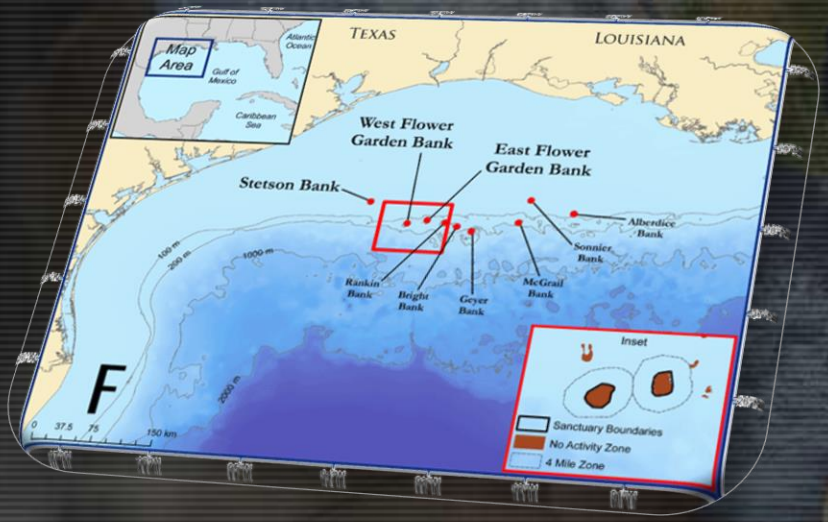
Flower Garden Banks National Marine Sanctuary: An Assessment of the Fisheries



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OVERVIEW

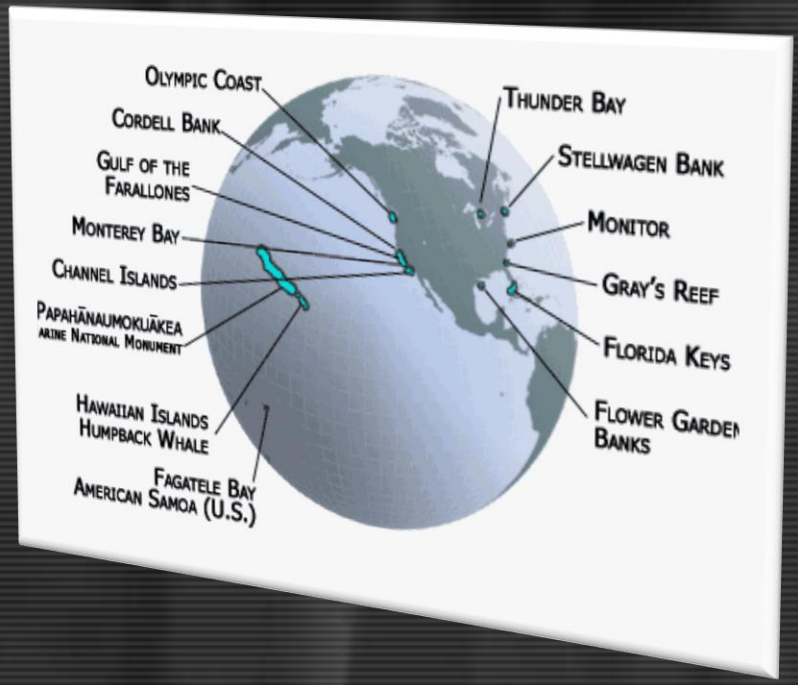
- Background
- Purpose/Objectives
- Methods
- Results
- Conclusions
- Summary
- Future Perspective

BACKGROUND

National Marine Sanctuaries

•In the Unites States there is an array of Marine Protected Areas (MPAs) with varying degrees of sizes and types. To date, there are approximately 1,700 different MPAs that are managed by federal, state, tribal, and local authorities under various statutory mandates (NOAA, 2009).

•One of the first designated types of MPA established in the United States was National Marine Sanctuaries (NMSs). Currently, the National Marine Sanctuaries Program (NMSP) has designated 13 NMSs and 1 National Monument since its inception (16 U.S.C. 1401-1445 *et seq.*).



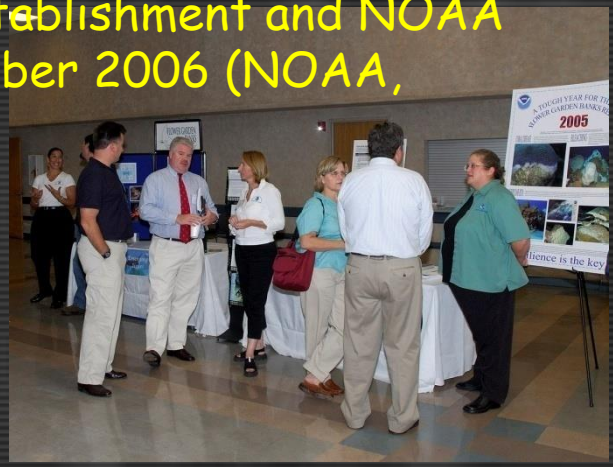
BACKGROUND

Flower Garden Banks National Marine Sanctuary

On 17 January 1992, NOAA's Office of National Marine Sanctuaries officially designated the Flower Garden Banks as a NMS making it one of the most remotely located sanctuaries in the U.S. (NOAA, 1991).

To guarantee that managers overseeing Sanctuaries meet their management goals and continue to conserve, protect, and enhance these significant living and cultural resources, the NMSP is required to periodically review each Sanctuary Management Plan (SMP) every five years (16 U.S.C. 1401-1445 *et seq*).

