Monitoring Human-Wildlife Disturbances to Protect Sand Barrier Estuaries from Artificial Breaching

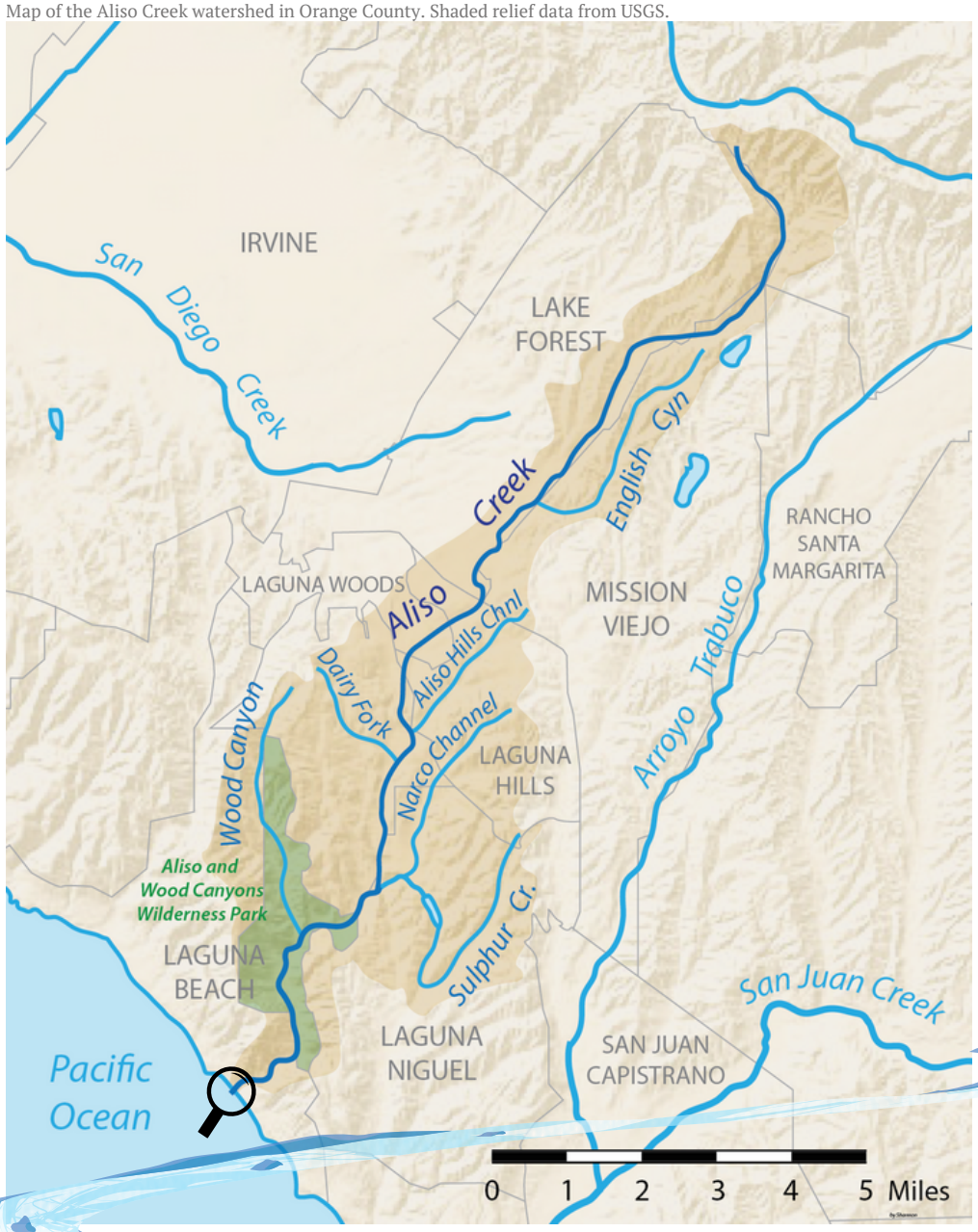
PREPARED FOR

The Laguna Bluebelt Coalition

PREPARED BY

Sabrina Medina
Project Coordinator | Orange County Coastkeeper

Map of the Aliso Creek watershed in Orange County. Shaded relief data from USGS.



