basin has been tilting westward and sinking while the Sierra has been rising. This ongoing process has created the majestic contrast of a desert lake bordered by high mountain peaks. As the western floor of the Mono Basin slipped downwards, its southern and northern margins tilted slowly towards its center, forming a bathtub-like basin that filled with water to form Mono Lake.

About 13,000 years ago, following the peak of the last great ice advance, the Mono Basin filled with water, but prior to that, much longer ago, it actually overflowed for a short time. This Ice Age lake covered 338 square miles and reached a depth of about 900 feet, five times larger than the modern lake.

You can see evidence of Mono's Ice Age glaciers in the morainal embankments at the mouths of Bloody and Lee Vining Canyons.

The Mono Basin's long history of volcanism is evident in the hills that mark the north and east boundaries of the basin—hills that date back some 11 million years. To the south lay the Mono Craters, the youngest mountain range in North America. Panum Crater, the northernmost of these craters, erupted only 650 years ago. Panum is easily reached from Highway 120, three miles east of Highway 395.

Mono's islands are also volcanic. Paoha Island is thought to be about 320 years old. Hot springs and steam vents in the basin show that volcanic activity is still present.

Black Point, on the north shore of Mono Lake, is the result of a volcanic eruption that began beneath the lake about 13,000 years ago. At that time, the lake level was still rising toward its post-Ice Age high point, but the lake was already about 400 feet deeper than it is today. As the top of Black Point cooled and contracted, narrow cracks or fissures formed on the summit—some of them only a few feet wide but as deep as fifty feet.

## Tufa $\text{Mono Lake water (carbonates) + freshwater springs (calcium) = Tufa (calcium carbonate)}$

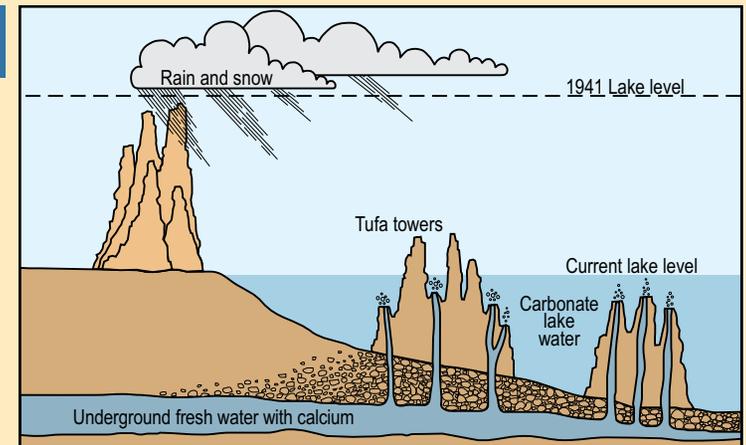
Mono Lake's tufa towers (pronounced "toofah") are spectacular examples of what nature can do with a few basic elements. These unusual spires and knobs are formed when calcium-bearing freshwater springs well up through alkaline lake water, which is rich in carbonates. The calcium and carbonate combine, precipitating out as limestone. Over many years, a tower forms around the mouth of the spring. This tufa-forming reaction happens only in the lake itself. As the lake level drops and exposes the tufa towers, they cease to grow.

The towers at South Tufa are estimated

to be younger than 300 years old. Other tufa around the lakeshore could be a few hundred years older. Far older tufa towers, some of them as old as 13,000 years, can still be found high above the current lake, along Mono's ancient shore.

Tufa is found in other alkaline bodies of water, but the variety and quantity of Mono's towers are unique.

Tufa is also formed as freshwater springs percolate through briny lake-bottom sand. The "sand tufas" are intricate sand tubes and columns exposed as winds strip away their sandy coverings.



The best place to visit the tufa towers is at the spectacular South Tufa Area (see map).

**The Mono Lake Basin** is a unique and inspiring landscape that offers visitors breathtaking scenery and abundant recreation opportunities. This brochure should provide you with information needed to explore the area, learn about the unique ecosystems, and experience the land and water in a safe and responsible manner. Additional information, permits, passes and guidebooks are available at the Mono Basin National Forest Scenic Area Visitor Center or by contacting one of the land management agencies listed below.



**Mono Lake Tufa State Natural Reserve**  
P. O. Box 99  
Lee Vining, CA 93541  
(760) 647-6331



Mono Lake Tufa State Natural Reserve—California State Parks manages state-owned lakebed lands below the elevation of 6,417 feet above sea level. The Reserve was established in 1982 to preserve the spectacular tufa formations and other natural features of Mono Lake. California State Parks and the U.S. Forest Service work cooperatively to manage the public lands around Mono Lake.



**Mono Basin National Forest Scenic Area**  
P. O. Box 429  
Lee Vining, CA 93541  
Mono Basin Visitor Center (760) 647-3044



Mono Basin National Forest Scenic Area—Part of the Inyo National Forest, the Mono Basin National Forest Scenic Area was established by Congress in 1984 to protect the natural, cultural and scenic resources of the Mono Basin. The first of its kind in the National Forest System, the Scenic Area encompasses 116,000 acres, including South Tufa and Navy Beach recreation sites and the Mono Basin Visitor Center in Lee Vining.



Photo by Donn Lusby

Mono craters



Photo by Mono Lake Committee

State Natural Reserve boardwalk

## PLEASE REMEMBER

Tufa may not be damaged or collected anywhere in the Mono Basin.

Vehicles must stay on designated roads and parking areas.

To protect wildlife, these boating regulations must be followed:

- To protect nesting birds, boats may not travel within one mile of any island or islets from April 1 to August 1.
- All boats and people must stay a minimum of 200 yards from any osprey nest (on offshore tufa) from April 1 to September 1. Boats may not approach congregations of birds.
- Boats should avoid the deltas of creeks and streams where birds congregate.
- Overnight travel on Mono Lake requires a permit that can be obtained at the Scenic Area Visitor Center in Lee Vining.



Mono Basin Visitor Center

Photo by Jim Stroup



Negit and Paoha islands

Photo by Mono Lake Committee



South Tufa Area formations

Photo by Jim Stimson



Ranger-guided walk

Photo by Marie Read

This brochure reprinted with funds granted from the Bodie Foundation, the parent organization of Friends of Mono Lake Reserve.

Friends of Mono Lake Reserve seeks to help visitors understand, appreciate and emotionally connect with Mono Lake's remarkable natural resources through interpretation and education and to inspire visitors to want to protect this outstanding resource and explore it further on their own. Visit our website at

[www.visitmonolake.org](http://www.visitmonolake.org)

-  RESTROOMS
-  ACCESSIBLE FEATURE
-  MAJOR TUFA AREAS
-  CAMPGROUNDS
-  PAVED ROADS
-  IMPROVED DIRT ROADS
-  4-WHEEL DRIVE ROADS
-  PARKING LOTS
-  NATIONAL FOREST SCENIC AREA
-  STATE NATURAL RESERVE
-  SCENIC AREA RECESSIONAL LANDS
-  PRIVATE OR CITY OF L.A. PROPERTY (within scenic area boundary)

