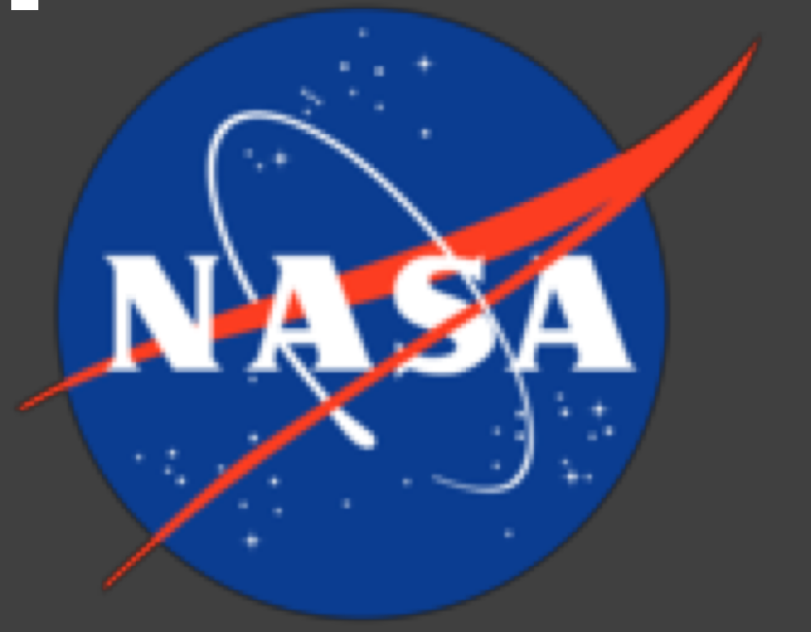


What in Tarnation? Monitoring Animal Entrapments at the Rozel Tar Seeps

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Abstract

The Great Salt Lake (GSL) is one of the largest migratory stops for many species of birds in North America. At Rozel Point, along the banks of the Great Salt Lake, there are tar seeps where some species of birds have gotten entrapped and died. These petroleum seeps are both naturally occurring and human created. The temperature that the seeps become sticky, the possibility of prey animals drawing predators in, and the appearance of the tar seeps are all important aspects of why birds are drawn to these seeps. Using motion sensor cameras and temperature monitoring devices, the animals that are visiting the tar seeps and the temperature variation of the seeps were monitored. Our data from summer 2018 and 2019 suggest that the most common species entrapped at Rozel Point are American White Pelicans. The purpose of this study is to monitor activity at the tar seeps and to keep track of the mortalities that occur there, observing the preservations of the animals in real time.



Figure 1 & 2. Natural oil springs from a reservoir and seeps through cracks in the ground or makes volcano-shaped mounds.

Introduction

- Rozel has both naturally occurring and human made petroleum seeps located in the north arm of the Great Salt Lake.
- During the summer months, the tar becomes viscous due to the high temperatures, this makes it easy for birds and other animals to get entrapped.
- American White Pelicans, barn owls, and various other species of birds have been found dead in the seeps. After entrapment, scavengers, mainly coyotes, visit the carcasses as they decay.
- Eventually, these dead organisms can be preserved in the tar and become fossilized. Rozel is unique because unlike other tar deposits with fossils already present, such as the La Brea Tar Pits, we can observe these preservations in real time.

