

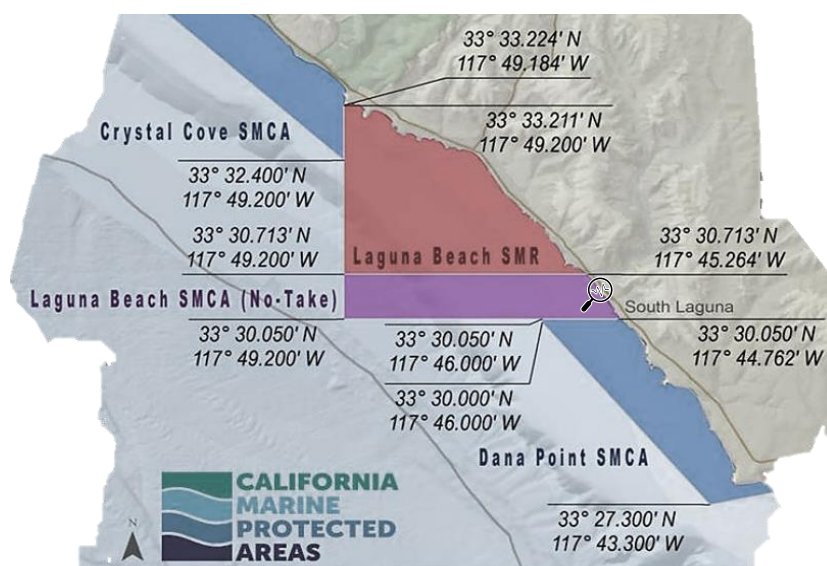
Protecting sand barriers in estuaries: Outreach program monitors human-habitat disturbance in California MPAs

A report of
The Laguna Bluebelt Coalition



SUMMARY

- Stakeholders are concerned about negative human impacts to a sand bar (or berm) in Aliso Beach & Estuary, California
- An outreach research program was developed to monitor human disturbance and increase awareness about sand barriers in estuaries
- Disturbing wildlife or habitat was observed about 2X more at Aliso Berm than at Treasure Island and Aliso Beach combined – all sites are within marine protected areas (MPA)
- Clear regulation and more enforcement are needed to conserve MPA habitat, including the sand bar at Aliso Beach, from damage, take, and/or disturbance
- Sand barriers in estuaries are important because the habitat may sustain sea-level rise, shelter endangered species, and filter urban pollution

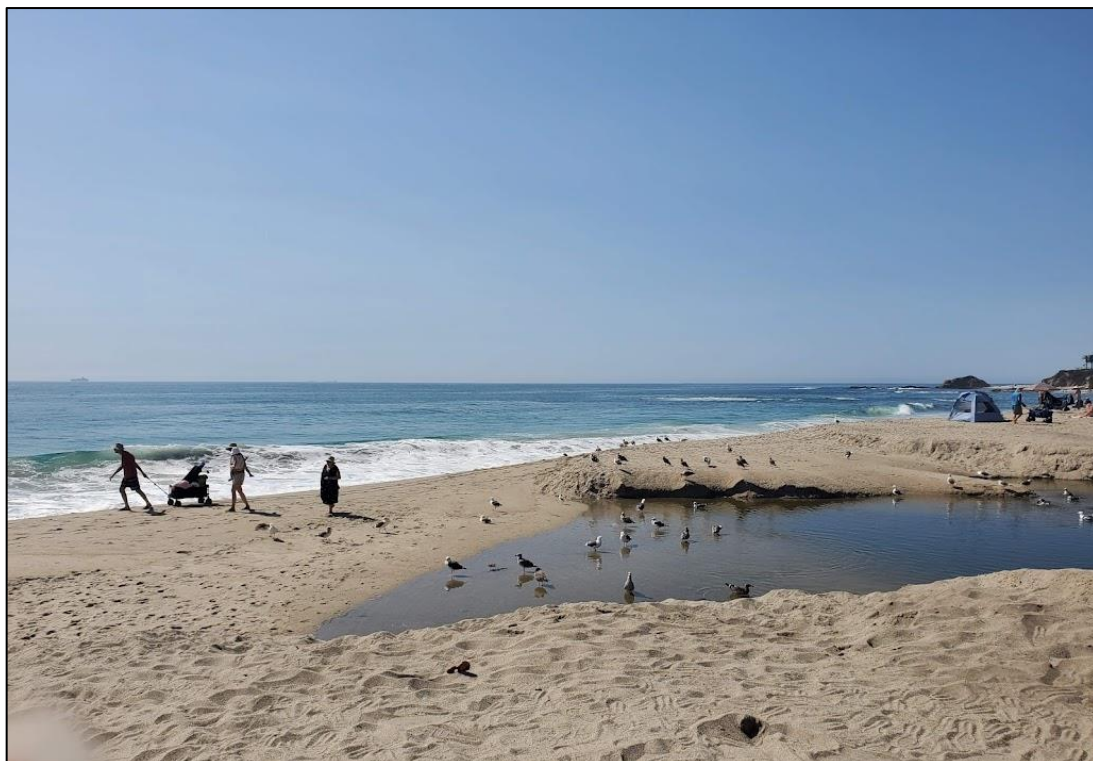


Map of MPA boundaries in Laguna Beach, CA. Aliso Berm is located in Laguna Beach State Marine Conservation Area (SMCA; purple) and south of Laguna Beach State Marine Reserve (SMR; red). The **Marine Managed Areas Improvement Act Public Resources Code Section 36710(c)** states the following about SMCAs: 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. The magnifying glass in the purple area is the approximate location of Aliso Berm.

