DRIVERS OF GULF HEALTH

WHERE DO WE GO FROM HERE?

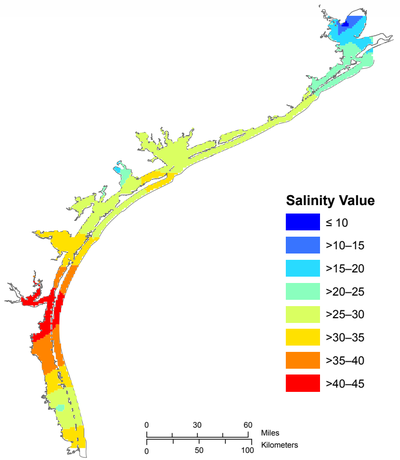
FRESHWATER INPUTS DRIVE CHANGE

The salinity of coastal waters can have a dramatic effect on the species present in the area. Historically, the Texas Gulf Coast has a strong salinity gradient, with low salinity waters in the northern bays (fed by freshwater influxes from the land) and high salinity waters in the southern bays (see map). Habitats for birds, oysters, fisheries, and seagrass are impacted by freshwater inflow into the Gulf.

Species that are more tolerant of low salinity, such as oysters, tend to be concentrated in the northern bays, whereas species that are tolerant of high salinity, such as seagrasses, tend to be concentrated in the southern bays.

Habitat loss along the Texas Gulf Coast is heavily driven by human impacts. The damming of coastal freshwater systems can have a significant impact on the salinity of coastal waters. Altering the salinity regimes of coastal waters can have far-reaching consequences for fish, birds, oysters and seagrasses.

Other significant factors influencing coastal health include the impacts of coastal urban development, sea-level rise, and climate extremes.



The Texas Gulf Coast exhibits a strong salinity gradient, with low salinity waters in the Upper Coast and high salinity waters in the southern bays and Laguna Madre. Image courtesy of Kalman Bugica and Mike Wetz.

A VISION FOR THE GULF OF MEXICO

We hope that report cards like this one can be created for the United States and Mexican Gulf Coast states and Cuba. These report cards could easily be linked together to create an Ecosystem Health Report Card for the entire Gulf of Mexico. We also envision that the report card can be expanded to include social, cultural, and economic factors to create a more holistic assessment of ecosystem health.

RECOMMENDATIONS

One of the greatest challenges in the stakeholder values process is identifying data and information that is useful for a regular ecosystem health assessment. Much of these data are not available for the Texas Coast or do not encompass all of the pertinent locations and times. To improve future assessments, we recommend that monitoring be expanded to fill the data gaps for each of the report card elements (birds, fisheries, seagrasses, water quality and oysters).

Want to learn more?
Visit the Harte Research Institute at:
https://www.harteresearchinstitute.org/

COASTAL SUCCESSES

- **Baffin Bay Volunteers** have donated their time to collecting data on the changing water quality of Baffin Bay. Their work is enormously helpful to scientists and managers.
- **Sink Your Shucks**, a program associated with the Harte Research Institute, has restored approximately 20 acres of oyster reef in the Mission-Aransas Estuary. Sink Your Shucks has placed 1.5 million lbs of oyster shells on the bottom to serve as new oyster reefs.

- **Red Snapper**, a commercially important fish species, has shown improvements in its populations. These fish appear to be benefiting from the reduction of shrimp trawl bycatch.

ABOUT THIS DOCUMENT

This report card was developed through participation of experts on Texas Coast oysters, seagrass, water quality, birds, and fisheries. The project builds on stakeholder values established during the EcoHealth Metrics Project, a partnership between Harte Research Institute, Harwell Gentile and Associates, and the University of Maryland Center for Environmental Science.

