Texas A&M Transportation Institute

PROJECT SUMMARY

Texas Department of Transportation

0-6970: Daily and Seasonal Movements of Brown Pelicans in the Bahía Grande Wetland Complex

Background

The brown pelican (*Pelecanus occidentalis)* is a charismatic inhabitant of coastal landscapes and communities all along the Texas Gulf Coast. During the first half of the 20th century, its population declined precipitously due to hunting, habitat loss, and the overuse of pesticides. In 1970, the brown pelican was listed endangered prior to the Endangered Species Act of 1973. Since then, its population has steadily recovered. Currently, the Gulf Coast has an estimated 12,000 breeding pairs, and the species is often used as an example of a successful species recovery.

This project deals with an unusual form of brown pelican mortality that occurs on State Highway 48 (SH 48) between Brownsville and Port Isabel in South Texas. Over the last decade, periodic, pulsed brown pelican mortality has occurred during fall and winter cold fronts. High winds that accompany these cold fronts create difficulties for brown pelicans that fly across the roadway toward habitat in a lagoon that borders the roadway. Specifically, the cold front conditions cause pelicans to crash-land on the road surface. Crash-landed pelicans become disoriented, struggle to regain flight, and are often injured or killed by passing motorists. During cases of extreme weather, over 200 pelicans have crash-landed within a single day. The pelican crossing problem is a conservation and animal welfare issue, and a safety risk for motorists and the public.

What the Researchers Did

The research approach involved data collection in the field, and statistical and mathematical modeling to develop a comprehensive view of the ecology of pelicans in the Bahia Grande Wetlands Complex (BGWC) that can be used to mitigate pelican mortality on SH 48. The project did the following:

- Thirty-five pelicans were fitted with GPS devices to recorded information on location, speed, and altitude. These data informed key pelican roost and loafing sites, flight paths, and seasonal migrations.
- More than 300 pelicans were captured and fitted with individually identifiable leg bands for a mark-resight study. These data were used to infer survival and seasonal movement of pelicans, and to estimate population size.
- A population model was developed using data generated through this project (notably, survival and migration estimates) as well as information mined from the scientific literature. The model was used to illuminate

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Project Completed:
3-31-2021

key life-history information and to infer the impact of mortality on the local pelican population.
- The researchers kept detailed measurements of each pelican mortality event that occurred during the study (2017–2021) and monitored pelican crossings of SH 48 during ambient conditions. The data were used to develop statistical models to understand the environmental and population factors that contribute to pelican mortality

What They Found

Pelican daily movements center around a small number of key roosting locations in the Laguna Madre and BGWC, as well as locations near Port Isabel and the west end of the Brownsville Ship Channel. Pelican habitat often coincides with human-built structures such as docks, piers, and marinas. Key roost sites and movement corridors were also identified that help explain the magnitude of the SH 48 mortality.

Intuitively, the magnitude and frequency of pelican events on SH 48 are related to the size of the local pelican population. The research team estimated that between 2,000 and 3,000 pelicans use the BGWC as a permanent overwintering location. According to the abundance estimation methods, pelican populations increase in August and reach the peak population size by November. Approximately 80 percent of pelicans leave the BGWC for spring and summer breeding sites.

Cold fronts are often accompanied by sudden changes in wind direction (southeastern to northwestern winds) and often speed (typically a 5- to 10-mph increase in wind speed). During these northwestern winds, faster wind speeds were also measured at an altitude of 21 feet above the roadway versus 12 feet above the roadway. These differentials are most likely caused by the topography on the northern side of SH 48. During northwestern winds, pelicans flying into the Bahía Grande (i.e., to roost sites) experience strong headwinds that cause crossing difficulties.

What This Means

The research provides useful information for mitigating the current SH 48 pelican problem, other pelican crossing problems, or wildlife crossing problems in general. Mitigation options for the pelican problem can be grouped as follows:

- Ecological interventions that modify the ecology of pelicans and either reduce or prevent SH 48 crossings (e.g., barriers to encourage pelicans to fly at increased altitudes, providing alternative roost sites).
- Linking of planning and environmental processes to ensure cross-agency commitments and approaches to mitigating transportation projects that create unintended conflicts between wildlife and the transportation infrastructure.
- Infrastructure engineering solutions designed to change infrastructure in a way to minimize downed pelicans.
- Traffic engineering solutions aimed at reducing the volume and speed of traffic on SH 48, such as dynamic warning lights, traffic calming, and temporary road closures.

For More Information

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Keyword: Research