In September 2006, the FGBNMS staff announced the initiation of its first Management Plan Review (MPR) since the Sanctuary's establishment and NOAA released a draft State of the Sanctuary Report on October 2006 (NOAA, 2006).



INTRODUCTION

FGBNMS Management Plan Review Process

- As part of the public process, NOAA held scoping meetings on 17, 19, and 24 October 2006 to discuss a range of alternatives for addressing FGBNMS concerns and issues.
- In general, most (66%) of the public comments received from 23 September to 23 November 2006 emphasized concerns with the fish and fisheries associated with the FGBNMS (NOAA, 2006).
- In February 2007, NOAA hosted a special meeting of the FGBNMS Sanctuary Advisory Council (SAC) to organize the public comments and draft an Action Plan as part of the MPR.
- Among the various Action Plan outcomes, SAC established six working groups to address specific priority issues identified through the public scoping process (NOAA, 2006). The fishing impacts working group developed the following statement:

"Fishing activities may negatively impact and threaten the natural living resources at the FGBNMS. Information on the influence of fishing activities on the resources of the FGBNMS are unavailable, but concerns are mounting about the impacts on the marine ecosystems in a variety of ways, both directly (reduced fish biomass) and indirectly (e.g., secondary impacts on species interactions, habitat alteration/damage, marine biodiversity impacts, economic impacts)" (NOAA, 2006).

INTRODUCTION

Given the public scoping outcomes, various workshops (NMS, 2007), and the objectives of the NMSP, one strategy that emerged was to establish "special" areas under sanctuary management as:

(1) No fishing;
(2) No diving; or
(3) No activity, except permitted research to establish the extent of potential impacts of fishing and other activities (NOAA, 2006).

PURPOSE

Goal and Objectives

In the interest of determining the future need, location and size of any "special" areas, the main objective of this study was to provide an assessment of the recreational and commercial fisheries associated with the FGBNMS. A secondary objective was to determine the baseline: Which years should be used for determining the baseline?

METHODS

Data

1. Commercial Fisheries
   A. NMFS General Canvass Landings Reporting System (GCLRS [1960-2007])
   B. Trip Interview Program (TIP [2003-2007])
   C. NMFS Historical Landings Program (HLP [1950-2006])

2. Recreational Fisheries
   A. Texas Parks and Wildlife Department (TPWD [May 2003-May 2008])
   B. NMFS Head-Boat Survey (HBOAT) (1986-2006)
   C. Galveston County *The Daily News* Reel Report (TDNRR) (August 2006-September 2008)

METHODS

COMMERCIAL DATA

1. All the commercial datasets lacked spatially-explicit fishing locations so data were compiled by individual Gulf state (Alabama, Mississippi, Louisiana, and Texas)

2. NMFS statistical shrimp grid system (proxy for area of capture). Each sampling grid is 111.1 km x 111.1 km (60 x 60 nm) and encompasses an area 12,321 km^2 (3,600 nm^2). Although the larger reefs (East and West Flower Garden Banks) of the FGBNMS are located outside any designated NMFS statistical grid, the reefs are within the vicinity of and adjacent to four NMFS statistical grids: grid 15 (eastern boundary) through grid 18 (western boundary)

METHODS

RECREATIONAL DATA

1. Data for each fishing mode (private and head-boat) were examined from five distinct areas where anglers indicated to TPWD staff that their fishing trip originated: (1) Sabine Lake (SL); (2) Galveston Bay (GB); (3) Matagorda and San Antonio Bays (MB-SAB); (4) Aransas and Corpus Christi Bays and upper Laguna Madre (AB-CCB-ULM); and (5) lower Laguna Madre (LLM)

