



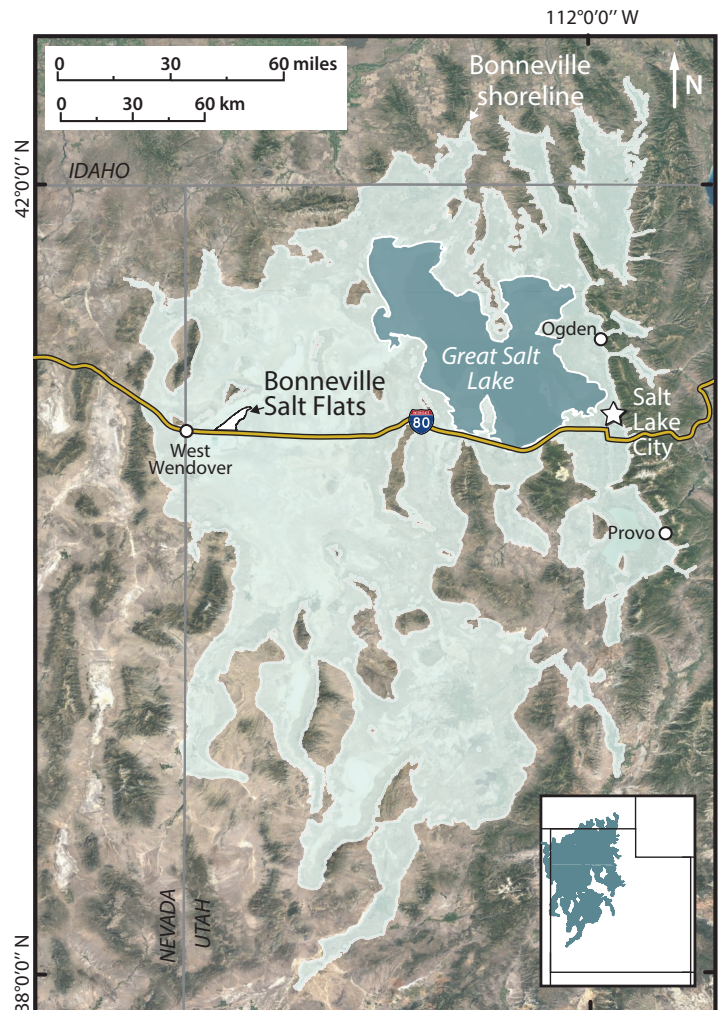
The Changing Bonneville Salt Flats

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WHAT ARE THE BONNEVILLE SALT FLATS?

The Bonneville Salt Flats in western Utah are renowned worldwide for hosting land-speed racing events. They are easily accessible from Interstate 80 and managed by the Bureau of Land Management. This distinct landscape spans approximately 5 miles wide by 12 miles long, featuring a smooth, hard salt crust that draws thousands of visitors each year. Both passers-by and enthusiasts find recreation here, attracted by a unique landscape and rich history. In 1846, the ill-fated Donner Party faced significant delays while traversing this challenging terrain. Since 1920, the brines beneath the flats have been a valuable source of potash, a crucial plant fertilizer. The Bonneville Salt Flats are an internationally important land speed racing and motorsports location. Since 1914, numerous land-speed records have been set and broken here, including a world speed record of 622.4 miles per hour in 1970. Recognizing its significance, the Bonneville Salt Flats speedway was listed on the National Register of Historic Places in 1973. Classified as a Special Recreation Management Area and an Area of Critical Environmental Concern since 1985, the salt flats offer diverse recreational opportunities. Additionally, you may recognize this iconic landscape from films and commercials.



