# ACTIONABLE SCIENCE

Habitat Along the Gulf Coast of Louisiana & Texas: Sea-Level Rise, Urbanization, & Mottled Ducks

Wetlands along the U.S. Gulf Coast have been harmed by increased salinity, tropical storm damage, and reduced freshwater inflows. Sea-level rise and urbanization are expected to further degrade these systems, harming wildlife that depend on them. Natural resource managers need to understand the current and future extent and condition of coastal wetland habitat to plan and implement effective conservation actions. Researchers used novel models based on data about the location and future habitat for the Western Gulf Coast mottled duck (*Anas fulvigula*, MD), an important indicator species for coastal marsh habitat, to promote strategic conservation actions, adaptive management, and collaboration along the Louisiana and Texas coast.

Project Location

A coastal marsh along the Gulf Coast region/Texas Parks & Wildlife
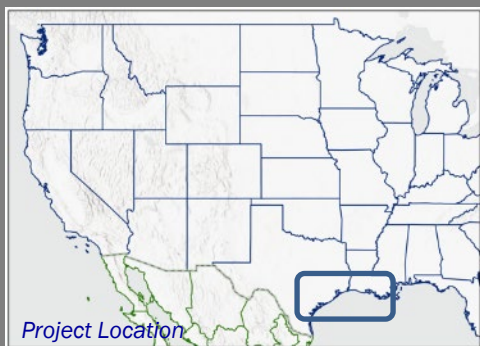
KEY ISSUES ADDRESSED

Researchers and managers lacked data on current MD habitat selection and use during key life-stages, limiting their ability to develop appropriate current and future strategies for protection of MD habitat. Additionally, limited knowledge of the impacts of sea-level rise (SLR) and urbanization on future habitat conditions existed.

As sea levels rise and human population increases, it is imperative that managers have enough region-specific information about future MD habitat conditions to develop appropriate conservation strategies.

PROJECT GOALS

- Identify current habitat selected by mottled duck to determine breeding and brooding habitat use
- Predict which areas of habitat will be gained or lost from sea-level rise using the SLAMM model
- Incorporate knowledge and insights of stakeholders from the project area into model development
- Project land use effects and habitat change from future urbanization on MD habitat
- Share projected changes to MD habitat with resource managers to prioritize conservation actions

Biologist navigating through a coastal marsh habitat via airboat / USFWS

PROACTIVE PLANNING

Proactive planning can identify, improve, and conserve current and future habitat for species that depend on vulnerable coastal wetlands in the Gulf Coast Region of the U.S.

PROJECT HIGHLIGHTS

Mottled Duck Habitat Selection: Findings on habitat selection suggest MD primarily select areas with fresh and irregularly flooded marshes. Rice production in coastal LA and TX comprises an important segment of MD habitat, but is sensitive to wider-ranging market forces making future predictions for this habitat difficult.

Predicting Future Habitat: Researchers used location data from radio marked MD hens from 2006-2011 to create an ensemble model of habitat selection for 2010. Next, they projected future habitat states using models of SLR (SLAMM model) and human development (SLUETH model). By combining future predictions with their model, they projected future habitat for MD through 2100 to examine predicted effects of SLR and urbanization.

Coastal Marsh Habitat Reduction: SLR models predicted reductions in coastal marsh habitats and the ensemble model predicted corresponding declines in overall habitat quantity and quality. The largest rate of habitat loss will be in the Chenier Plain of Louisiana at 71%. Urbanization model predicted a 72% increase in the amount of developed land by 2100. Most of this urbanization is not expected to impact MD habitat directly. The biggest habitat losses are projected to come from SLR.

Application of the Results: Project results are used to inform the Aransas and Big Boggy National Wildlife Refuge Land Protection Plans and also help steer sampling efforts for NOAA's Firebird Research Project.

Collaborators

- See online for full list of partners

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LESSONS LEARNED

The SLAMM was a useful tool for modeling projections across a wide geographic range such as LA and TX, serving as a reasonable first step to engage in proactive conservation planning and adaptive management. However, modelers need to continually update these projections to capture recent local sea-level rise rates and impacts of new coastal wetland conservation projects. Successful development of the products required a technical team of MD experts across agencies and organizations. Co-creation took longer, but provided insights into differences across geographies and perspectives among end-user groups, resulting in stronger models. The team proceeded carefully when using land cover classification products across large geographies. They ensured accuracy by critically analyzing datasets to identify discrepancies in projections, comparing land classifications differences across states, and engaging with partners to ground-truth and correct datasets. Additional research on MD ecology in southeastern LA and south TX could help better understand current and future habitat conditions and inform conservation efforts.

NEXT STEPS

- Conduct additional research on mottled duck ecology across their entire range
- Update habitat projections and existing models as more information becomes available
- Continue to share research findings with managers to improve coastal wetland conservation along the Gulf Coast region

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A mottled duck being fitted with a radio transmitter/USFWS