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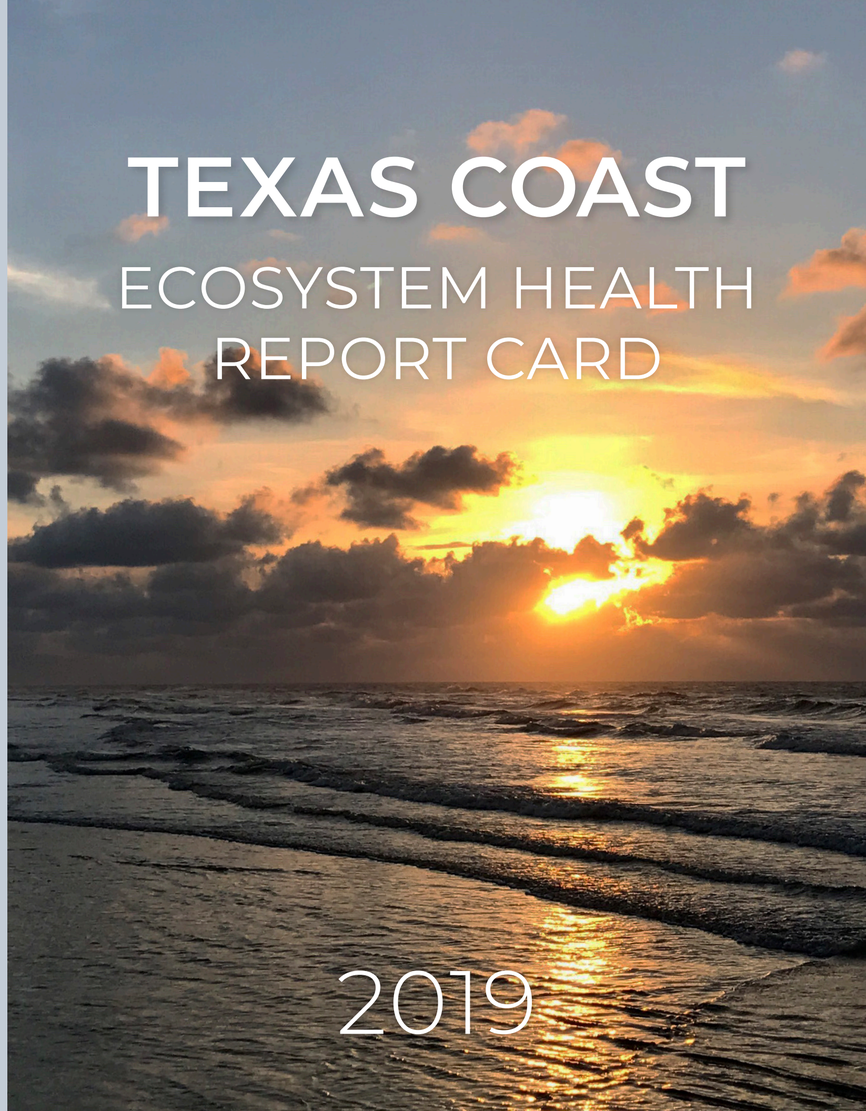
University of Maryland Center for Environmental Science Integration and Application Network



TEXAS COAST

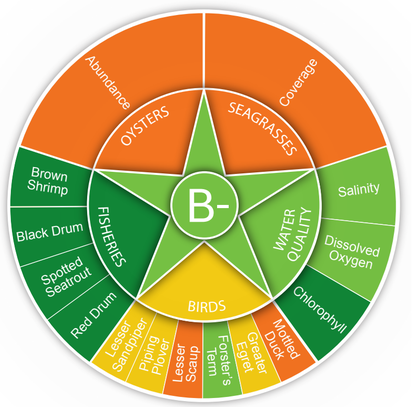
ECOSYSTEM HEALTH REPORT CARD

2019

TEXAS COAST: MODERATELY HEALTHY

The Texas Coast of the Gulf of Mexico scored a B- overall, indicating moderately good health. Along the entire coastline, fisheries were the highest scoring indicator, demonstrating consistently healthy populations of the indicator species despite increasing demand from humans. The Texas Gulf Coast also had generally good water quality results, with good dissolved oxygen and chlorophyll concentrations. Upper Laguna Madre demonstrated less healthy conditions due to nutrient pollution, while mid-coast estuaries showed a drop in overall health due to increasing salinity.

Birds also scored moderately coast-wide, despite continuing habitat losses. Oysters and seagrasses were the lowest scoring indicators. For oysters, this result could be attributed to low abundance in the mid-coast bays. Oysters were not expected or observed in southern waters, due to Laguna Madre's high salinity. For seagrasses, this finding is due to recent reduced coverage in Upper Laguna Madre.



Texas Coast Health Scale

F	D	C	B	A	
Ecosystem condition is very poor	Ecosystem condition is poor	Ecosystem condition is moderate	Ecosystem condition is good	Ecosystem condition is very good	Unknown

*Overall indicator scores are based on the region averages.