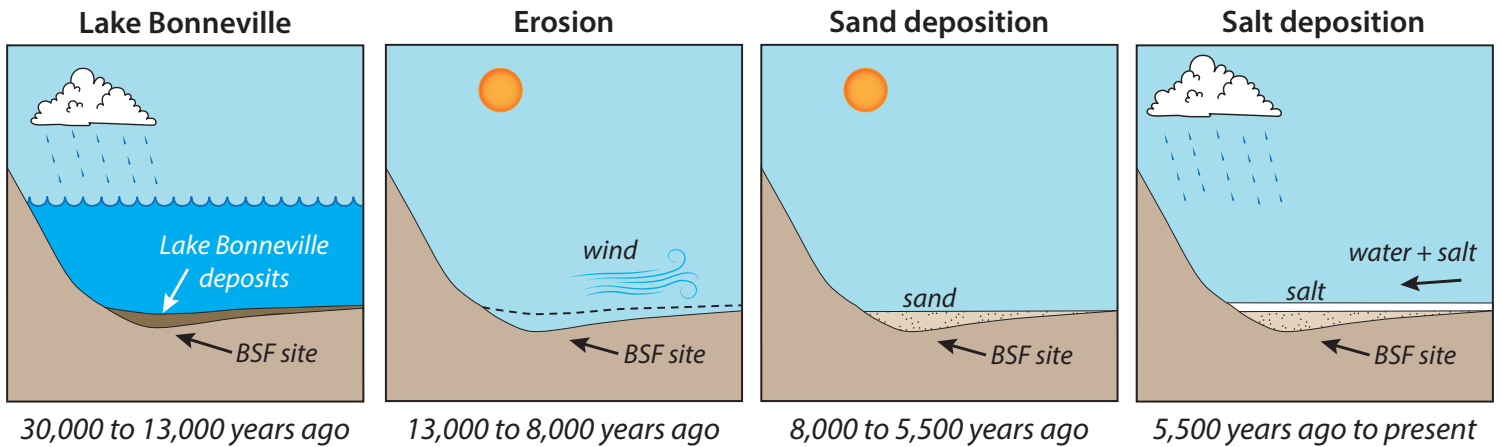
Location overview. Late Pleistocene-age Lake Bonneville is shown in the light-blue shaded area.



The salt flats are globally renowned as a destination for breaking land-speed records (images by Jeremiah Bernau).

HOW OLD ARE THE SALT FLATS, AND HOW DID THEY FORM?

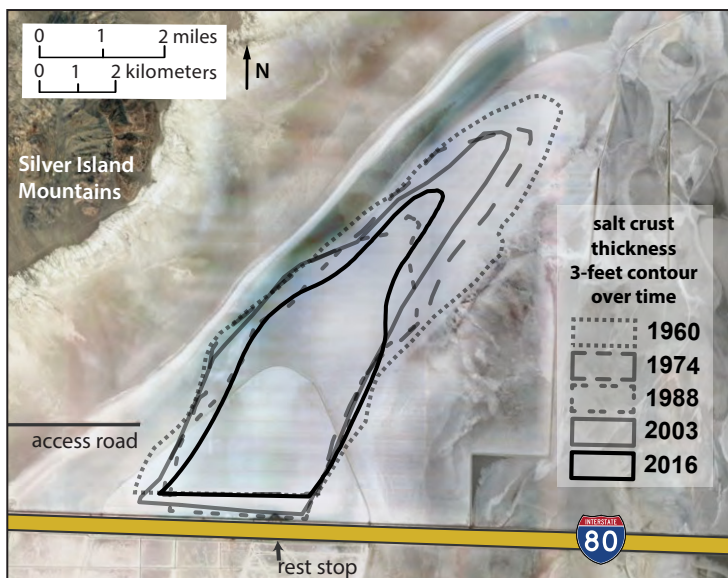
Historically, the Bonneville Salt Flats were regarded as the desiccated remnants of ancient Lake Bonneville. However, new research revealed that after Lake Bonneville dried up approximately 13,000 years ago, about 5 feet of Lake Bonneville sediments were blown away by wind at the site of the salt flats. Erosion ceased around 8,000 years ago when gypsum sand, which forms from the evaporation of salty water, began to accumulate. About 5,500 years ago, increased rainfall enabled groundwater and surface water that carrying dissolved salt to accumulate at the salt flats, forming the salt crust.