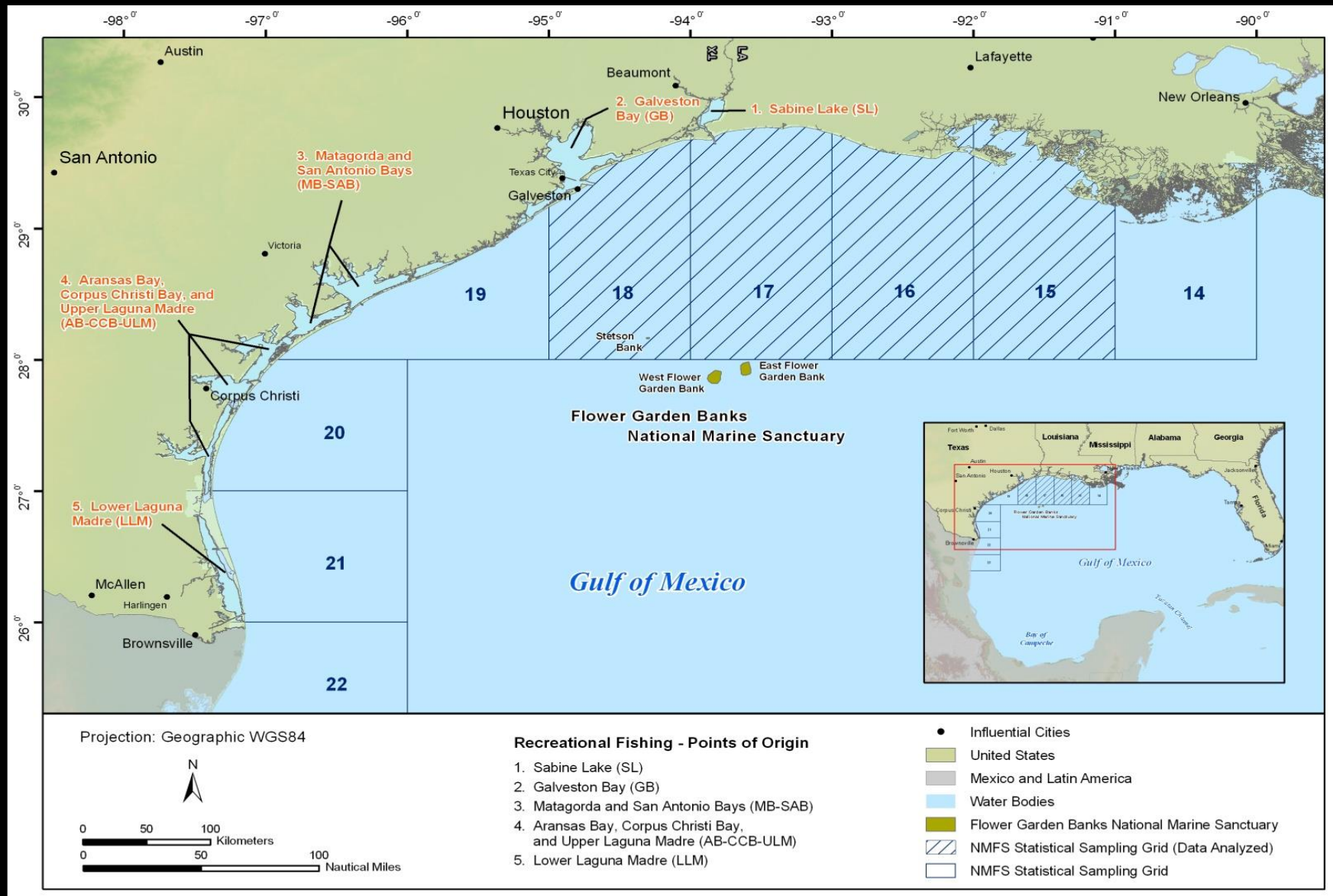
2. HBOAT data were examined from the two fishing areas neighboring the FGBNMS: Area 25 (Northeast Texas [Sabine Pass-Freeport, TX] and Area 26 (Port Aransas, Texas [Port Aransas, TX]).

METHODS

RECREATIONAL DATA

3. The TDNRR recreational fishing data consist of charter boat fishing effort, landings, species composition, and sizes reported by fishing captains to the Galveston County paper- *The Daily News*. These data were not collected through any standardized collection program, but do provide some additional information.

STUDY AREA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30°
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27°
26°
Austin
San Antonio
Beaumont
TX
LA
Houston
Lafayette
New Orleans
2. Galveston Bay (GB)
1. Sabine Lake (SL)
3. Matagorda and San Antonio Bays (MB-SAB)
Texas City
Galveston
Victoria
4. Aransas Bay, Corpus Christi Bay, and Upper Laguna Madre (AB-CCB-ULM)
19
18
17
16
15
14
Stetson Bank
West Flower Garden Bank
East Flower Garden Bank
Flower Garden Banks National Marine Sanctuary
Corpus Christi
20
5. Lower Laguna Madre (LLM)
21
McAllen
Harlingen
Brownsville
22
Gulf of Mexico
Texas
Louisiana
Mississippi
Alabama
Georgia
Florida
Gulf of Mexico
Projection: Geographic WGS84
N
0 50 100 Kilometers
0 50 100 Nautical Miles
Recreational Fishing - Points of Origin
1. Sabine Lake (SL)
2. Galveston Bay (GB)
3. Matagorda and San Antonio Bays (MB-SAB)
4. Aransas Bay, Corpus Christi Bay, and Upper Laguna Madre (AB-CCB-ULM)
5. Lower Laguna Madre (LLM)
Influential Cities
United States
Mexico and Latin America
Water Bodies
Flower Garden Banks National Marine Sanctuary
NMFS Statistical Sampling Grid (Data Analyzed)
NMFS Statistical Sampling Grid

DATA ANALYSES

First: For each dataset (commercial and recreational fishery catch data) were summarized, graphed, and various factors (i.e., landings, fishing gear, fish groups, and species composition) were statistically evaluated using non-parametric and parametric techniques (Kruskal-Wallis, ANOVA, Student's *t*-test, and regression analysis). Data was initially evaluated for normality and log-transformed when necessary. For the recreational dataset, seasonal catch, annual fishing effort, fishing rates (CPUE) were evaluated and compared; fishing effort data for commercial fisheries were unavailable. The HBOAT dataset was used to evaluate the average weight per fish by species (1986-2006 and 2000-2006).