INTRODUCTION

The **Aliso Wildlife Habitat Monitoring Program**, also known as Aliso Berm Buddies, enlists volunteers to monitor human disturbance at the mouth of Aliso Creek by Treasure Island and Aliso Beach. These sites are within the Laguna Beach State Marine Reserve (SMR) and State Marine Conservation Area (SMCA) respectively– both **marine protected areas** (MPA) regulated by the state in Laguna Beach, Orange County, California.

Anthropogenic impact and lack of enforcement in Aliso Beach has raised concerns from residents, visitors, and organizations (e.g., Laguna Bluebelt Coalition, Surfrider Foundation). A wave-built sand barrier, bar, or **berm**, located at the end of Aliso Creek, is temporarily open during high precipitation, and also closed during



Aliso Berm is a sand barrier that intermittently closes Aliso Creek's (right) connection with the ocean (left). It is a geological marine resource for wildlife, as well as for lifeguards and visitors to cross and access two MPAs.

low precipitation. Aliso Berm has been observed to be dug out so that the creek mouth widens and forms a standing wave for recreational skimboarding. It is also occasionally dug by the County of Orange under a permit to protect adjacent private property from flooding.

Disrupting the berm may deteriorate Aliso's **bar-built estuary** – a fragile and variable habitat that intermittently limits connection with the ocean, borders residential homes, and has contained federally-protected endangered species (**Endangered Species Act, 16 U.S.C. 1531**) including the Southern Tidewater Goby¹, Steelhead/Rainbow Trout², and California Least Tern³. In addition, Aliso Creek is an urban watershed in Orange County – artificial breaching can flush stormwater, pathogens, toxins, and debris that may impair the health of humans (**Clean Water Act, BEACH Act, 33 U.S.C. 1313**) and federally-protected wildlife (**Clean Water Act, Coastal Zone Management Act, 16 U.S.C. 1451–1465**) including marine mammals (**Marine Mammal Protection Act, 16 U.S.C. 1361**) and migratory birds (**Migratory Bird Treaty Act, 16 U.S.C. 703–712**) in the coastal habitat.

The Laguna Bluebelt Coalition contracted Orange County Coastkeeper (OCCK) to develop the outreach program and conduct a pilot study with funding from the City of Laguna Beach. OCCK is a nonprofit clean water organization that specializes in effective programs on research, enforcement, conservation, and education.



The goal of the Aliso Wildlife Habitat Monitoring Program is to monitor human-wildlife activity at Aliso Beach and Treasure Island MPAs and educate visitors about the importance of sand barriers within estuaries.

¹ Swift et al., "A new species of the bay goby genus *Eucyclogobius*, endemic to southern California: evolution, conservation, and decline".

² Becker et al., *Steelhead/rainbow trout (Oncorhynchus mykiss) resources south of the Golden Gate, California*.

³ Avery et al., "Aversive conditioning to reduce raven predation on California least tern eggs".

Aliso Beach and Treasure Island were divided into three surveys: (1) Treasure Island, (2) Aliso Berm & Creek, (3) Aliso Point. The survey boundary of Aliso Berm & Creek followed the angle of fencing that borders the creek. The other boundaries extended perpendicularly to shore. Observers recorded location type of human and wildlife activity – creek, ocean, berm, sand, or rock.



RESULTS

A total of 109 surveys were conducted by 10 trained observers at Aliso Beach and Treasure Island during September–December 2021, Phase One of the pilot program.



Potential MPA violations

Total human disturbance to wildlife and habitat occurred 48 times at Aliso Berm, whereas disturbance occurred nine times at Aliso Point, and 32 times at Treasure Island. No potential MPA violations were observed to be reported to authorities (i.e., police or CA Fish and Wildlife). Wildlife and habitat disturbance included:

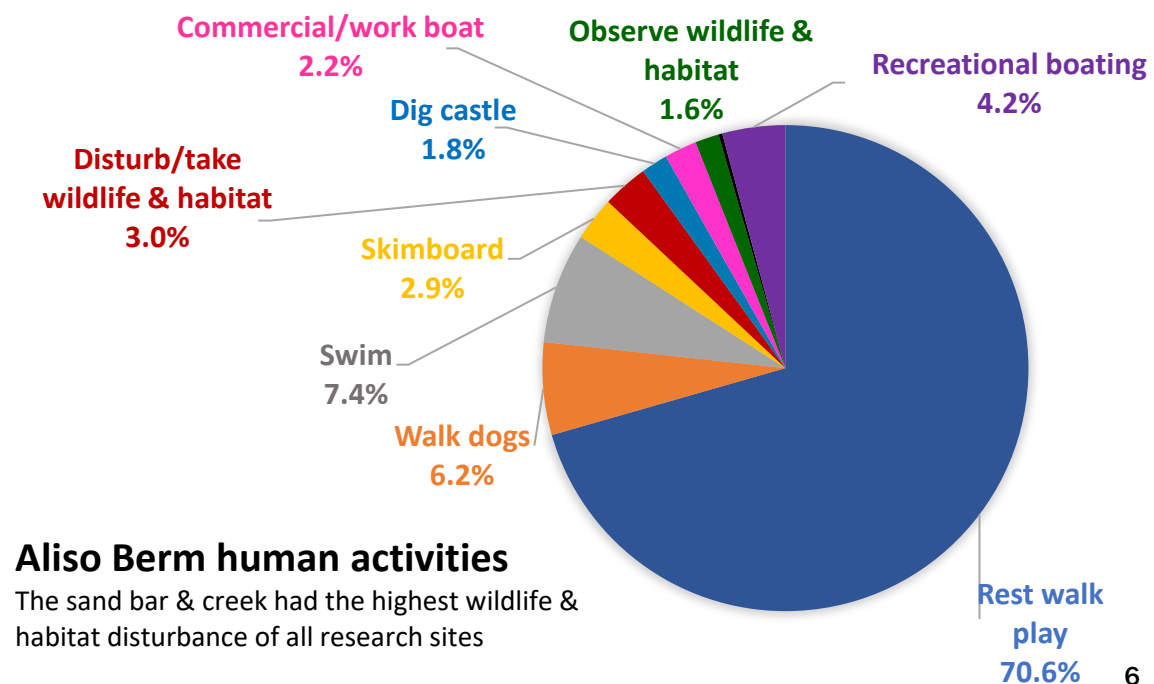
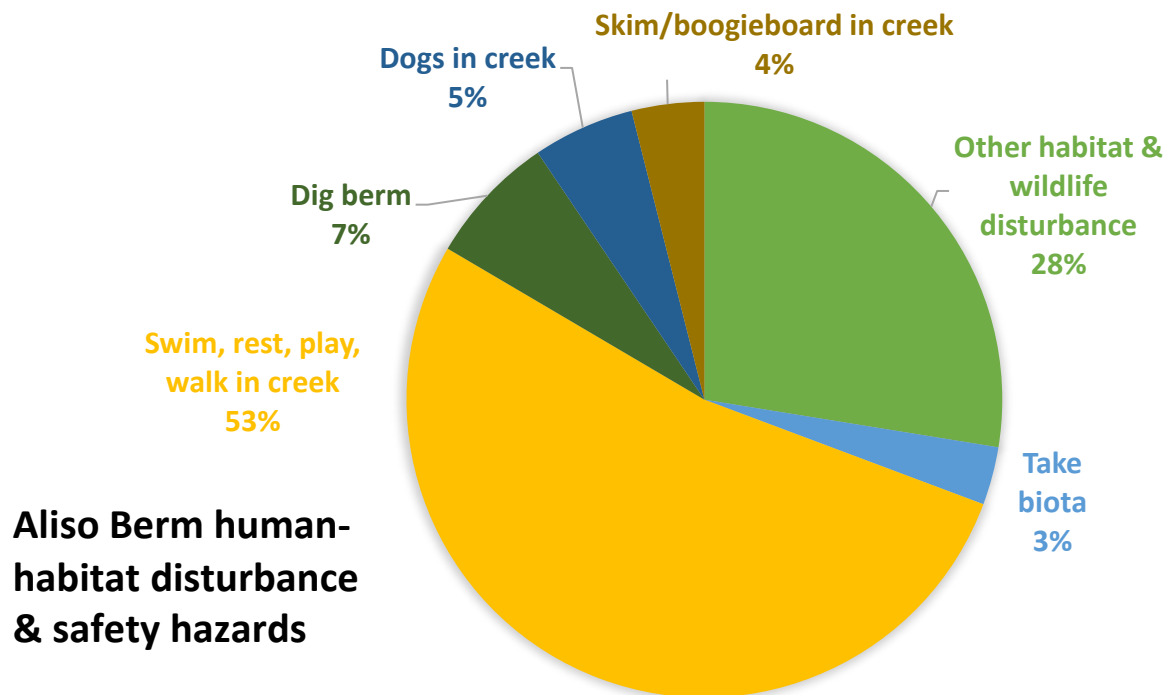
- Digging berm
- Humans or dogs chasing or walking through birds/flocks
- Observing harbor seals too closely
- Feeding wildlife
- Throwing sand or rock at birds or creek
- Recreational fishing
- Taking biota (e.g., shells, rock, sand)

Visitors and dogs have been observed swimming at the mouth of Aliso Creek. As shown below, debris has been taken from MPA habitat and kicked or thrown at wildlife or the creek.