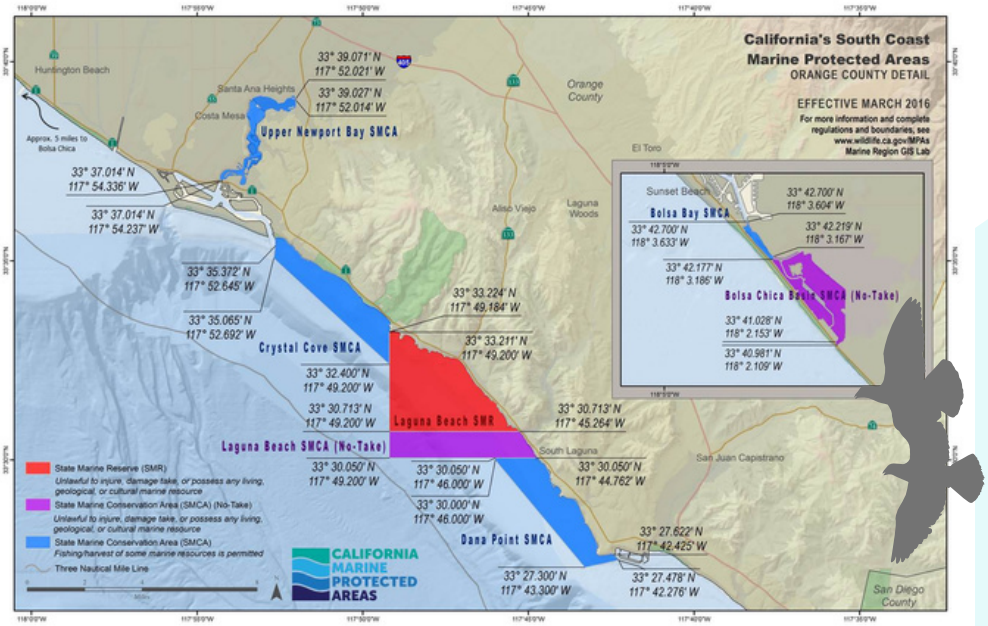
Aliso creek is 30 sq miles; servicing Lake Forest, Mission Viejo, Laguna Hills, Laguna Woods, and Aliso Viejo before ending at Aliso Beach in Laguna Beach, California. The magnifying glass is the approximate location of the Aliso Berm.

Laguna Beach is located on the unceded lands of indigenous tribal nations in which we are deeply indebted. Historically Aliso Beach has served as the boundary between the Acajachemen and Tongva tribes. We thank indigenous peoples who historically have preserved natural resources. Recognition of Traditional Ecological Knowledge as a means for adaptive management practices is crucial in the resiliency for further conservation.

ALISO CREEK

LAGUNA BEACH

Marine Protected Areas (MPAs)



Aliso Beach is unique as it falls within two MPAs; the northside of the beach, also known as Treasure Island is part of the State Marine Reserve (SMR; Red) while Aliso Creek and the south end of the beach are part of the State Marine Conservation Area (SMCA; Purple).

The berm at Aliso Beach separates Aliso Creek from the ocean and is located within the SMCA in which it is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource for commercial or recreational purposes, or a combination of commercial and recreational purposes, that the designating entity or managing agency determines would compromise protection of the species of interest, natural community, habitat, or geological features. The designating entity or managing agency may permit research, education, and recreational activities, and certain commercial and recreational harvest of marine resources (Marine Managed Areas Improvement Act Public Resources Code Section 36710(c))

PROJECT SUMMARY

Berm Buddies

August 2022 -
November 2022

Aliso berm links Aliso Beach and Treasure Island, providing safe access between the SMR and SMCA MPAs; photo by Sabrina Medina

SUMMARY

Aliso Creek is an open/closed coastal estuary within the marine protected area (MPA) in Laguna Beach, California. The sand berm that keeps the creek separate from the ocean is regularly breached, causing concern for residents and wildlife. Lack of enforcement has resulted in high human activities considered to be hazardous and disturbance. Observations of these activities were observed 4X more at Aliso Berm and Creek than Treasure Island and Aliso Beach combined - many of which are MPA violations. Human-wildlife interactions are impacting wildlife abundance at the berm and creek and could explain reasons for low biodiversity. However, artificial breaching is also a human health hazard as runoff flushes pathogens, toxins, and debris into highly visited beaches - violating the Clean Water Act. Conservation of this area is important as Aliso Creek is critical habitat for endangered, threatened, and endemic species at risk of habitat fragmentation. In addition the estuary provides ecosystem services necessary to combat impacts of climate change including mitigation of erosion and sea level rise. The creek is also important in drought conditions as a ground water reserve and cooling of high fire risk areas and nearby underserved communities. Outreach and education is vital in protecting and communicating the importance of this coastal ecosystem.

POTENTIAL VIOLATIONS OF ARTIFICIAL BREACHING

Artificial breaching causes significant morphological changes due to strong outflow; photo by Sabrina Medina

Waterline of creek before and after breaching event

ENDANGERED SPECIES ACT
CLEAN WATER ACT, BEACH ACT
COASTAL ZONE MANAGEMENT ACT
MARINE MAMMAL PROTECTION ACT
MIGRATORY BIRD ACT

INTRODUCTION

Aliso Creek is considered a temporary open/closed estuary, in which it does not permanently flow into the ocean. The berm is a naturally built sand barrier that intermittently closes the estuary from the Pacific ocean. While breaching can occur naturally during high precipitation, **artificial breaching** has resulted in concerns from residents, visitors, and organizations[1] (Laguna Bluebelt Coalition, Surfrider, and OC Coastkeeper).

Although it is illegal to breach Aliso Berm, the creek has a history of being dug out by unauthorized individuals.

Approximately 2.5 million gallons of water flooding the MPAs creates a standing wave that has been sometimes observed for recreational skimboarding[1].

"We want to preserve the history of Aliso Beach without causing further disturbances to a fragile and important ecosystem"

Such events have been repetitively reported to the County of Orange under a **Water Pollution** violation as these artificial breaching events not only disrupts the estuary ecosystem, but causes **erosion** and is a **human health hazard**. Aliso creek is an urban watershed; draining the creek flushes sediment, urban runoff, toxins, pathogens, and debris into the MPA. During the month of September Orange County Public Health Services had posted warnings indicating bacterial levels from Aliso Creek Interface exceeded health standards.