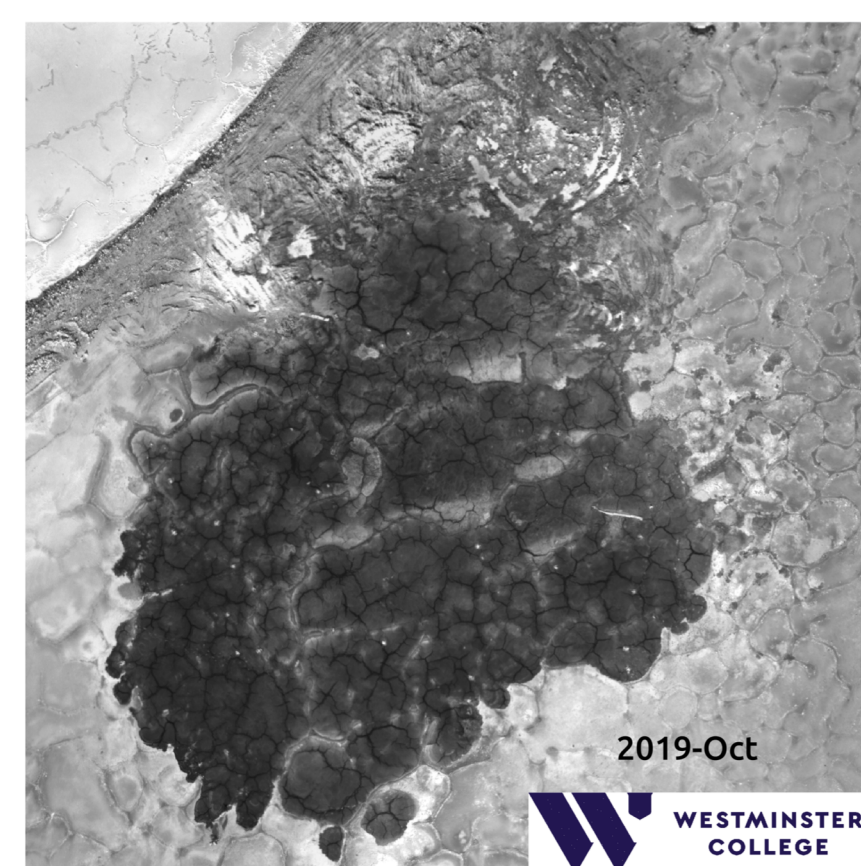
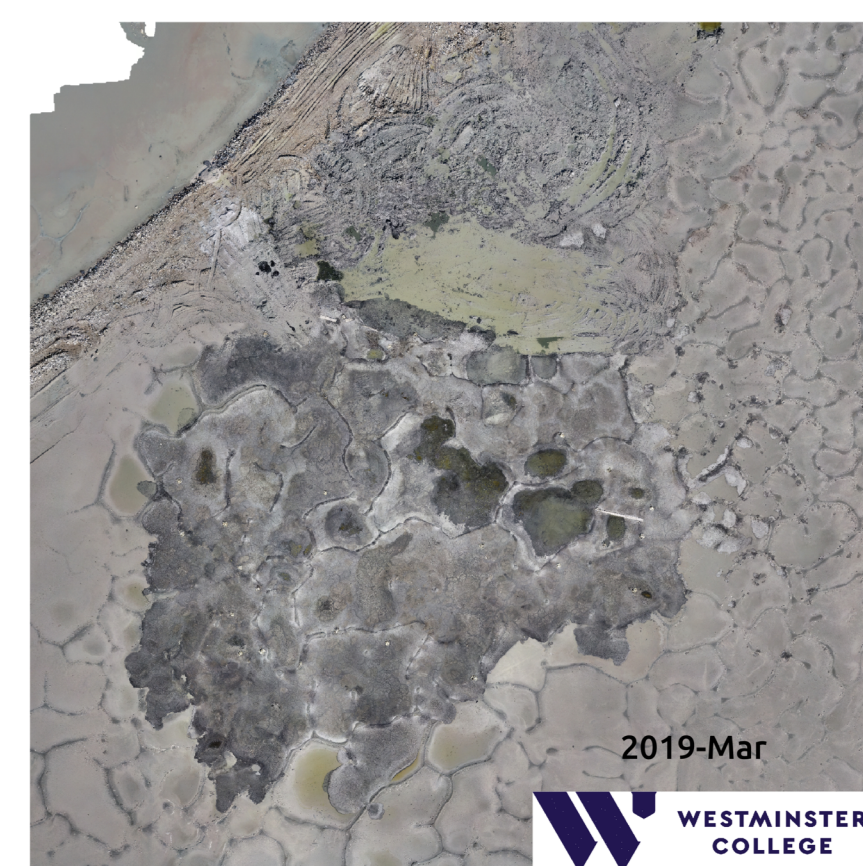


Image Credit: Foad Yousef

Figure 3 & 4. These drone images show the seasonal variation in sample site #3 from March 2019 to October 2019.

Methods

- Cuddeback motion sensor cameras were set up around the three biggest seeps in Rozel Point to document any animal entrapments or visitations.
- Pictures were taken on an hourly time lapse and whenever the cameras sensed motion.
- Pictures were then analyzed to see how many visitations and entrapments occurred at these three seeps.



Figure 5. Coyote looking for carcasses to scavenge on during the night, when the tar is firm enough to walk on.