Potential hazards

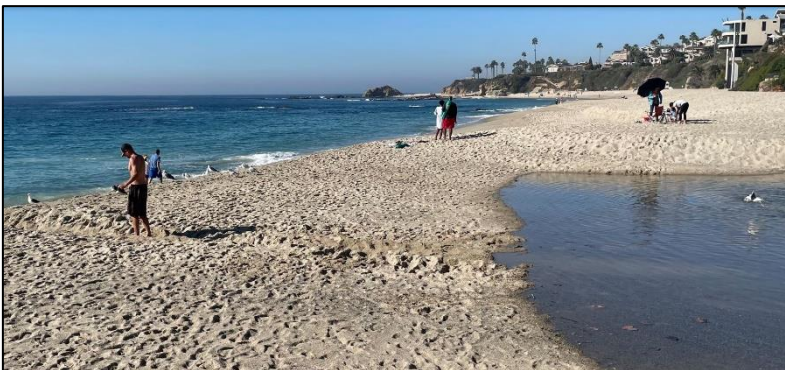
Several activities at Aliso Berm may be hazardous to visitors' safety and health. Most activity in the mouth of the creek were children swimming. Potential hazards included:

- Resting, playing, walking, swimming in creek
- Skim/boogieboarding in creek
- Viewing breached berm
- Crossing breached berm

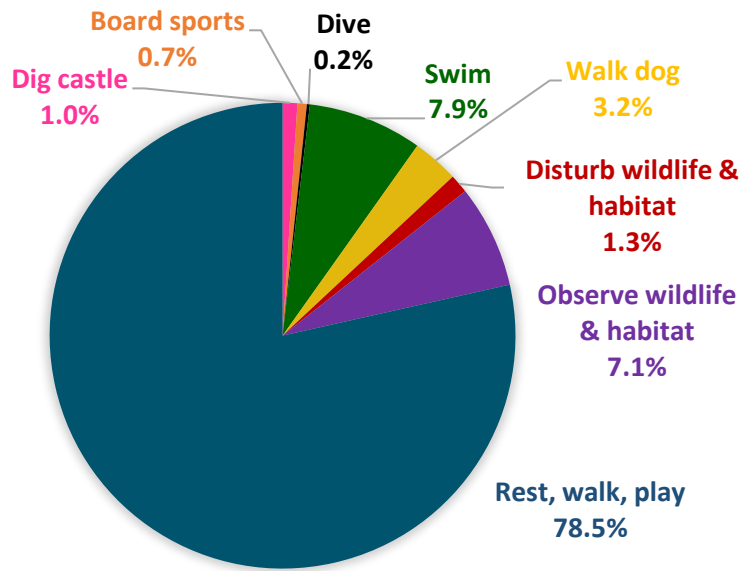


Aliso Berm in state marine conservation area was dug nine times during surveys

One volunteer observed at least five people digging the sand barrier within one hour: *I noticed an adult casually digging out the berm with their feet to create a stream from Aliso Creek to the ocean. After they saw that I was observing them, they stopped digging and left the area. Another adult and younger individual walked up when the first person was digging and began to dig. After less than one minute, the adult saw me, stopped digging, and left. Then they watched their companion continue to dig, which was for the entire length of my survey (20 min), and the stream gradually moved closer to the ocean. When I returned to the mouth of Aliso Creek about 30 minutes later, after completing a survey in another area, other kids were interested in joining, and another adult and younger individual were digging out the berm in the same manner.*

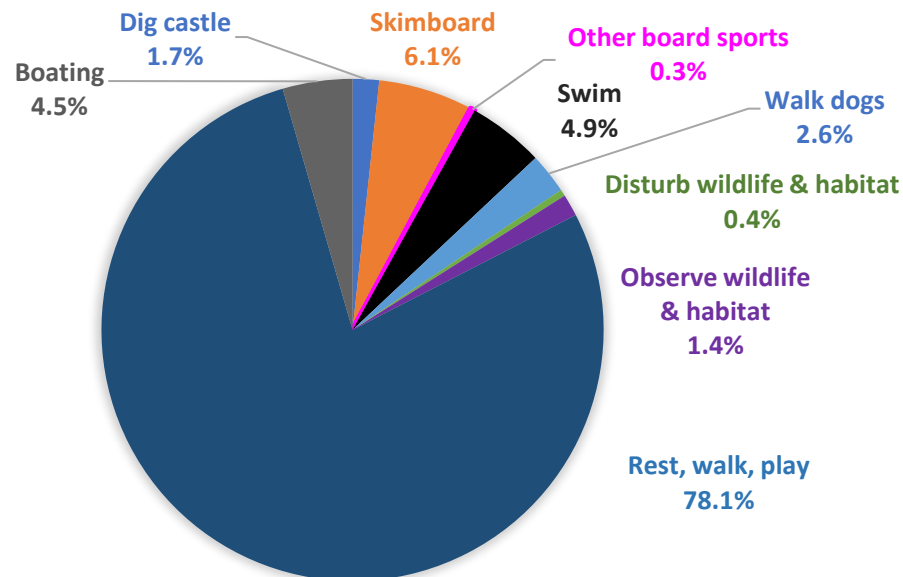


Survey Photos Above: Several people in one survey, as described by the volunteer, dig Aliso berm with feet or hands. Left: Skimboarders dig the sand bar during another survey. After the individuals saw the observer collecting data, they stopped their digging activity and proceeded to skimboard in the ocean.