DATA ANALYSES

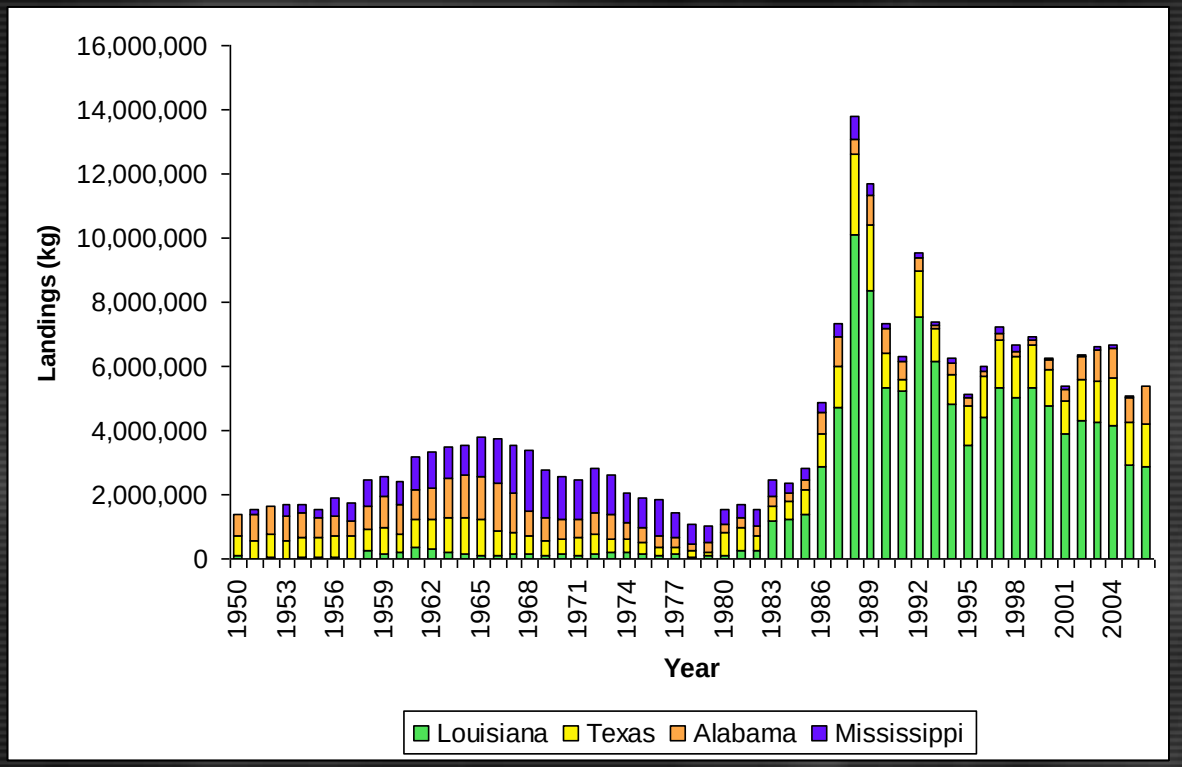
Second: Generally, for most factors, commercial data were evaluated by using two separate time-series (historical [1950-2006] and recent [1996-2006]). The recent 10-year time-series (1996-2006) was selected for further detail analysis because data preliminarily showed that total landings appeared to be stable and catch composition relatively consistent during this time period. However, in some cases, a third, more recent time-series (2003-2007) was evaluated instead of the second time-series (1996-2006). This 5-year time-series (2003-2007) was selected because preliminary examination of the data showed that this time period better reflected current fishing trends.

The overall goal of these time-series analyses was to reveal which period of time reflected the current fishing activities within the vicinity of the FGBNMS.

RESULTS

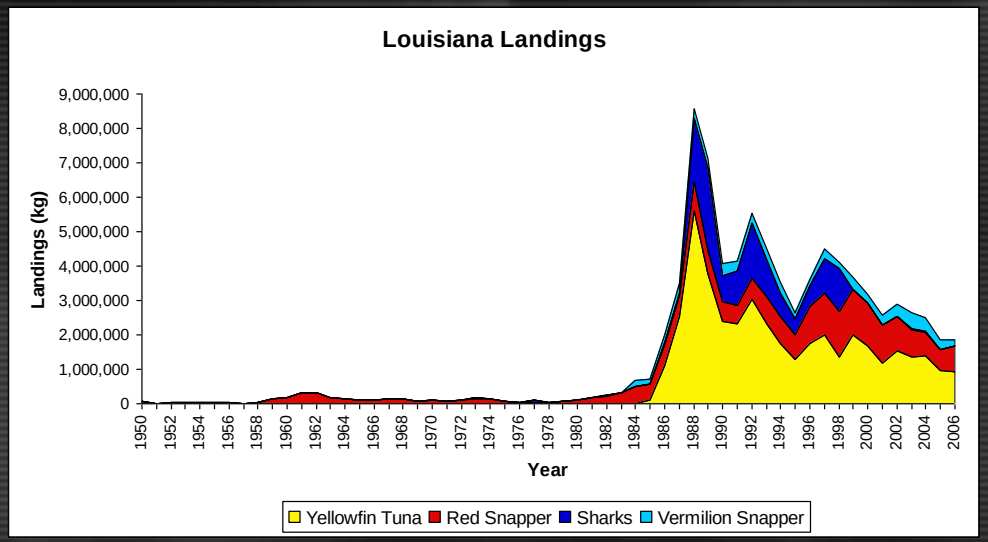
COMMERCIAL DATA

Excluding Florida (70%), most of the commercial landings (1950-2006) were off-loaded in LA (49%) and TX (21%). The overall mean was 4,066 metric tons. Significant differences in total landings were detected among states.