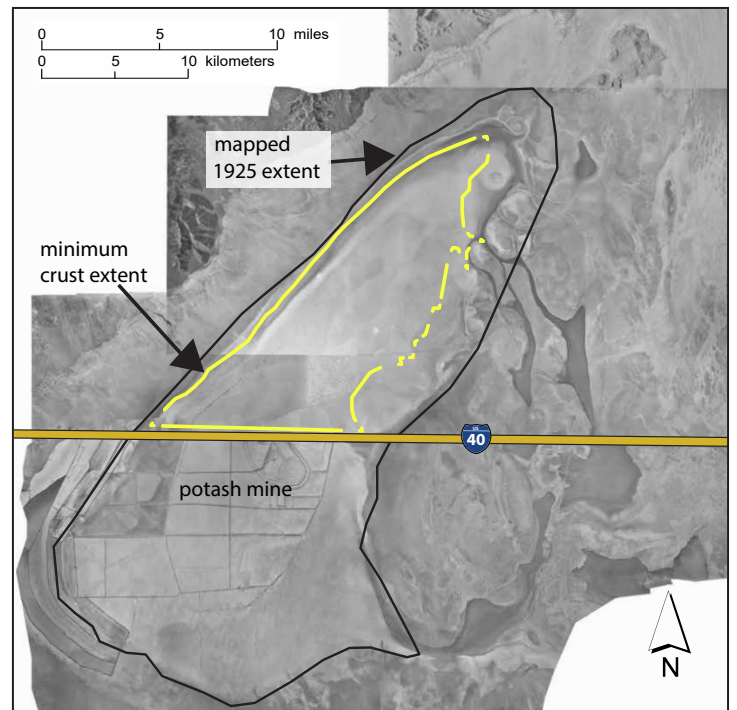
The depositional history of the Bonneville Salt Flats (BSF) area.

ARE THE BONNEVILLE SALT FLATS SHRINKING?

Concern about declining salt crust quality at the Bonneville Salt Flats dates back to at least the 1960s within the racing community. Regular measurements of the salt crust thickness have been taken to address this concern. These measurements, along with satellite images, indicate the volume and size of the salt crust have generally decreased over time.



Change in the thickest section of the Bonneville Salt Flats (>3 feet thick) over time (base image from May 2019).

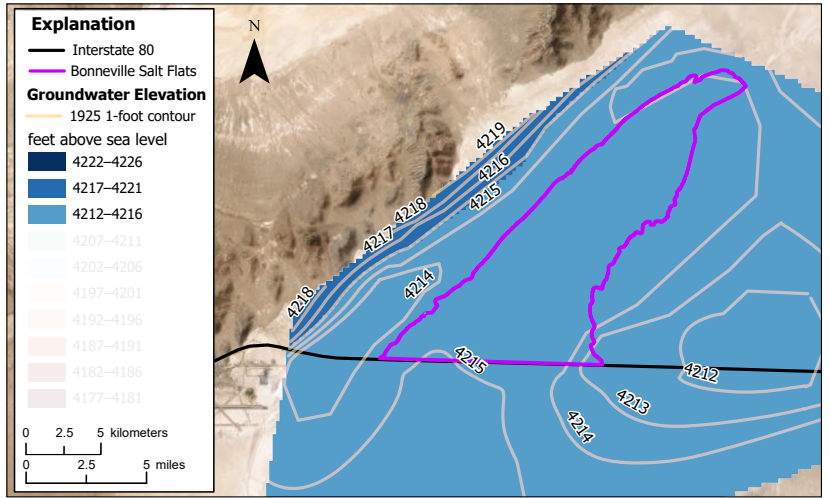


Change in Bonneville Salt Flats extent over time. Black outline of 1925 Bonneville Salt Flats extent (the earliest recorded crust extent; base image from 1953). The region south of US Route 40 (now I-80) is a potash mine. The yellow outline represents one of the smallest documented salt flat extents. Satellite imagery confirm a long-term trend in declining area since at least the 1980s.

WHY ARE THE BONNEVILLE SALT FLATS CHANGING?