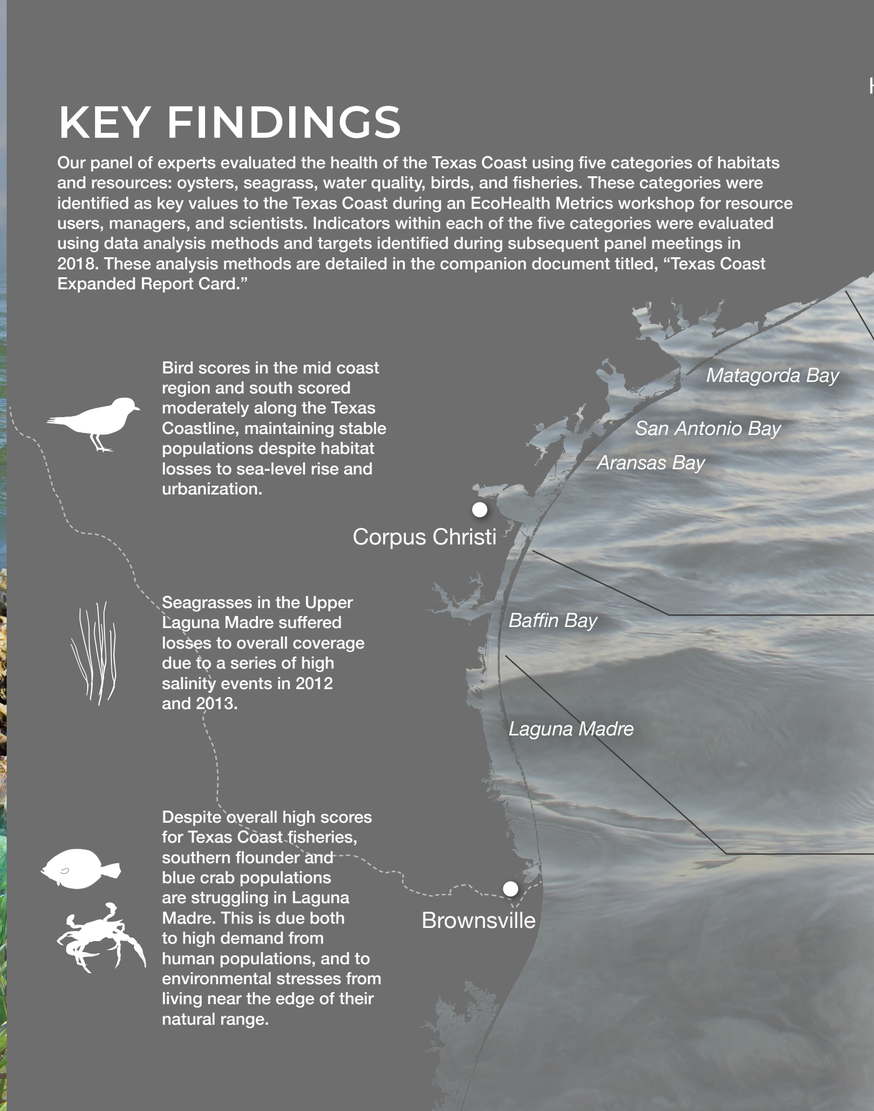
KEY FINDINGS

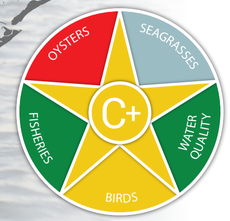
Our panel of experts evaluated the health of the Texas Coast using five categories of habitats and resources: oysters, seagrass, water quality, birds, and fisheries. These categories were identified as key values to the Texas Coast during an EcoHealth Metrics workshop for resource users, managers, and scientists. Indicators within each of the five categories were evaluated using data analysis methods and targets identified during subsequent panel meetings in 2018. These analysis methods are detailed in the companion document titled, "Texas Coast Expanded Report Card."

Bird scores in the mid coast region and south scored moderately along the Texas Coastline, maintaining stable populations despite habitat losses to sea-level rise and urbanization.

Seagrasses in the Upper Laguna Madre suffered losses to overall coverage due to a series of high salinity events in 2012 and 2013.

Despite overall high scores for Texas Coast fisheries, southern flounder and blue crab populations are struggling in Laguna Madre. This is due both to high demand from human populations, and to environmental stresses from living near the edge of their natural range.



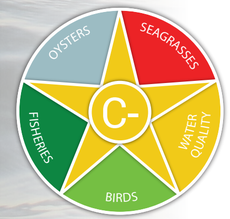


UPPER COAST

Oyster populations in the Upper Coast fell sharply after Hurricane Harvey in 2017, when a sudden release of freshwater caused a large mortality event. Seagrasses are extremely rare in this area, due to the region's relatively low salinity. As one of the more urbanized regions, it is also unsurprising that Galveston Bay experienced localized high chlorophyll and an increasing salinity trend. Several of the indicator bird species decreased in the region, while fisheries were stable.

MID COAST

Oysters and seagrasses in the Mid Coast scored moderately, with stable populations over time. Despite having fewer urban alterations than the Upper Coast, the region has experienced broad-scale salinity increases, as well as increases in chlorophyll and decreases in dissolved oxygen. The data on bird populations were limited, so the scores for the Mid Coast and Upper Laguna Madre were consolidated. Fisheries indicated overall strong populations.



UPPER LAGUNA MADRE

Due to its natural high salinity, the overall Laguna Madre region has not historically been a good habitat for oysters (which were not expected in the region). Laguna Madre has, however, historically been a stronghold for seagrasses (which are more tolerant of high salinities). Despite this, prolonged periods of high salinity in 2012 and 2013 heavily impacted seagrasses, especially manatee grass, in Upper Laguna Madre. The area was also marked by rising DO and chlorophyll over time.

LOWER LAGUNA MADRE

Lower Laguna Madre is notable in its limited urbanization and seemed less susceptible than Upper Laguna Madre to high salinity extremes. The region is characterized by healthy seagrass populations, healthy dissolved oxygen and chlorophyll levels, and stable or increasing bird populations. Fisheries scored very highly, although we observed a drop in blue crab and southern flounder populations in both Upper and Lower Laguna Madre.