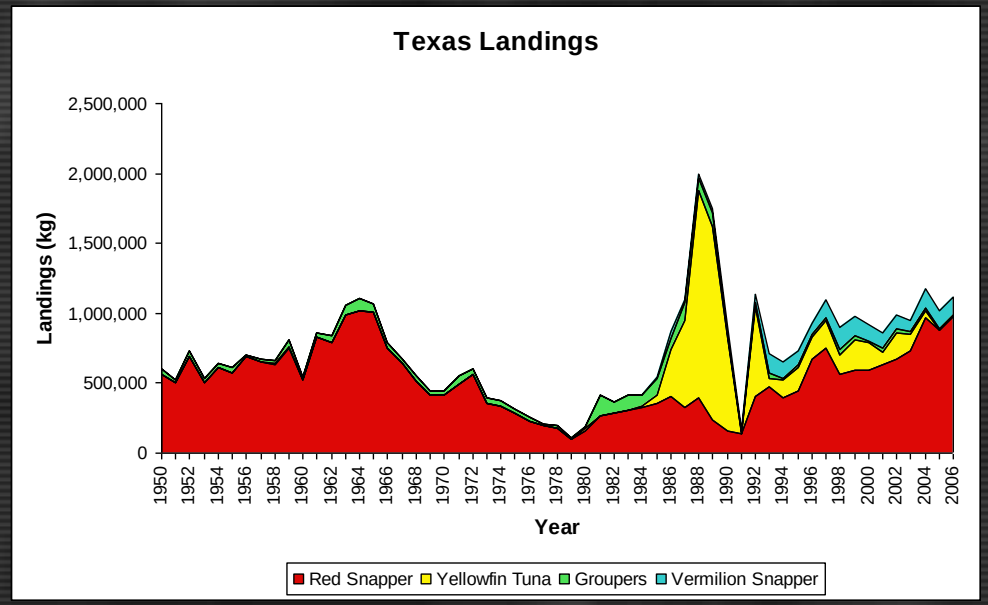


RESULTS

No significant differences were detected between historical (1950-2006) and recent landings (2003-2007) in LA.

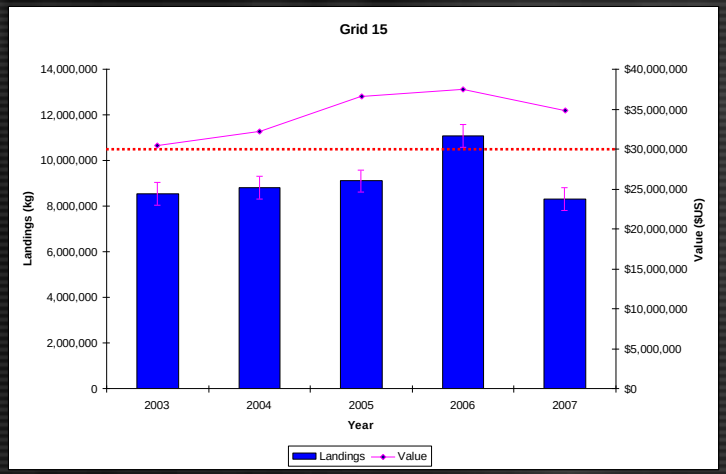


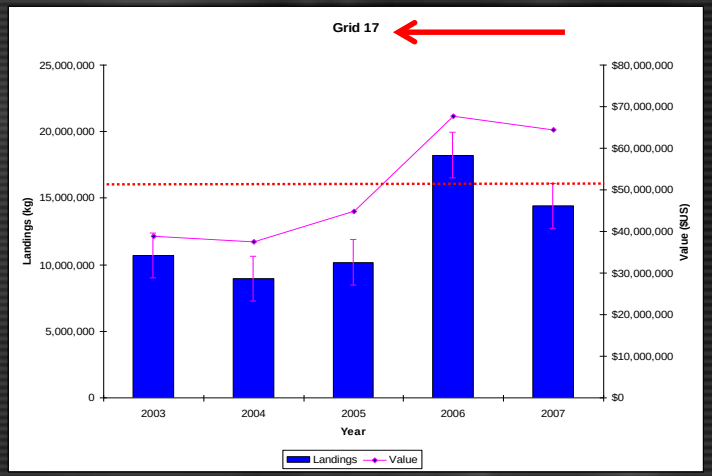
In contrast, significant differences were detected between historical (1950-2006) and recent landings (2003-2007) in TX.