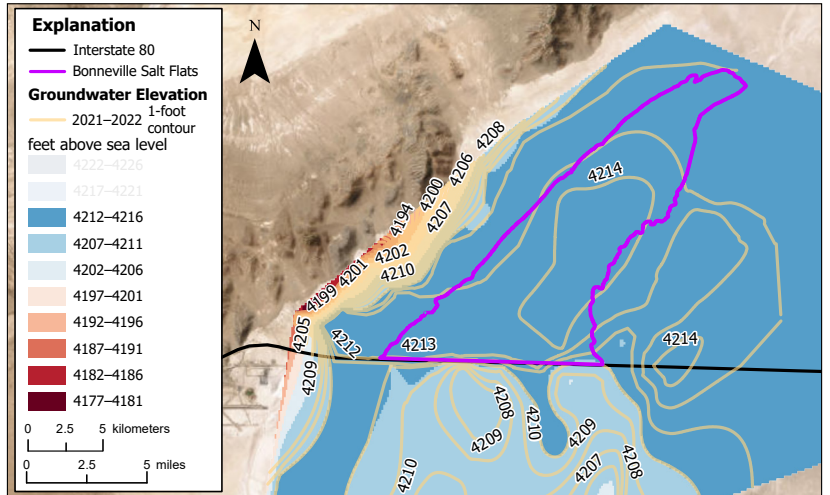
Saline pans, like the Bonneville Salt Flats, form and expand when they receive water from surface water and groundwater sources. However, due to changes in climate, the region has experienced decreased precipitation and reduced water flow, resulting in less water reaching the salt flats. Moreover, in the past century, both salt and groundwater have been extracted from the salt flats and the surrounding vicinity. These factors have caused significant alterations in groundwater levels around the salt flats. Groundwater, instead of flowing into the salt flats, now flows out, carrying away salt and gradually diminishing the flats over time.

Bonneville Salt Flats Groundwater Level (1925)



Elevation of groundwater levels near Bonneville Salt Flats in 1925 (earliest known measurement) show water from the mountains to the northwest flowing toward the salt flat.

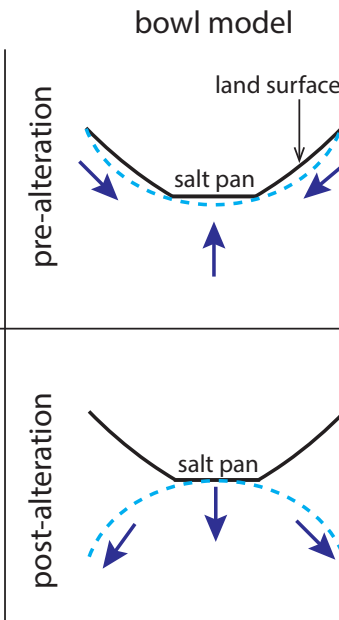
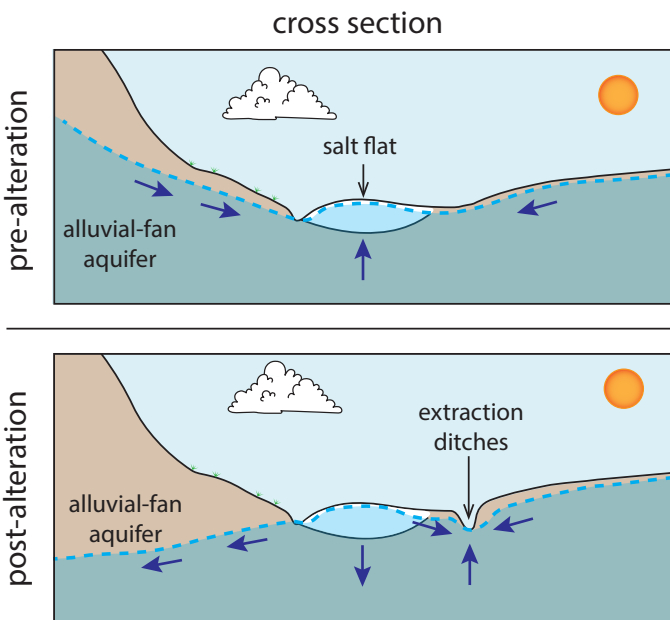
Bonneville Salt Flats Groundwater Level (2021-2022)



Elevation of groundwater levels near Bonneville Salt Flats in 2021 and 2022 show water from the salt flats flowing west toward the mountains and south toward the mine.



Brine extraction ditch (image by Jeremiah Bernau).