In addition, the creek is designated as **critical habitat for endangered species** including the Southern Tidewater Goby[2], Steelhead/Rainbow Trout, and California Least Tern. The California Coastal Commission considers Aliso Creek a Environmentally Sensitive Habitat Area for the Southern Tidewater Goby and attributes artificial breaching as a reason for its declined status.

Posted warnings at Aliso Beach indicating hazardous bacterical levels; photo courtesy of Jinger Wallace

Skimboarding, digging, and sliding down sand into the creek as a result of artifical breaching exasterbates coastal erosion

[1]Santos, A.J., Protecting sand barriers in estuaries: Outreach program monitors human-habitat disturbance in California MPAs.
[2]Swift et al., Mortality of native and non-native fishes during artificial breaching of coastal lagoons in southern and central California.

The Berm Buddies Program was developed as a result of lack of enforcement

The Aliso Beach Wildlife-Habitat Monitoring Program, also known as Berm Buddies has 3 goals:

1) protect critical habitat of Aliso Beach including its estuary, watershed, and sand bar
2) increase research, reporting, outreach, and access
3) include disadvantaged communities and inform government agencies.

Surveys were conducted at three sites, indicated by the boundary lines above. A total of 66 surveys were conducted by 4 trained observers at Aliso Berm and Creek, Aliso Beach, and Treasure Island. Observations of human activity and wildlife were recorded for the creek, berm, sand/rock, and ocean.

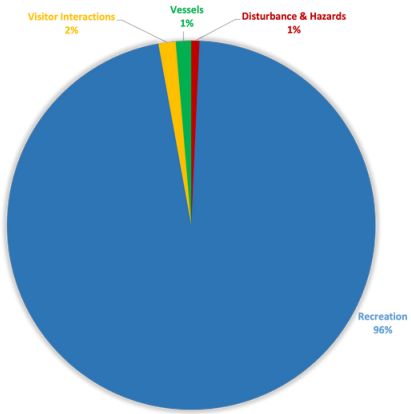
OC Parks Rangers and Lifeguards standby breached berm as a drone and gulls fly over head; photo by Sabrina Medina

RESULTS

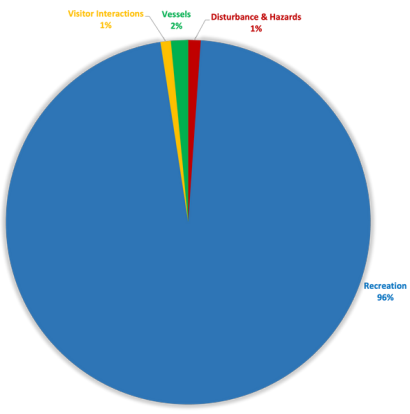
The berm was breached at least five times; once by OC Parks under permit to prevent flooding upstream and the remainder by unauthorized individuals. However, one incident was reported early and successfully reversed. All others resulted in further disturbances due to artificial breaching. Each incident was reported OC Parks via myOCeServices. In addition, there was one observation of individuals discussing breaching but decided against it based on tides.

Recreational Activities

Aliso Point and Treasure Island were similar in their breakdown, with a majority of observations being recreations activities including resting, walking, playing, building a castle castle, swimming, snorkeling, scuba, etc.