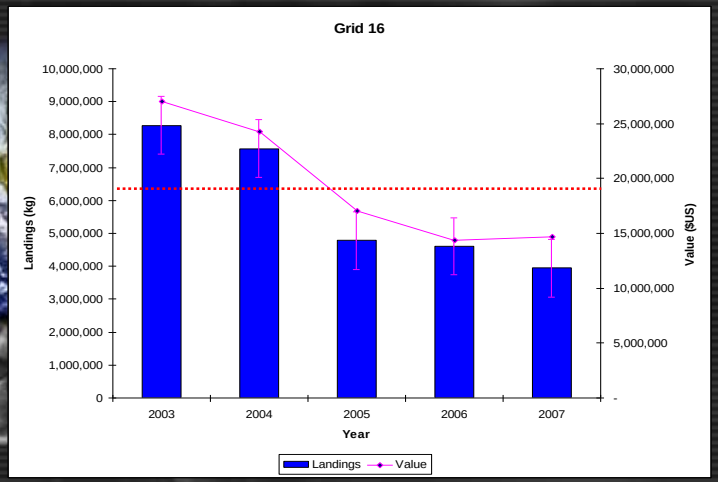


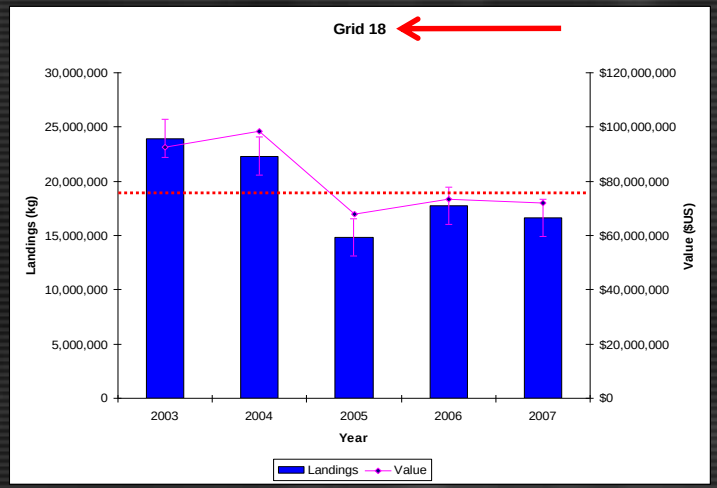
RESULTS

Cumulative landings (top 10 species): Least (21%) reported landings were from NMFS grid 18 and greatest (30%) from grid 17. No statistical differences were detected among grids and time.



