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Estimating Willingness to Pay for Coastal Estuarine Resources: A Case Study of Florida's Nature Coast

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Estimating the Willingness to Pay for Coastal Estuarine Resources: A Case Study of Florida's Nature Coast

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Background

Suwannee River Basin & Florida's Nature Coast

- The Suwannee River is one of the largest undammed rivers in the southeastern United States
- The Suwannee River Basin contains a mix of agricultural land, forests (commercial and naturally-occurring), and residential developments
- The watershed is tightly linked to Florida's Nature Coast, where the Suwanee River empties into the Gulf of Mexico.
- Changes in land and water use in the basin as well as changes in climate in the region impact water quality and aquatic populations in the Gulf along the Nature Coast
- The Nature Coast has been recognized for its "exceptional biological, aesthetic, and scientific value" (Southwick Associates 2015) and has been identified as a high priority site for conservation in the Northern Gulf of Mexico (Beck and Odaya 2001).
- 13% of all jobs in the Nature Coast region depend directly on natural resources (tourism, forestry, farming, fishing), compared to only 1% of jobs in Florida overall (Southwick Associates 2015).

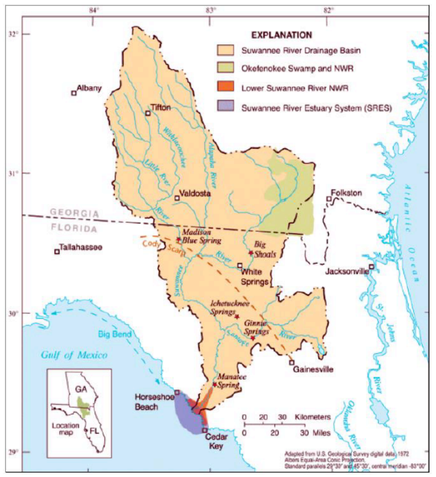


Figure 1: Suwannee River Basin

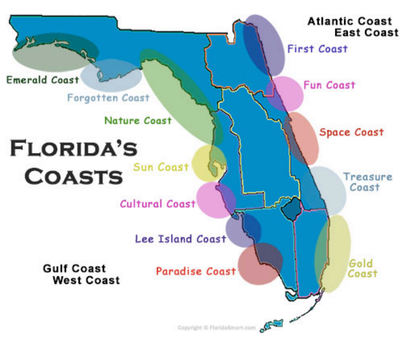


Figure 2: Location of the Nature Coast and other Florida Coasts

Current and Predicted Impacts

Changes in River Flow and Water Quality

- Increased variability in rainfall has led to extreme low-flow events in the Lower Suwanee River. Four of the six most extreme low-flow events have occurred since 2003.
- River discharge per centimeter of rainfall has decreased as well, likely due to land use changes.
- Changes in flow impact salinity in the Nature Coast which impacts aquatic populations that are dependent on narrow salinity ranges for their survival

Figure 3: The Suwannee River headwaters during a 2011 drought

- Changes in land and water use patterns have resulted in reduced water quality in the basin and consequently in the Nature Coast
- Changes in quantity and/or quality impact food webs in the Gulf Coast ecosystem with impacts on populations ranging from benthic invertebrates, forage fishes, commercial and recreation fisheries and protected species

Changes in Climate

- Sea level rise and changes in temperature and precipitation patterns are expected for the Nature Coast
- Minimum fall daily air temperatures and number of days above 20°C have consistently increased over the last 25 years.
- Increasing temperatures increase evapotranspiration which reduces runoff and groundwater discharge in the Suwannee River Basin
- Changing temperatures have likely contributed to the northward spread of a variety of species in the Gulf, including the Common Snook and Parrotfishes, with implications for food web structure and commercial and recreational fisheries.
- The lack of heavy frosts has allowed Black, Red, and White Mangrove to extend and persist into the northernmost reaches of the Gulf