Treasure Island human activities

Highest wildlife & habitat observations of all research sites



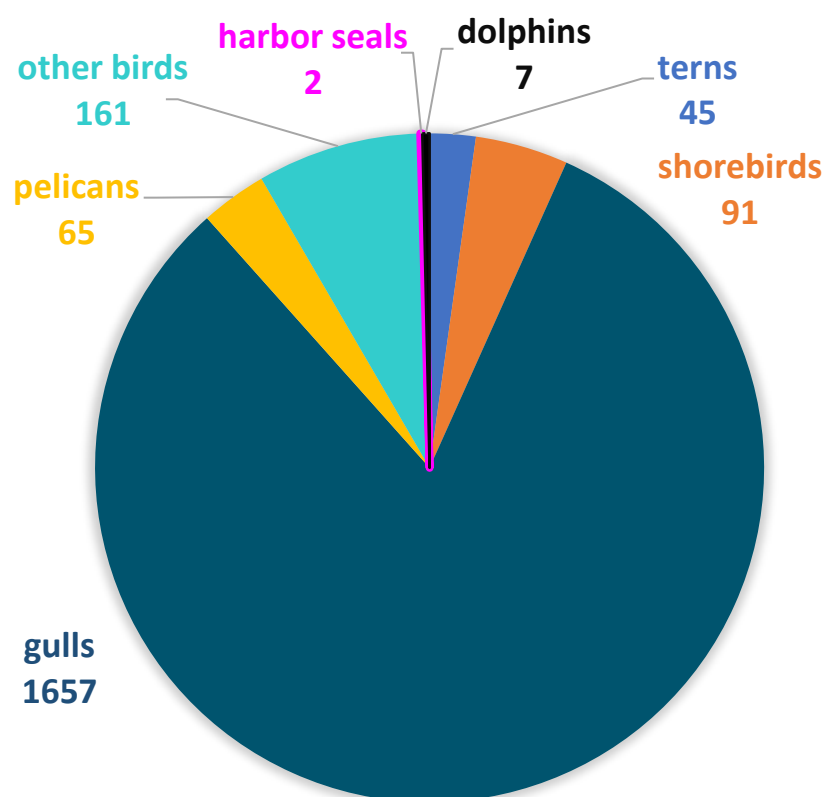
Aliso Point human activities

Highest in skimboarding of all research sites

Survey Photos Top – Bottom. (1) Disturbance to wildlife: individuals walking through resting flock of Elegant terns and gulls; birds flew and left area. (2) Potential safety hazard: two children and one adult climbing and sitting on edge of berm cliffs. (3 – 5) Potential health and safety hazards: walking, swimming, skimboarding, and playing in creek.

Wildlife activity

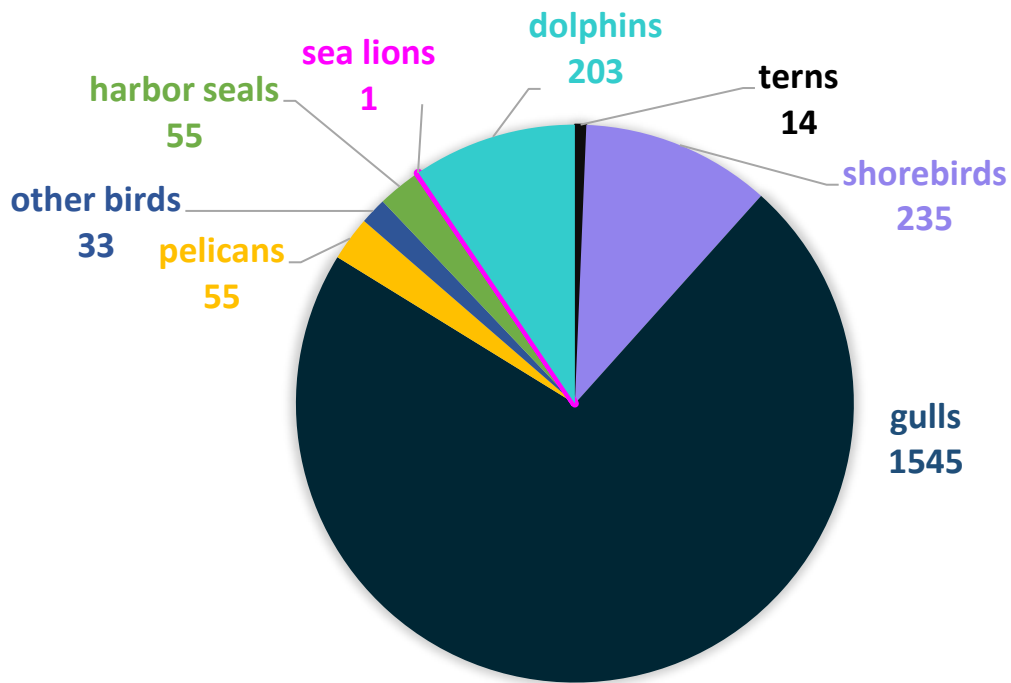
Gulls were the most abundant wildlife category observed in the surveys. Other birds recorded were cormorants, ducks, geese, grebes, oyster catchers, and Snowy Egrets. Shorebirds included foraging plovers and sand pipers. Cetacean species were Coastal Bottlenose Dolphins and Common Dolphins.