Results and Discussion

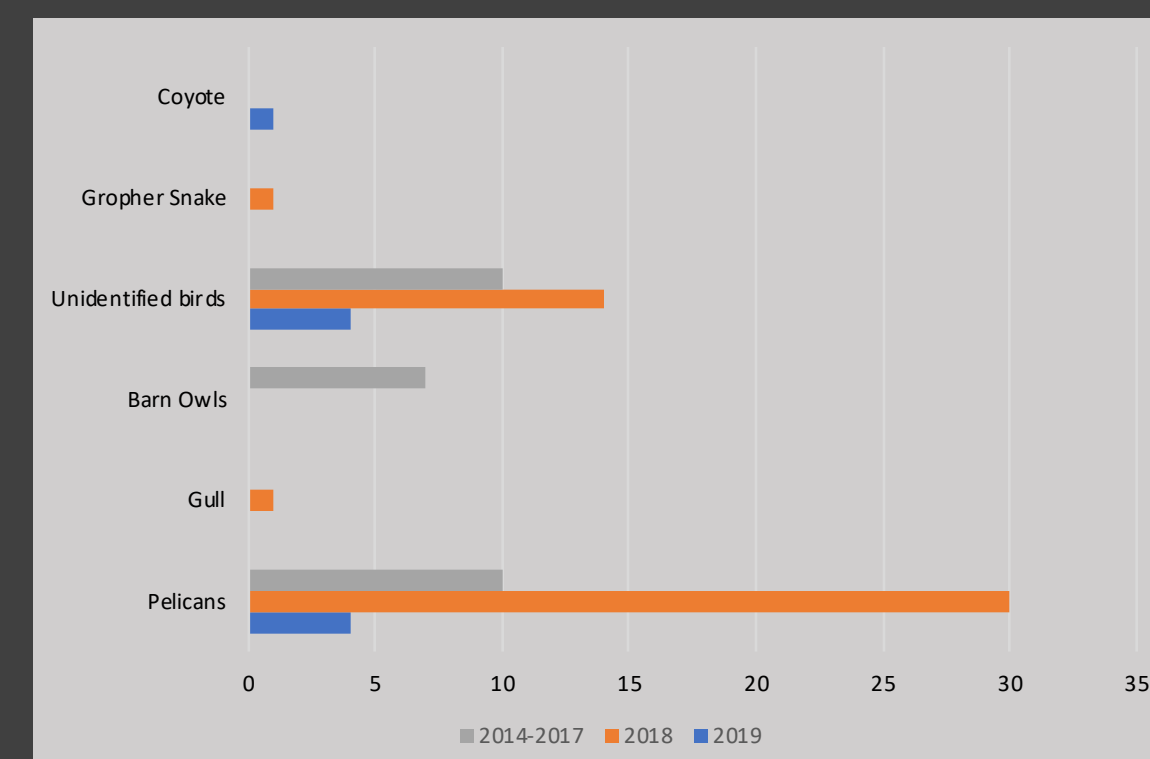


Table 1: Number of animals entrapped in the Rozel Point Tar Seeps from 2014 to 2019.



Figure 6. 4 pelicans, 4 unidentified birds, and 1 young coyote were found entrapped in the 2019 summer season.

- Pelican mortalities greatly decreased from the 2018 season (Table 1).
- Coyote entrapment this season is novel.
- All entrapments occurred during the afternoon when the tar is the most viscous.
- The decline in pelican mortalities is most likely due to the decline of breeding numbers on Gunnison Island. Low GSL water levels allowed coyotes to walk on exposed land bridges to the island.

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Acknowledgements

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Ongoing Projects

Microbial Diversity in the Rozel Tar Seeps: Little research has been done on the microbial diversity of Rozel Point. The highly saline soil and high nitrogen and sulfur content of the petroleum seeps makes it a unique environment. The purpose of this study is to see how these potential discoveries can help us get a better understanding of the ecology of petroleum environments, as well as hypersaline ecology. Samples of tar, soil, and water were collected from the seeps in the summer of 2019. DNA was isolated from the samples and we plan to use 16S rRNA gene sequencing to identify any bacteria or archaea.



Figure 7. Small methane bubbles rise on the surface of Seep #3.

Why at Rozel?

- Methane bubbles that vary in size and texture rise from the seeps (Figure 7).
- Similar bubbles are found in the La Brea Tar Pits, further research found that it is due to microbes producing methane gas.
- Bubbles have also been found in the soil near the seeps, have not determined if they are methane bubbles as well.