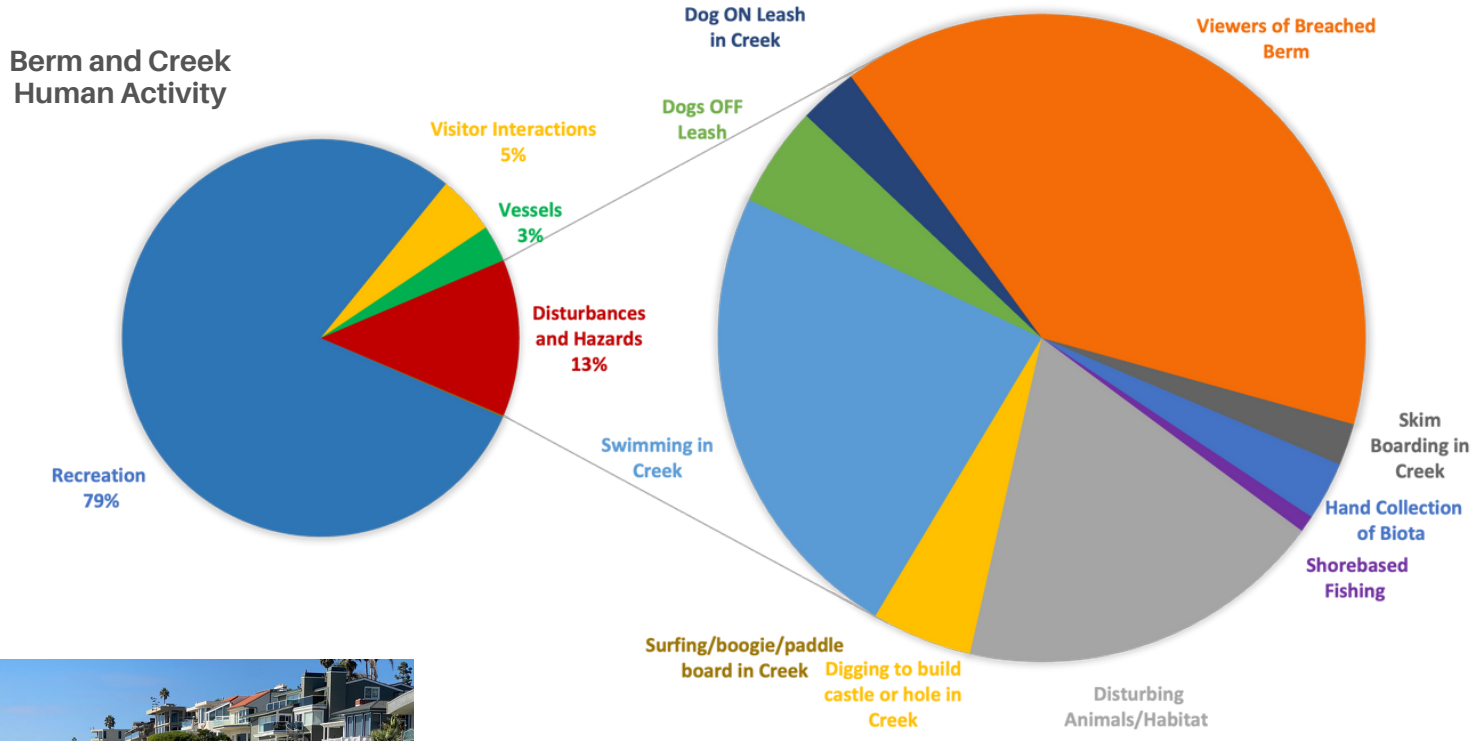
Aliso Point Human Activity

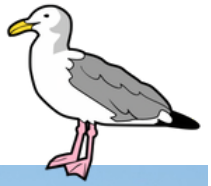


Treasure Island Human Activity

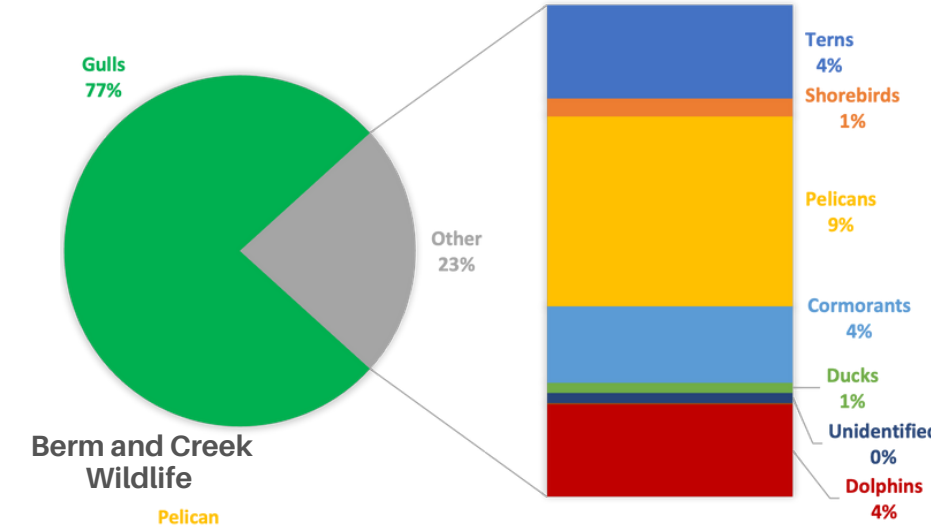
Human Hazards and Disturbances

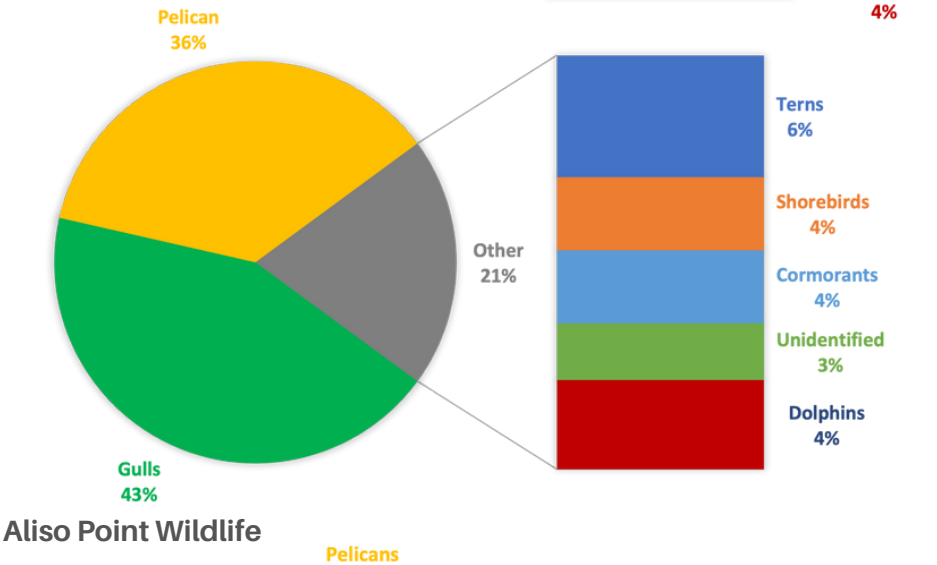
A total of 272 human hazards or disturbances were observed across all three survey sites with the greatest proportion of violations occurring at Aliso Berm and Creek.