Aliso Berm Wildlife Count

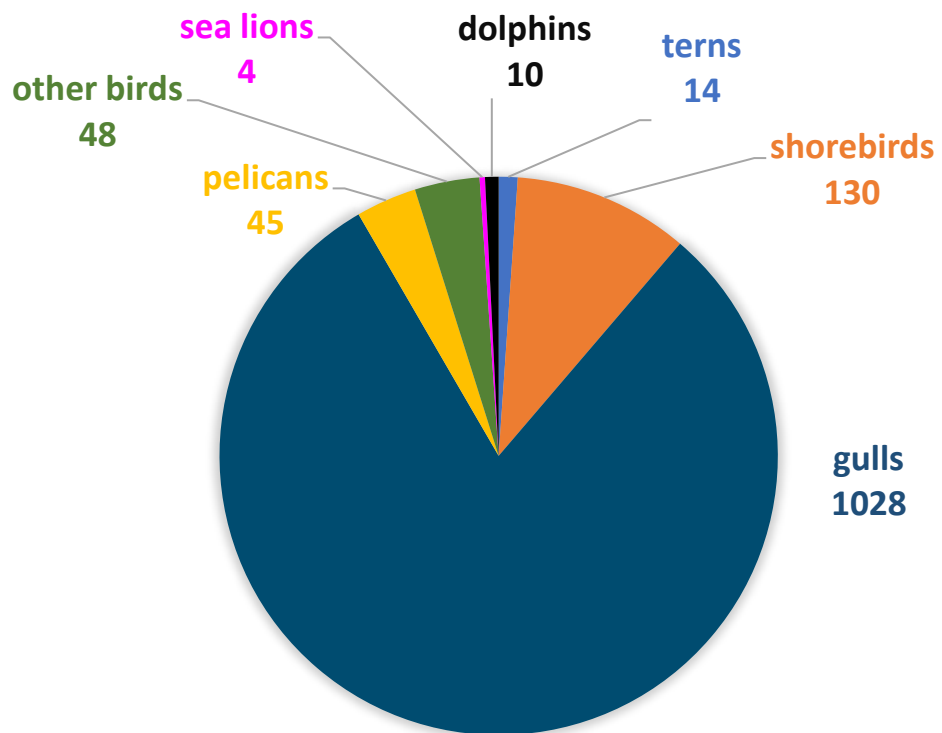
All birds in Aliso Creek were bathing, feeding, or resting

Survey Photos Top-Bottom. (1) Most harbor seals observed were resting on land. (2) Gulls and shorebird resting, bathing, and feeding in Aliso Creek. (3) Flock of Elegant terns and gulls resting on berm.



Treasure Island Wildlife Count

Most harbor seals were observed resting in Treasure Island



Aliso Point Wildlife Count

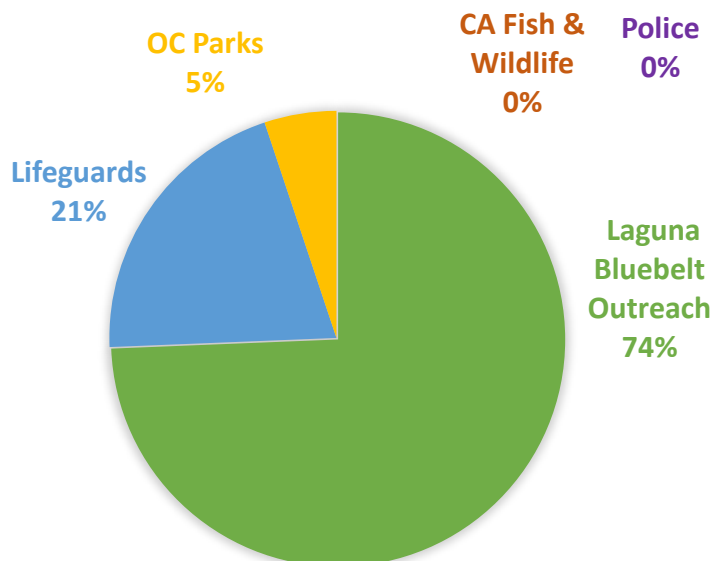
Outreach

An outreach pop-up station was installed near Aliso Berm for beach visitors. Signs and pamphlets offered peer-reviewed information about sand bar protection, endangered species, MPA regulations, estuary ecology, and water pollution. Also available were beach cleanup supplies, COVID-19 viral protection, and wildlife field guides.



Brochure and outreach station by Laguna Bluebelt & Orange County Coastkeeper.

Outreach events were open to the public for 13 days. More than 29 visitors engaged with our Outreach Personnel – a 94% success rate in communicating with the public during surveys. Also working were OC Parks, who engaged with visitors 17% of their time, lifeguards 15% of the time, California Fish and Wildlife 0%, and Laguna Beach Police 0%, during our surveys.



Public Engagement

Total percentage of interactions between visitors and working groups at Aliso Beach and Treasure Island.