Sampling Sites

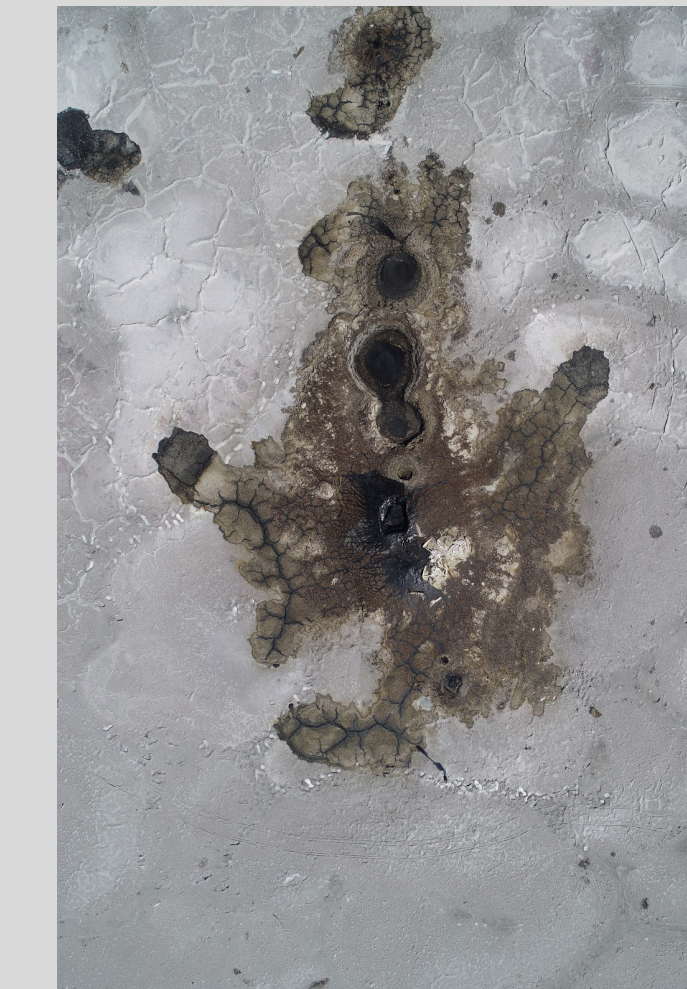
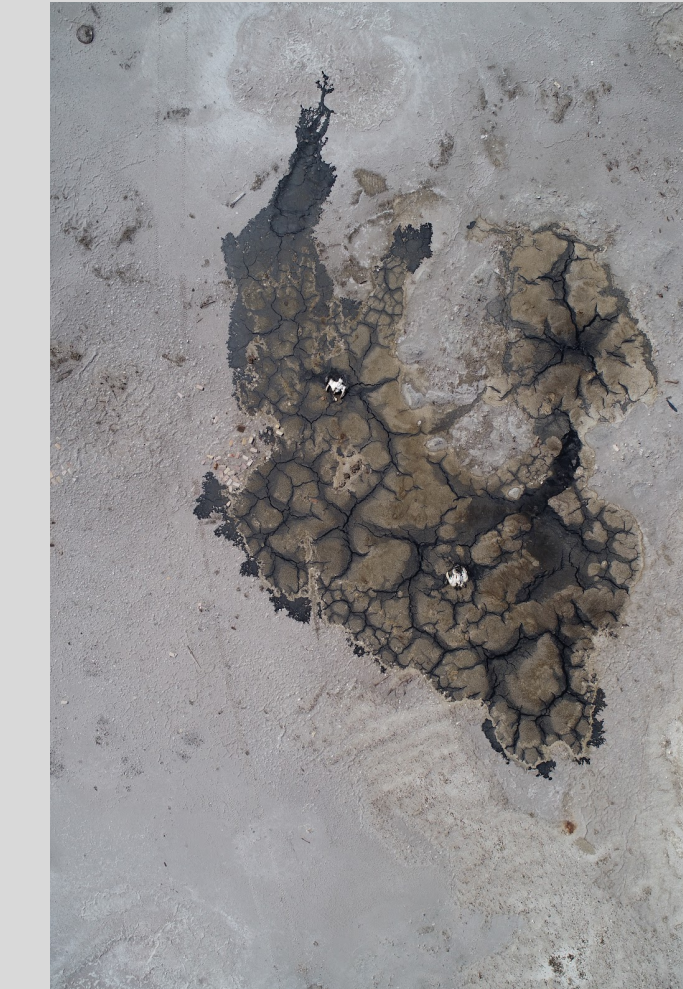


Image Credit: Utah Geological Survey

Seep #1: Volcano Seep



Seep #2: Pelican Seep



Seep #3: Big Seep

Measuring methane and heavier alkanes:

Who cares about methane?

Methane is a significant green house gas contributing to climate change. Natural hydrocarbon seepage produces positives fluxes of methane into the atmosphere. The natural flux of methane has always been underestimated, producing inaccurate methane budget calculations. This leads to ineffective planning on the control of industrially-produced methane, this is becoming increasing important in a globally changing environment.

Methodology:

- The aim of this project is to measure the flux of methane and heavier alkanes from natural seepage areas in order to refine global greenhouse gas budgets.
- Closed chambers will be deployed at each sample site.
- Gas chromatography analysis of samples.
- Flux measurements calculated for different seasons.



Figure 8. Closed chamber with gas syringe and anchor.