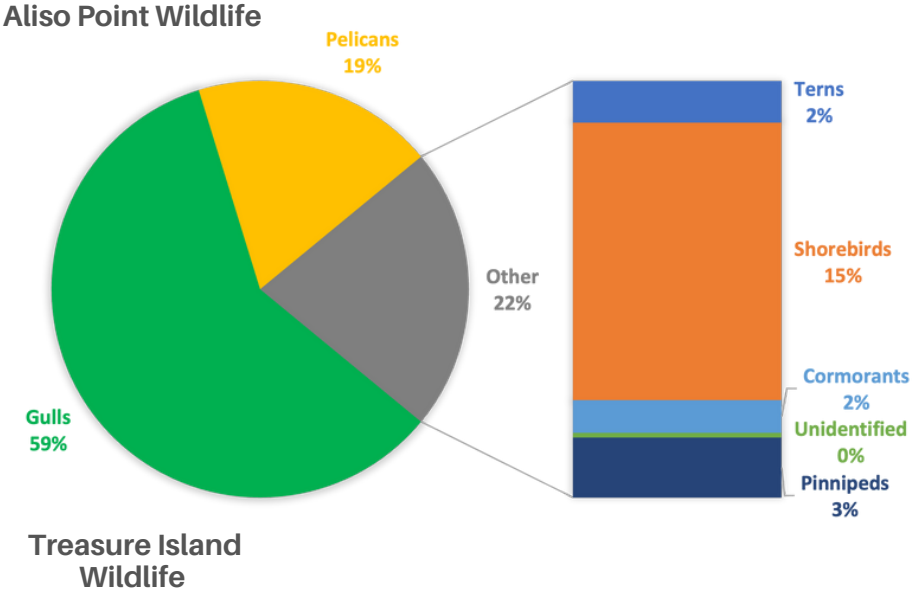




Survey photos left to right and top to bottom; violation and descriptions (1) Disturbing Animals and Habitat/Dogs off leash; three dogs swimming in the creek and an adult and child skipping rocks. (2) Disturbing Animals and Habitat; adult and child feeding gulls. (3) Digging a hole; adult digging hole to fit pop-up tent. (4) Swimming; adult and child swimming in creek. (5) Skimboarding; adult and child surfing in the creek; photos by Sabrina Medina







Photos left to right: (1) Cormorant resting on a rock. (2) Tern foraging and flying over the ocean; photos by Sabrina Medina

Photos top to bottomt: (1) Seagull resting on sand berm at sunset. (2) Shorebirds foraging along the water line; photos by Sabrina Medina

Wildlife Observations

Simpson's Diversity Index	
Berm and Creek	1.67
Aliso Point	3.06
Treasure Island	2.59

Wildlife observational breakdown for each site shows that gulls were the most prevalent shorebird at all three sites. Although the Berm and Creek site had the most species richness or number of species, calculations of Simpson's Diversity Index showed the **Berm and Creek had the least biodiversity** when taking into consideration species richness and evenness relative to populations size.