Research Training

The Program Coordinator recruited and trained ten volunteers to identify, observe, and record human and wildlife activity, following standardized protocol of *MPA Watch* – a statewide citizen science program that surveys MPA beaches. Methods were modified to include data collection of wildlife, Aliso Creek, and Aliso Berm. Each research assistant fulfilled the following requirements:

- Complete the two-hour training including a practice survey at Aliso Beach with the Program Coordinator
- Learn MPA regulations specific to Laguna Beach
- Follow methods detailed in Berm Buddies Handbook
- Survey research sites independently during variable weather
- Identify and observe behavior of dolphins, seals, sea lions, and coastal birds
- Differentiate human activities; determine environmental conditions; record and photograph observations
- Estimate group size of wildlife and people
- Enter surveys into project database in Google Drive
- Engage with visitors about the program and provide educational material



Volunteer reviews bird species with Program Coordinator. Training included coastal bird and marine mammal identification.

Most research observers were early-career women (73%) and people of color (55%) who learned field methods, data entry, community engagement, and conservation policy that are applicable to STEM professions. Volunteers participated from the affiliations:

1. California State University, Fullerton
2. California State University, Long Beach
3. University of California, Irvine
4. University of California, Santa Cruz
5. SoCal Dive Babes
6. Laguna Ocean Foundation

Oil Spill

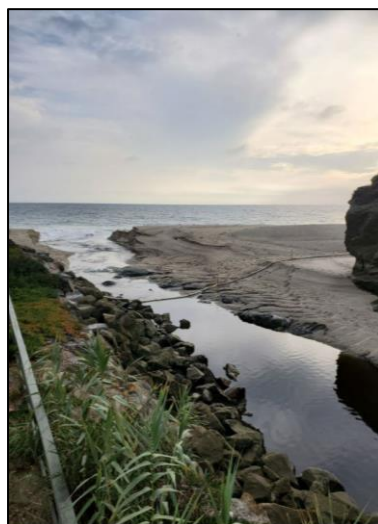
On October 2, 2021, Pipeline P00547 spilled oil in Huntington Beach and expanded into Laguna Beach. Three days later, Aliso Beach and Treasure Island (i.e., water and sand areas) were fully closed for a total of six days. Water areas at both beaches were observed to be closed for 22 days. Surveys were conducted at alternate viewing points during beach closures. Photography documented the creek and berm during the spill.

One oiled bird Western Grebe was spotted in Treasure Island by staff during surveys on October 4. The bird appeared lethargic and preened excessively on the sand near the shoreline. The Oiled Wildlife Care Network was contacted and rescued the bird.



Two booms were placed near the creek mouth after the Huntington Beach oil spill in October 2021. Oil slicks and coloration/visibility of the creek water were recorded during our surveys.

Tar balls ($n=13$) were also found along Treasure Island and were reported to CA Fish and Wildlife on October 20, 2021.



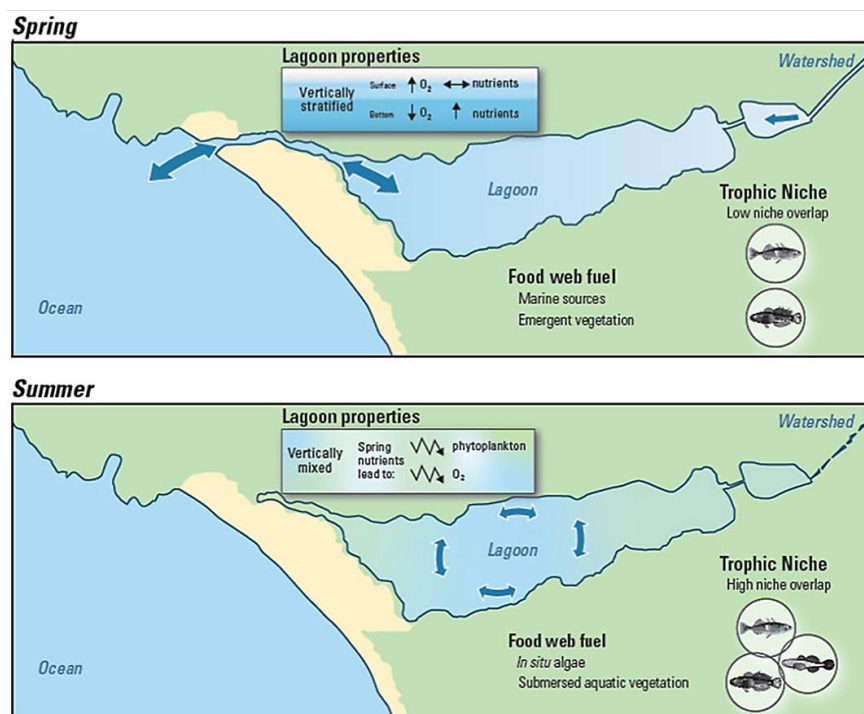
CONCLUSIONS

Importance

Sand barriers like Aliso Berm are important because they can help buffer our lands at risk of sea-level rise. These barriers regulate estuaries' connection with the ocean and maintain the essential environmental conditions that are sensitive, variable, and seasonal for threatened wildlife.^{4,5}

- Intermittently closed estuaries are critical environments that may be sustained under high rates of sea-level rise, thus reducing the anticipated global loss of these important ecosystems.⁵
- Estuarine food webs are complex because marine, freshwater and terrestrial prey circulate variably and seasonally within the habitat.^{6,7,8}

Seasonal changes amplify food web dynamics especially in a lagoonal estuary, like Aliso Creek & Berm, which can be seasonally closed and disconnected from the ocean in low-precipitation periods.⁸



⁴ Dimova et al., "Hydrogeologic controls on chemical transport at Malibu Lagoon, CA: Implications for land to sea exchange in coastal lagoon systems".

