

## **Taking Flight: Building a Culture of Conservation at the Punta Banda Estuary**

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The following Capstone Advisory Committee members provided guidance throughout the duration of the project and have reviewed the final report:



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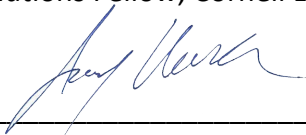
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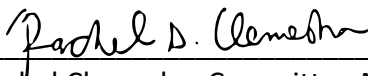
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## Abstract

Punta Banda, located in Baja California, Mexico, is made up of a five-mile long sandbar that extends into Todos Santos Bay (Bahía de Todos Santos) and creates a protected estuary with salt marsh, mud flat, sand dune, and lagoon zones that provide habitat to a variety of species, including migratory and resident birds. Wetlands and birds can be useful topics for engaging the public on conservation efforts because they are culturally relevant, inspire wonder, encourage connections to the outdoors, and are important components of a healthy coastal and marine ecosystem. Through two interactive ArcGIS StoryMaps, this capstone project aims to share data on the wetlands, shorebirds, and seabirds of the Punta Banda estuary with the public in order to continue to generate support for conservation efforts among locals and visitors. Despite conservation efforts, there are still many anthropogenic threats to the estuary and the birds that use it to feed and nest.

This document provides a report of activities conducted as part of a capstone project for the Scripps Institution of Oceanography Master's program in Marine Biodiversity and Conservation.

## Introduction

Punta Banda is a 5,913-acre sand bar and estuary located on the Pacific side of the Baja California, Mexico peninsula along the coast of the Maneadero Valley. This area, including the surrounding region up to modern day San Diego County, are part of the traditional land of the Kumeyaay people who started inhabiting this region over 4,500 years ago and used this estuary sustainably for hunting, fishing, foraging, and shelter (Garduño, 2015). Today, the local community is made up of communal farmlands, or ejidos, most of which were granted through agricultural reform (Medellín-Azuara 2013). The Punta Banda sandbar has some development such as residential, trailer, and vacation homes as well as a partially developed, and now abandoned, resort. Visitors to Punta Banda and the surrounding region include locals, national visitors, and international visitors who come to enjoy activities such wine-tasting, birdwatching, kayaking, fishing, and swimming.

Map of the Punta Banda Estuary



## Background and Problem Statement

Wetlands like the one at Punta Banda are among the most productive ecosystems in the world (EPA 2018). They regulate water quality, act as nursery areas for young fish, can contribute to regulating floods and the impacts of storms, help in erosion control, act as carbon sinks, and generally improve water security (CBD 2015). Despite being some of the most beneficial ecosystems in the world, approximately 35% of wetlands were lost between 1970-2015, disappearing faster than any other ecosystem which is mostly due to development, pollution, and water diversion (Ramsar 2018). Aerial surveys between 1972–2008 revealed that there was a 14.5% reduction in the wetland area over this time period driven by coastal development and erosion (Watson 2018).

The Punta Banda estuary was designated as a Wetland of International Importance by the Ramsar Convention, an international treaty for the conservation and sustainable use of wetland, in 2006. However, there is limited capacity to enact and enforce conservation regulations. Cooperation among stakeholders, including the general public, will be needed to address the lack of legal accountability and to support effective local management.

Punta Banda holds various designations beyond being a Wetland of International Importance. This site is part of the Pacific Flyway, a major north-south thoroughfare for migratory birds, earning it a designation as a Site of Regional Importance through the Western Hemisphere Shorebird Reserve Network. Todos Santos Bay, including the Punta Banda Estuary, is considered an Important Bird Area (IBA) by BirdLife International. Over 144 species of birds use the estuary throughout the year (Howell 1999). Among those birds are California Least Tern (*Sternula antillarum*), a seabird, and Western Snowy Plover (*Charadrius nivosus*), a shorebird, who nest at the estuary from May to August and April to August respectively (Clark 2019).

Shorebirds are found along shorelines and mud flats. Their long beaks and legs are useful for feeding in these shallow waters. Seabirds are adapted to spending the majority of their life at sea; webbed feet and long wings are common in this species. In general, seabirds and shorebirds have declined by as much as 70% over the last 40 to 50 years alone (Rosenberg 2019). Their declines share common themes, all of which are exacerbated by our rapidly changing climate: habitat loss from coastal development, disturbance from humans and cars driven on the beach, predation from wild and domesticated predators, and pollution from urban and agricultural runoff as well as more frequent high tide events.