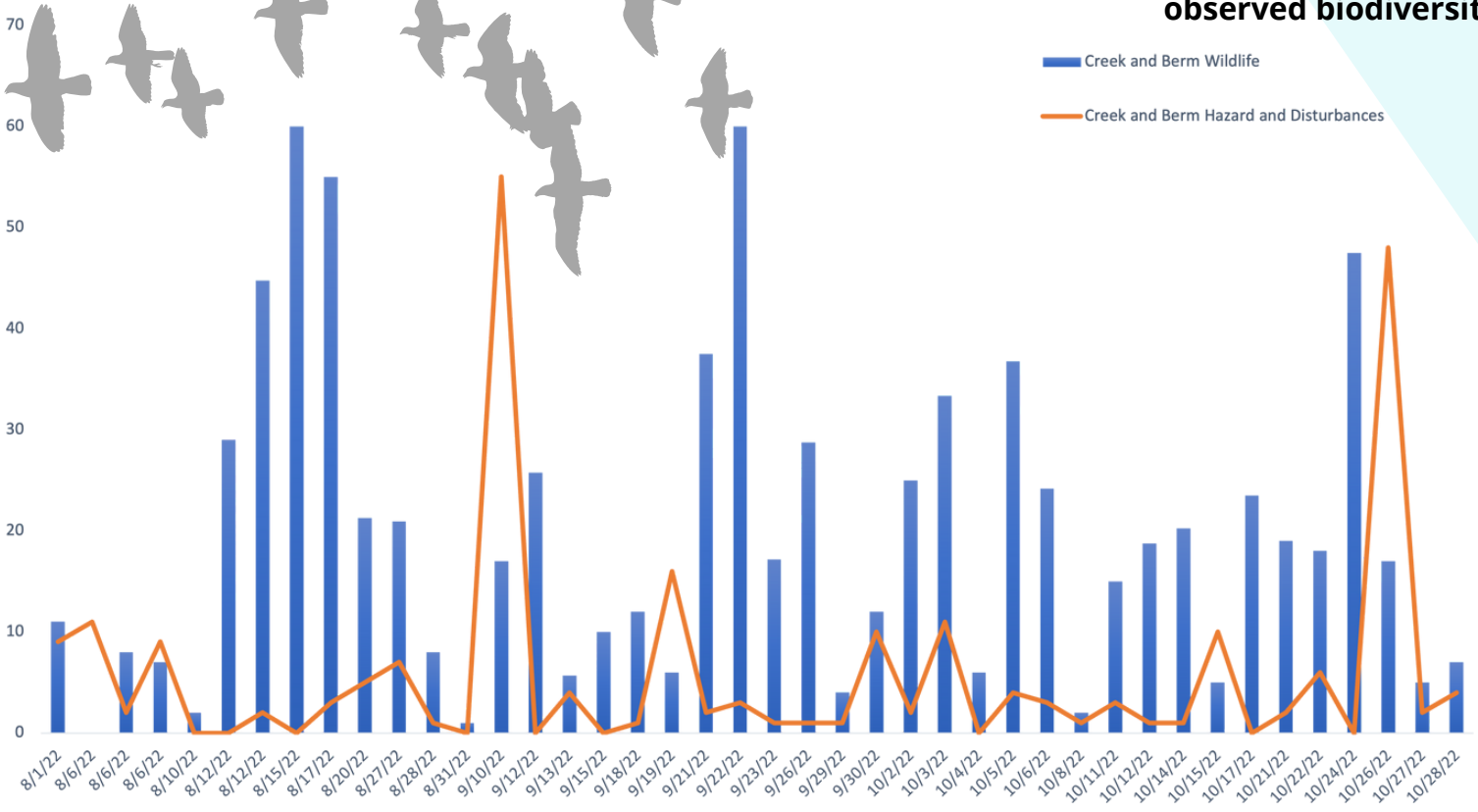
HUMAN-WILDLIFE INTERACTIONS

The Berm and Creek site often experienced heavy human interactions as a result of linking Aliso Beach and Treasure Island. However, wildlife observations significantly varied with human disturbance and hazards. A linear regression of Berm and Creek observations indicates that **increases of disturbance and hazards reduces wildlife abundance** ($F = 4.107$, $p < 0.05$).

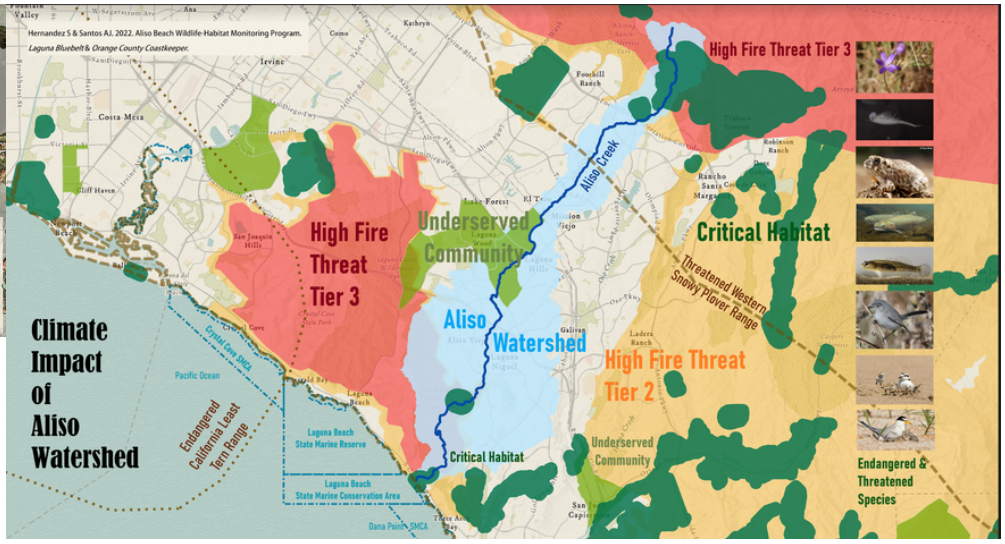
The berm and creek experiance human-induced traffic on-shore and off-shore; photos by Sabrina Medina

Viewers of breached berm, recreational skimboarders, and seagulls

Gulls and shorebirds often use the creek and berm area to rest and hydrate. Artificial breaching removes this critical area for wildlife and could be influencing observed biodiversity.



Aliso Berm and Creek Hazard and Disturbance on Wildlife Observations



GIS imagery created by intern of climate impact of Aliso Beach and Estuary; highlighting sea level rise, landslide hazards, high fire threats, underserved communities, and critical habitat

ECOSYSTEM SERVICES

Laguna Beach and neighboring cities receive varied benefits provided by Aliso Creek and a healthy ecosystem.

Areas surrounding Aliso Creek are prone to erosion and landslides. The sand barrier protects the neighborhoods in these areas and mitigates erosion and sea level rise[3]. In increase drought conditions, the creek is also an important ground water reserve[4], cooling and servicing high fire and underserved communities. In addition the Laguna Wilderness is considered critical habitat. Many species that rely on the creek are threatened or endangered as a result of habitat fragmentation due to artificial breaching; including the Southern Tidewater Goby which is endemic and only found in Southern California coastal estuaries.