"Salt follows the flow of water."
Brenda B. Bowen,
University of Utah
Geology professor

Explanation

- water flow →
- water table - - -
- land surface —

Diagram showing how groundwater flow beneath the salt flats has shifted over time.

SECURING THE BONNEVILLE SALT FLATS' FUTURE: CAN THEY BE PRESERVED?

As scientists delve deeper into the processes impacting the Bonneville Salt Flats, our understanding of the most effective methods for preserving and restoring this remarkable landscape has evolved. Over the past 25 years, a salt laydown project has been implemented, utilizing groundwater sourced from the alluvial fans of the Silver Island Mountains located northwest of the salt flats.



Brine from the salt laydown project entering the salt flats (image by Jeremiah Bernau).

This water dissolves salt residue from the nearby potash mine, creating a brine that is pumped onto the salt flats. Although the project has not yielded the expected growth of salt crust, it may have slowed crust decreases. Nevertheless, this endeavor has resulted in water loss from the alluvial fan, enabling groundwater and salt from the salt flats area to flow away from the saline pan.

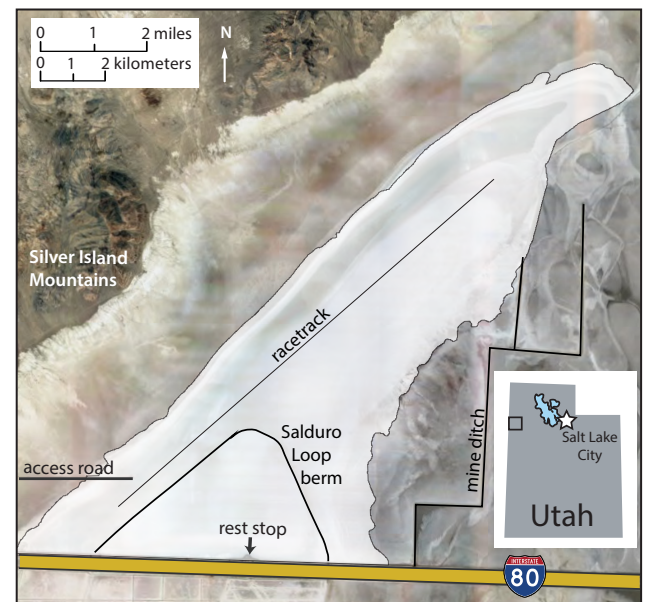
Other proposals to preserve the salt flats include suspending brine extraction and reducing water use. With a better grasp of the factors that shape the longevity of the salt flats, optimism grows for impactful restoration strategies that can secure the Bonneville Salt Flats for future generations.

CAN I VISIT THE SALT FLATS?

Absolutely! The salt flats are an incredible place unlike anywhere else in the world. Please help preserve this public treasure by not driving on wet salt. There are plenty of opportunities to enjoy this unique destination throughout the year. Choose the optimal time for salt flat driving by waiting for a few weeks of dry weather to dry out the crust; usually, between June and September is best. Failing to do so may result in your vehicle getting stuck and requiring an expensive tow, especially in muddy areas near the edges where the salt crust is thinner. You are always welcome to walk onto the salt flats.

Even slight rainfall can cause flooding, making it riskier to traverse the salt flats. To ensure a safe trip, check the current conditions here: <https://www.chronolog.io/site/BSF101> and https://mesowest.utah.edu/cgi-bin/droman/meso_base_dyn.cgi?stn=bflat before planning your visit and prepare for the challenging environment. There is no shade or water available, and the bright sun reflecting on the salt crust can be blinding.

Check the annual salt flat event schedule here: <https://www.blm.gov/visit/bonneville-salt-flats>.



How to visit the Bonneville Salt Flats. Salt flats visible at Interstate 80 rest stop. For a closer look or access to the racetrack, take Exit 4 and follow the access road. Salduro Loop berm divides the salt flats, preventing racetrack access from the rest stop (base image from May 2019).



Salt polygons illuminated by the sunrise (image by Jeremiah Bernau).

WHERE CAN I LEARN MORE?

For a richer grasp of the salt flats' history and trip-planning resources, explore here: <https://geodata.geology.utah.gov/pages/search.php?search=%21collection129324>.