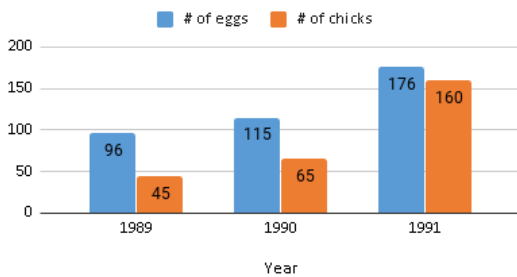
Least Tern are federally listed as Endangered in the U.S. and a Special Protection Species in Mexico. Snowy Plover are federally listed as a Threatened Species in both the United States and Mexico. The Endangered Species Act, passed in 1973 in the United States, is intended to protect and restore species and their necessary habitats by prohibiting the taking of listed animals or their parts. Exceptions are made depending on whether it is listed as Endangered or Threatened. In Mexico, threatened and endangered species are regulated under the general terms of the Ecology Law, Law of Endangered Species Protection, General Wildlife Law, and also

under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to which both the United States and Mexico are a Party.

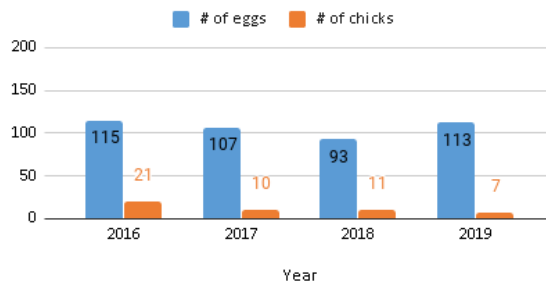
Least Tern and Snowy Plover nest directly on sand, laying small, sand-colored eggs. However, between the size and color of the eggs and their proximity to popular recreation areas, both species have seen reductions in number of chicks born each season at Punta Banda. Below is data from Pro Esteros collected during monitoring efforts from 2016-2019. Snowy plover data has only recently begun to be collected at the Punta Banda estuary.

Least Tern monitoring efforts at Punta Banda show that between 2016 and 2019, 21 out of 115, 10 out of 107, 11 out of 93, and 7 out of 113 eggs hatched each year. This is especially stark when compared to data collected from 1989 to 1991 which showed 45 out of 96, 65 out of 115, and 160 out of 176 eggs hatched successfully. While what happened to a significant portion of the eggs (8-36 eggs from 2017-2019) is unknown, predation by animals and high tides washing away nests contributed to the majority of eggs lost between 2017 and 2019.

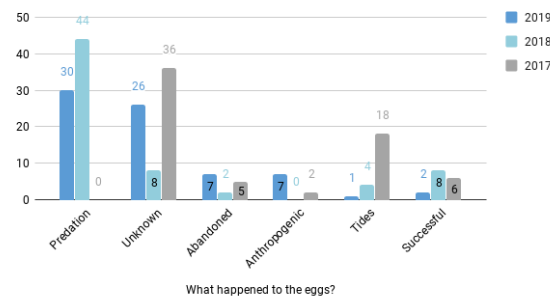
Least Tern Monitoring 1989 - 1991



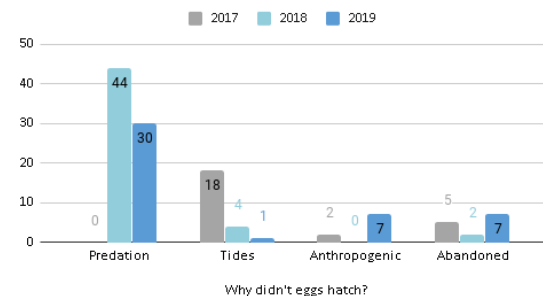
Least Tern Monitoring 2016 - 2019



Least Tern Egg Outcomes



Least Tern Eggs - Unsuccessful



Estuaries do more than provide a nesting and foraging space for birds. They also help mitigate climate change by storing significant amounts of carbon from the atmosphere. One study found that wetland soil at the Punta Banda estuary stores 9.36 million metric tons carbon dioxide equivalent to the yearly annual emissions of 1.97 million passenger vehicles (Watson 2018). The lagoon area plays an important role in the life cycle of fish by providing a functional nursery for juvenile fish to grow. In turn, it provides important economic benefits to the commercial, artisanal, and recreational fishing industry. Meanwhile, the wetlands also provide filtration services as water draining from the mountainside mixes with debris and is filtered out by the

marsh as well as protection from sea-level rise as the wetlands provide a buffer between rising tides and nearby communities. In order to maintain the beneficial properties of this wetland habitat, locals and visitors should continue to work together to ensure a balance between use and conservation of this area for future generations.