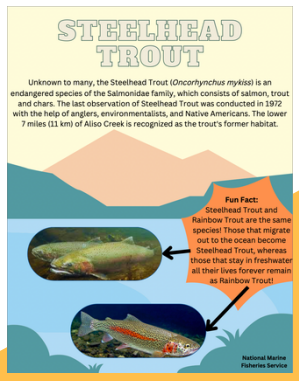
Photo courtesy of Jinger Wallace

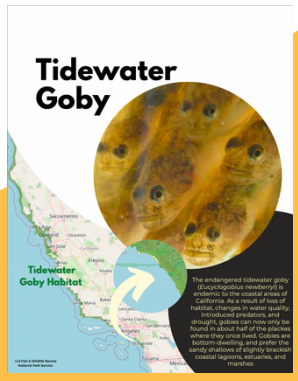
OUTREACH AND EDUCATION

Let The Berm Be

Pop-up outreach events were set up multiple times a month at Aliso Beach by the berm. Educational signs set up by the creek informed beach go-ers on the importance of protecting the sand berm.

The public engaged in conversation with research assistants regarding local MPA regulations, marine and estuary ecology, water pollution, and ecosystem services. Additional educational activities were offered to visitors such as water quality testing to compare the salinity of the creek and the ocean.





Educational materials made by intern highlighting endangered and endemic species that live in the ecosystem

[3]Matthews et al., Using ground water basins as storage facilities in southern california.
[4]Thorne et al., Wetlands in intermittently closed estuaries can build elevations to keep pace with sea-level rise.

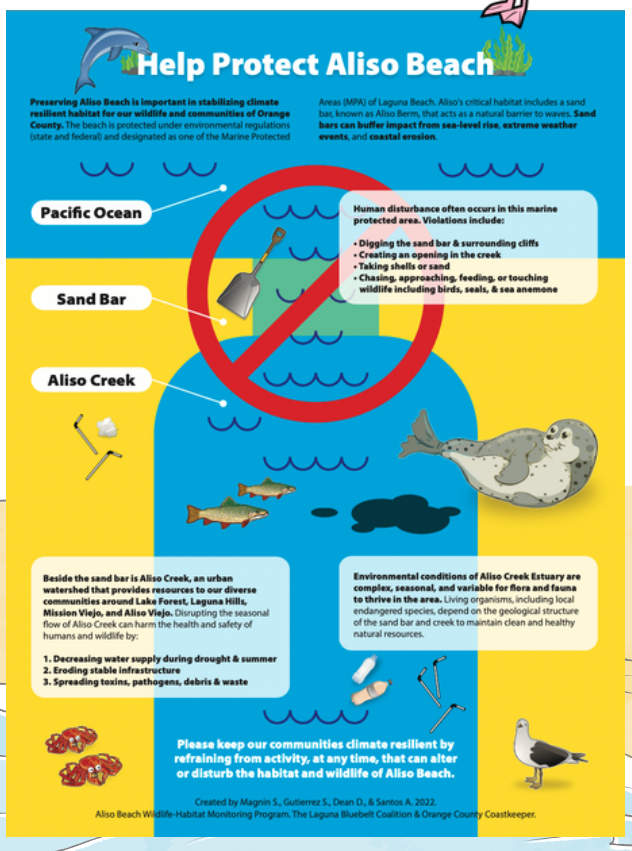
Photos top to bottom; (1) Group digging the sand berm. (2) OC Lifeguard attempts to fill in stream. (3) By-stander offers his board to obstruct stream. (4) Sand berm is successfully restored; photos by Sabrina Medina

Community Reporting

One of the observed breaching events was an example of successful early community reporting. A group of four individuals was observed digging the sand barrier during an outreach event. The violation was immediately reported to CA Fish and Wildlife, Laguna Beach Marine Safety, and OC Lifeguards.

A stream was created from the creek to the ocean by shuffling feet back and forth between the two bodies of water while another used a shovel to remove sand. Once a canal is established the stream naturally widens and is difficult to reverse. OC Lifeguards responded to the call within 10 minutes and proceeded in attempting to fill in the stream with sand. A nearby skimboarder, who was interacting at the outreach booth only 30 minutes prior, offered his board to temporarily obstruct the stream; giving the Lifeguard the opportunity fill in the sand barrier and close the lagoon. Thus **early reporting and education can mitigate impacts of artificial breaching**.

The group of individuals asked to speak to the Project Coordinator and resulted in a productive educational opportunity about the berm.



Educational material made by intern communicating the importance of protecting the sand bar

MPA RESEARCH ASSISTANTS

A total of twelve research assistants and interns worked on the Berm Buddies project in making educational materials or assisting in field work and outreach. Research assistants were recruited and trained by the Project Coordinator. A majority of observers were women in early-career STEM professions interested in marine conservation, sustainability, and community engagement.