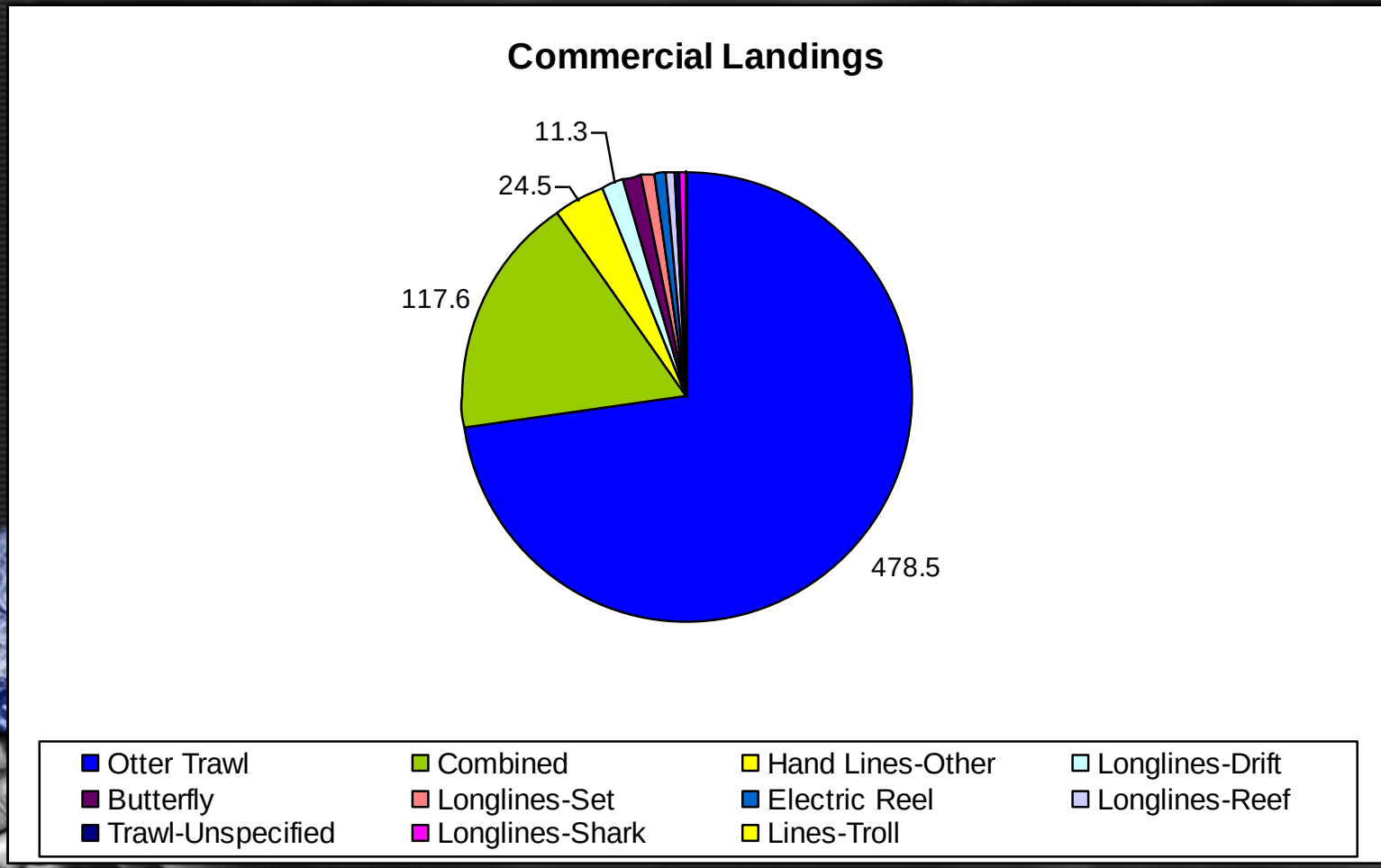






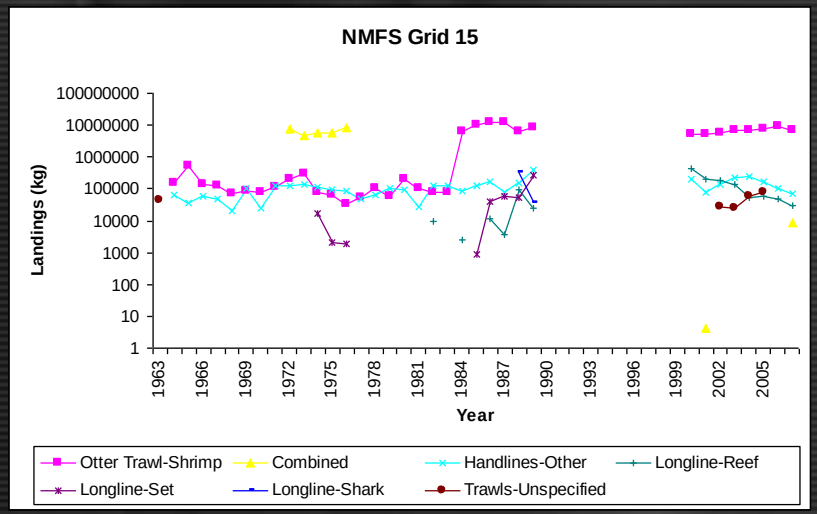
RESULTS

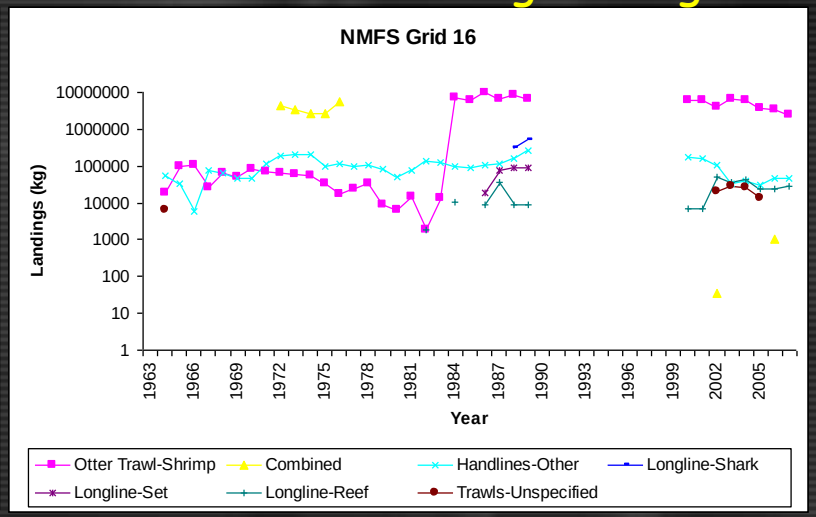
GEAR: Gulf of Mexico commercial fisheries were primarily landed by 11 fishing gears. Otter trawl (78%) and Combined (18%).

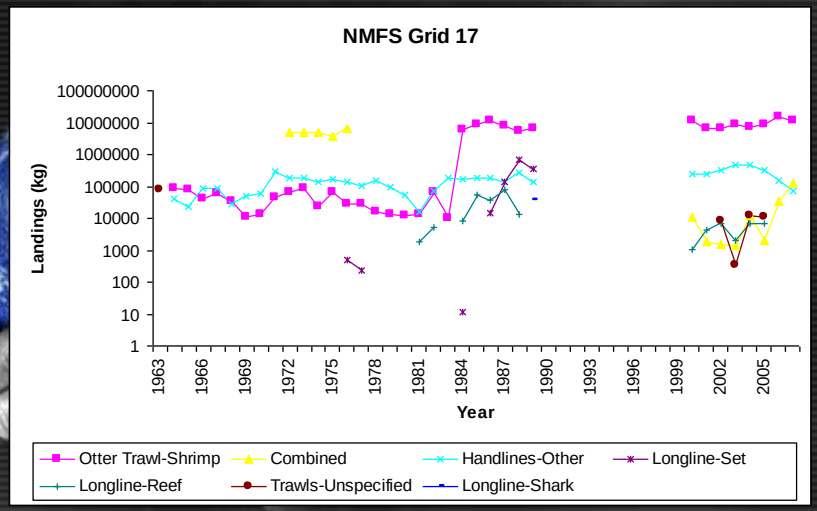


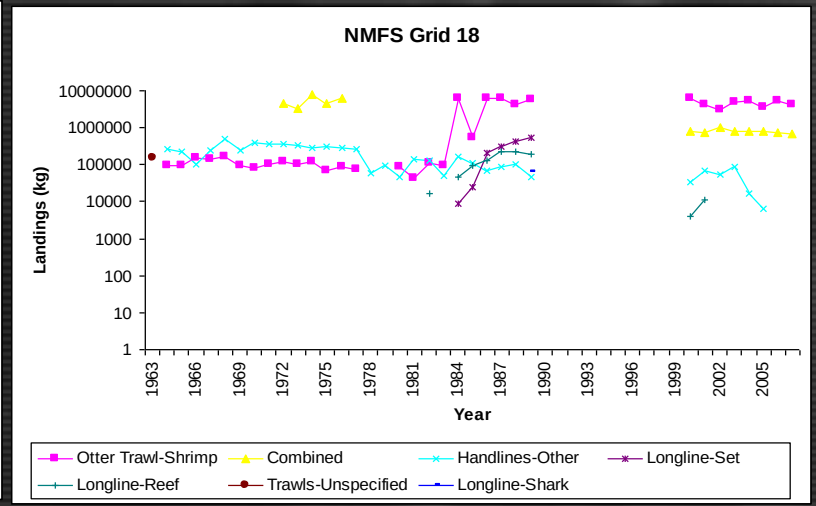
RESULTS

Cumulative landings (top 7 gears): Overall statistical differences were detected among gears, but not by grid or the interaction between grid and gear. However, there were specific significant differences within grids. Statistical differences were detected between 1963-2007 and 2003-2007 and among some gears.