⁵ Thorne et al., "Wetlands in intermittently closed estuaries can build elevations to keep pace with sea-level rise".

⁶ Netto et al., "Effects of Artificial Breaching of a Temporarily Open/Closed Estuary on Benthic Macroinvertebrates (Camacho Lagoon, Southern Brazil)".

⁷ Chen et al., "The influence of nutrient loading on methylmercury availability in long island estuaries".

⁸ Young et al., "Ocean connectivity drives trophic support for consumers in an intermittently closed coastal lagoon".

- Artificial breaching can reduce habitat and food availability for wildlife, such as harbor seals⁹ observed in both Laguna Beach MPAs. Beach grooming or maintenance has been assessed for negative impacts to the California Grunion¹⁰ which spawn and incubate their eggs in sand¹¹, including in beaches of Orange County.
- Migratory birds that were disturbed at the MPAs are protected by the Migratory Bird Treaty Act including Snowy Egret, Brown Pelican, Western Gull, and Elegant Tern¹².
- Marine mammals that were observed in the habitat are protected by the Marine Mammal Protection Act including Common Dolphin, Coastal Bottlenose Dolphin, Harbor Seal, and California Sea Lion.

Recommendations

1. Specific language should clearly define and classify sand barriers, bars, or berms¹³ as included habitat of Laguna Beach marine protected areas, and any disturbance to the habitat is illegal. The definitions of **injure**, **damage**, **take**, and **possess** must be described clearly; regulations should include language that defines **disturbance** and specifies the act of recreational digging or widening the opening of a river, stream, or creek, is unauthorized and should not occur at any time, even when precipitation occurs (Marine Managed Areas Improvement Act, Public Resources Code Section 36700).
2. More enforcement is needed at the sand barrier of Aliso Beach to ensure compliance of existing MPA Regulations and the Endangered Species, Marine Mammal, and Migratory Bird Acts.
3. Additional studies are needed to understand the environment and dynamics of the bar-built estuary at Aliso Creek and Beach. Water quality and species abundance should be evaluated for negative impacts from stormwater, urban runoff, oil pollution, and damage to the critical habitat.

⁹ Backe et al., "Effects of sea-level rise and storm-enhanced flooding on Pacific harbour seal habitat: A comparison of haul-out changes at the Russian and Eel river estuaries".

¹⁰ Martin et al., The Walker Scale: Details of a Method for Assessing Beach-Spawning Runs of California Grunion *Leuresthes tenuis* (Atheriniformes: Atherinopsidae)".

¹¹ Santos et al., "The Beach-Spawning California Grunion *Leuresthes Tenuis* Eats and Digests Conspecific Eggs".

¹² Perez et al. "High Connectivity Among Breeding Populations of the Elegant Tern (*Thalasseus elegans*) in Mexico and Southern California Revealed Through Population Genomic Analysis".

¹³ van Niekerk et al., "An Estuary Ecosystem Classification that encompasses biogeography and a high diversity of types in support of protection and management".

Next Steps

Research is postponed currently because finances have been fully utilized. Phase Two of the Aliso Wildlife Habitat Monitoring Program include:

- Examine presence of federal and state protected species by E-DNA testing¹⁴
- Perform thorough water quality sampling at multiple sites
- Post additional permanent signs near Aliso Berm to increase awareness (i.e., policies of MPAs, clean water, and protected species)
- Continue volunteer recruitment and community outreach for beach surveys of human and wildlife behavior and abundance



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 for all plant, fish and animal species. We promote education of local marine resources and enforcement of environmental protection laws and regulations. The Coalition seeks to provide a forum for communication, relationship building, and public outreach toward the common goals of caring for the marine life environments of Laguna Beach.

Acknowledgements

Thank you, Jinger Wallace, Mike Beanan, and Ray Hiemstra, for your valuable guidance and support to the Aliso Wildlife Habitat Monitoring Program; thank you for defending our lands and seas. Many thanks to our assistants Marco, Gloria, Michal, Michelle, Sam, Ciara, Jacky, Hailey, Sarah, and Patricia, for giving your free time to the research. In addition to surveying, thank you Sarah Gutierrez for reviewing the literature, Hailey Catena for surveying with dedication and updating on-scene, and Sam Khun for assisting with oil spill response, volunteer recruitment, and coffee. Thank you Firoozeh Peiman, John Ehlers, Matt Sylvester, Suzanne Welsh, and Mike Horn for your helpful work and shared experiences. We sincerely appreciate the kind support of Laguna Bluebelt Coalition, Orange County Coastkeeper, City of Laguna Beach, and protectors of Aliso Berm.

¹⁴ Sutter & Kinziger, "Rangewide tidewater goby occupancy survey using environmental DNA".

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