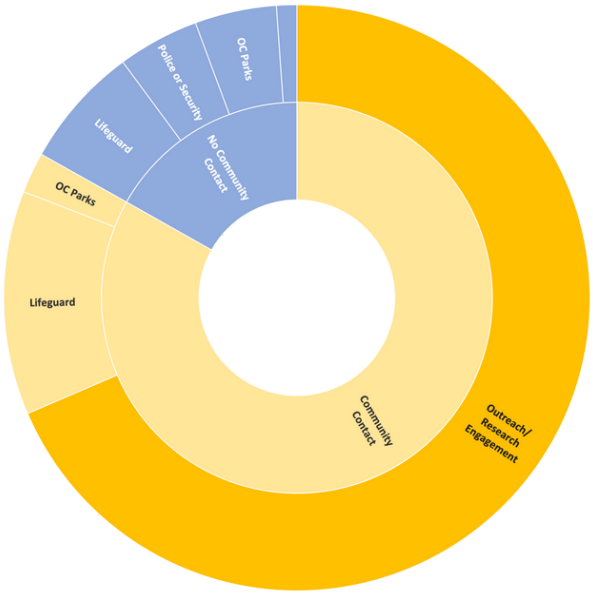
Training

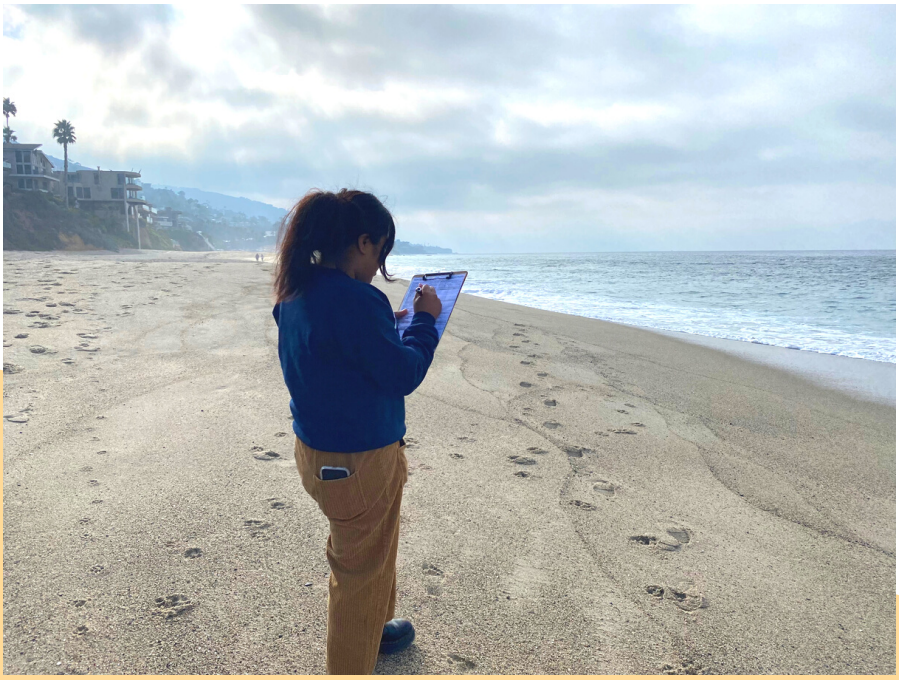
Interviews and basic training were conducted remotely and included an overview of survey sites, MPA regulations, and identification of shore birds and marine mammals. Each research assistant completed a in-person field training with the Project Coordinator before conducting independently. Methods were kept consistent with the standard operating protocol of the previous survey season.

Community Engagement

Research assistants were approached 68 times for Research and Outreach engagement during surveys and outreach events.

Other personal present included Lifeguards, OC Parks, and Police or Security. Those communicating with the public were recorded under Community Contact.





Data collection at the Treasure Island survey site and Research Asisstants at outreach events; photos by Sabrina Medina and Jinger Wallace

CONCLUSIONS

Aliso Creek is an important ecological resource for humans and wildlife. The naturally sand-built bar provides access between two main beaches. Artificial breaching causes significant morphological and ecological changes; resulting in environmental and human impacts. Hazardous behaviors and habitat disturbance reduces wildlife observations and biodiversity at the berm and creek. As part of the State Marine Conservation Area, it is critical that unauthorized digging and widening of the creek mouth be prohibited and enforced within the marine protected area of Laguna Beach. Additional education and outreach engagement can lead to community reporting and mitigate impacts of artificial breaching. Aliso beach and creek is less developed than nearby watersheds and serves as a model for restoration practitioners of intermittently open/closed coastal estuaries. Therefore, a longer-term monitoring project could provide better context to anomalies, seasonal changes and further understanding the ecological functions and processes of Aliso Creek and other sand barrier estuaries.

Photos by Sabrina Medina

Laguna Beach is rooted in surf culture; especially Aliso Beach. The sport of skimboarding was born as a result of Aliso's shore break. To be successful in shifting the cultural perception of the creek, it is critical to acknowledge the history and invite the community to create a legacy rooted in protecting Aliso's natural resources.

Acknowledgements

Dedicated to the ocean, those that work to protect it, and the indigenous peoples and land in which we are deeply indebted to.

Thank you, Ray Hiemstra, Mike Beanan, and Jinger Wallace for constantly supporting and advocating for the Aliso Wildlife-Habitat Monitoring Program. Thank you Allison for all the guidance and hard-work poured into the project; and to all the research assistants that collected data, helped with outreach, and made educational materials. Much thanks to the support of The Laguna Bluebelt Coalition, Orange County Coastkeeper, City of Laguna Beach, Marine Safety Personnel, and the many wonderful people met at the Aliso Berm.

The Laguna Bluebelt Coalition brings together organizations and individuals with a common goal of protecting and restoring marine life, conserving biological diversity and maintaining healthy, sustainable marine habitats.

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