Despite the work of local organizations, few current communication tools exist which combine information on local regulations related to the Punta Banda estuary or that provide up to date information on monitoring efforts at the estuary in one location. As Ensenada continues to grow, it is important that visitors share a sense of responsibility for the estuary. By telling a story, using maps, photographs, and other visual elements, the public can increase their appreciation for this ecosystem and the species that depend on it.

The goal of this project was to create two ArcGIS StoryMaps that could be used to educate the public on the ecosystem benefits of wetlands, create awareness, and effect change in behavior among local and international visitors. This project shares shorebird, seabird, and wetlands information with the public in order to educate and build support for conservation efforts. Pro Esteros, a wetland conservation organization based in Ensenada, and other local organizations have been gathering data and implementing conservation efforts at the estuary site for many years. By sharing their data in an interesting and interactive way, especially during the 2020 coronavirus quarantine, this project can help the public better understand the environmental, economic, and social benefits of the estuary and their role in keeping places like Punta Banda vibrant. If successful, this project will help to grow a culture of conservation among visitors to the estuary.

## **Methodology**

ArcGIS StoryMaps are a web-based application that enables interactive storytelling through text and multimedia content such as videos, photography, data visualizations, and maps. By sharing scientific information through this format, it can become more interesting, memorable, and compelling. Information that was gathered was divided into two StoryMaps (both of which are also available in a Spanish-language version):

[The Punta Banda Wetland: A guide to use, benefits, and conservation](#)  
[Birds of the Punta Banda estuary](#)

The first StoryMap is intended to impart readers with answers to the following questions:

- What are wetlands?
- How do they benefit the local community?
- What kind of activities are allowed at the Punta Banda estuary?
- How can the public support this ecosystem?

The second StoryMap is intended to impart readers with the answers to the following questions:

- What are seabirds and shorebirds?

- What are the anthropogenic threats to seabirds and shorebirds?
- Why is Punta Banda an important wetland for these birds?
- How can you identify a Snowy Plover and Least Tern?
- What are the threats to Least Tern and Snowy Plovers and how can you support them?

Information for this project was gathered through a literature review and interviews with experts and stakeholders. Biological monitoring data on Least Tern including number of nests, chicks, eggs, and threats gathered between 2016 and 2019, as well as historical data from scientist Eduardo Palacios were previously collected by capstone committee members through their work with Pro Esteros and the Coastal Solution Fellows Program at the Cornell Lab of Ornithology. Remote interviews were conducted with the following experts and stakeholders to provide a personal context:

- Sr. Rafael Ponce, local fisherman, diver, and ejido (communal land) representative
- Liliana Ortíz Serrato, Biologist and Coordinator with Pro Esteros
- Gabriela Iburguchi, Conservation Program Manager, Pacific Coast Bird Conservation at the San Diego Zoo - Institute for Conservation Research
- Travis Wooten, Senior Research Coordinator, Recovery Ecology at the San Diego Zoo - Institute for Conservation Research

Both StoryMaps are intended for older teens and adults that are likely to visit Baja California for the recreational activities but may not know about this particular area or its ecological significance. Links have been made freely available for public use and will be shared with a list of marine, bird, travel, and conservation focused social media influencers, non-profit, university and governmental organizations. Data analytics have been enabled on these websites to track engagement which can be used to obtain insights into who is using the StoryMap. Access to the website will continue to be made available through the VisitPuntaBanda.com domain which has been purchased to make the information easily accessible when conducting an internet search for the Punta Banda estuary.

### **Future Prospects**

As more people read the StoryMaps, more data will be gathered about what the audience looks like including how many people visited each site, average time spent on the site, age range, gender, what part of the country they are accessing the site from. This can help inform future outreach efforts by local organizations. Due to the coronavirus pandemic, an in-person visit to the estuary and to participate in this season's monitoring efforts were not possible. My hope is to return to the estuary when Baja California reopens for travel.

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