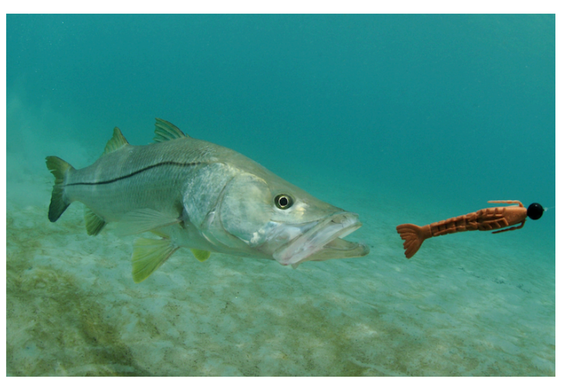


Figure 4: Common Snook in the Gulf of Mexico

Study Objectives & Methods

Research Questions

- How does willingness to pay for coastal management programs vary as:
  - Populations of snook, red drum, and/or seatrout vary relative to the status quo?
    - Does valuation depend on whether or not the species is native to the Gulf?
  - Seagrass abundance varies relative to the status quo?

Survey Methods

- A survey was disseminated through Qualtrics to a national panel of respondents in April 2022.
  - Respondents did not need to have previously visited the Nature Coast. This allows us to consider non-use value as well as use value.
- The survey collected data on:
  - Nature Coast visitation experience
  - Attitudes and beliefs about the Suwannee River Basin, environmental changes, concerns, and issues, and government action regarding environmental management efforts.
  - Demographic information
- The survey also included a choice experiment (CE) section, as shown below.
  - Each respondent received 8 CE questions and an additional question asked about their prior participation in environmental programs

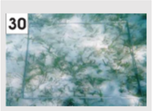
	Program A	Program B	No Management Actions Taken
Snook Population	Doubles	Stays the same (i.e., today's population)	Declines by 50%
Red Drum Population	Declines by 50%	Stays the same (i.e., today's population)	Declines by 50%
Seatrout Population	Stays the same (i.e., today's population)	Declines by 50%	Declines by 50%
Seagrass Percent Abundance	80	80	30 
Annual Cost to Your Houshold	$10	$85	$0

Figure 5: Example Choice Experiment

Econometric Methods

- To determine how environmental attributes affect willingness to pay for environmental management on the Nature Coast, a conditional logit model was estimated.

Results

Willingness to Pay

Table 1. Odds-Ratios from a Conditional Logit Regression Model

Attribute	Odds-Ratio	Standard Deviation
Snook		
No Change	1.522***	0.063
Increase	1.584***	0.068
Red Fish		
No Change	1.366***	0.057
Increase	1.377***	0.060
Trout		
No Change	1.374***	0.057
Increase	1.588***	0.073
Seagrass		
55%	1.179***	0.052
80%	1.389***	0.060
Cost	0.991***	0.001
N	18,000	

- Interestingly, the impact of changes in fish population on likelihood of choosing a given management program and WTP vary by species.
- Maintaining the status quo population of snook, relative to a decline in population, has the largest impacts on likelihood of choosing a program and WTP. This species is also the one that was not historically found as far north as the Nature Coast. Its historically rarity may explain why there is a higher willingness to pay to maintain its presence.
- For red fish, maintaining or to increasing the population has approximately the same impacts on likelihood of selecting a program and WTP, suggesting that respondents are content with the current population levels.
- Moving from no change to an increase in the population for trout has the biggest increases in likelihood of selecting the program and WTP, suggesting that respondents are not satisfied with the status quo levels of trout in the Nature Coast.
- Unsurprisingly, respondents are less swayed by increasing seagrass cover, despite the potential ecological ramifications of improved seagrass abundance.

Table 2. Willingness to Pay

Attribute	Willingness to Pay
Snook	
No Change	$45.88
Increase	$50.24
Red Fish	
No Change	$34.08
Increase	$34.91
Trout	
No Change	$34.67
Increase	$50.25
Seagrass	
55%	$18.02
80%	$35.86

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