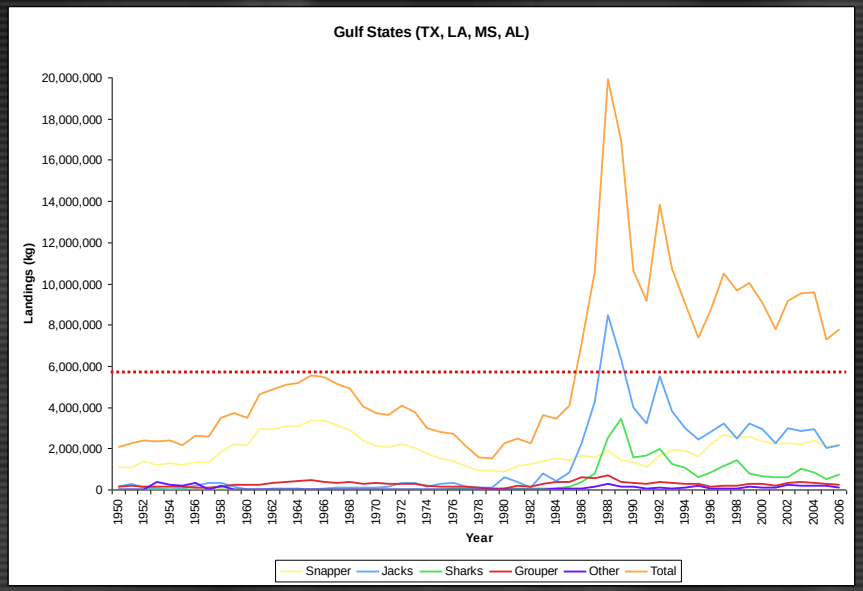
RESULTS

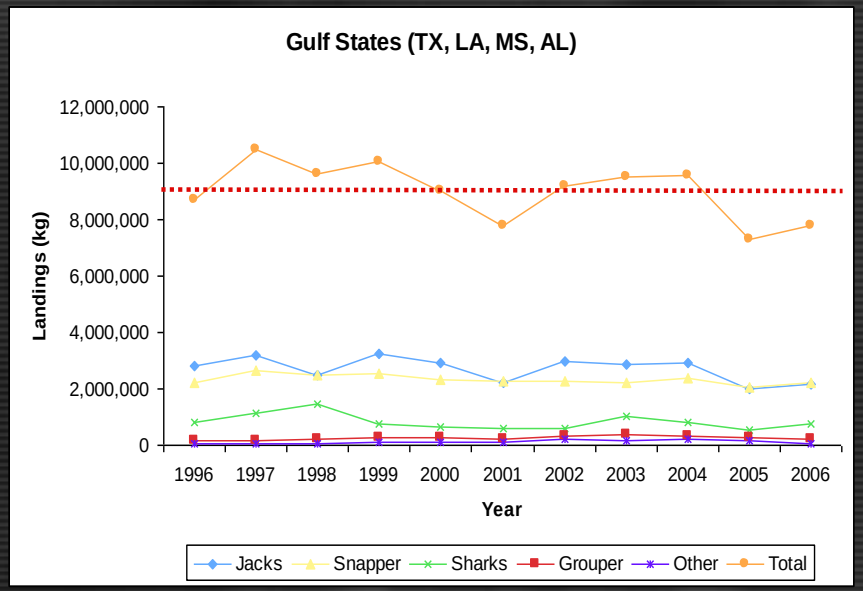
Catch composition: Commercial fisheries (1950-2006) primarily landed four major fish groups: snapper (19%), jacks (jacks, tuna, and mackerel [14%], shark (4%), and grouper (3%). Significant differences were detected among fish groups, but no differences were detected between time-series. ([1950-2006]; [2003-2006]),

Snapper	Jacks	Tuna/Mackerel	Shark	Grouper	Other
Black Snapper	Greater Amberjack	Atlantic Bonito	Blacktip Shark	Gag	Barracuda
Blackfin Snapper	Lesser Amberjack	King Mackerel	Bull Shark	Graysby	Bigeye
Cubera Snapper	Almaco Jack	Cero	Dusky Shark	Black Grouper	Creole-Fish
Dog Snapper	Bar Jack	Spanish Mackerel	Hammerhead Shark	Goliath Grouper	Jolthead Porgy
Gray Snapper	Black Jack	Albacore Tuna	Longfin Mako Shark	Marbled Grouper	Red Porgy
Lane Snapper	Jack Crevalle	Bigeye Tuna	Sandbar Shark	Misty Grouper	Scups or Porgies
Mutton Snapper	Horse-eye Jack	Blackfin Tuna	Shortfin Mako Shark	Snowy Grouper	Squirrelfish
Queen Snapper	Cobia	Bluefin Tuna	Spinner Shark	Grouper	Tilefish
Red Snapper	Blue Runner	Little Tunny	Silky Shark	Yellowedge Grouper	Blueline
Silk Snapper		Skipjack Tuna	Thresher Shark	Yellowfin Grouper	Goldface Tilefish
Vermilion Snapper		Yellowfin Tuna	Tiger Shark	Yellowmouth Grouper	Sand Tilefish
		Wahoo		Red Hind	Gray Triggerfish
		Cero		Speckled Hind	Ocean Triggerfish
				Scamp	

RESULTS

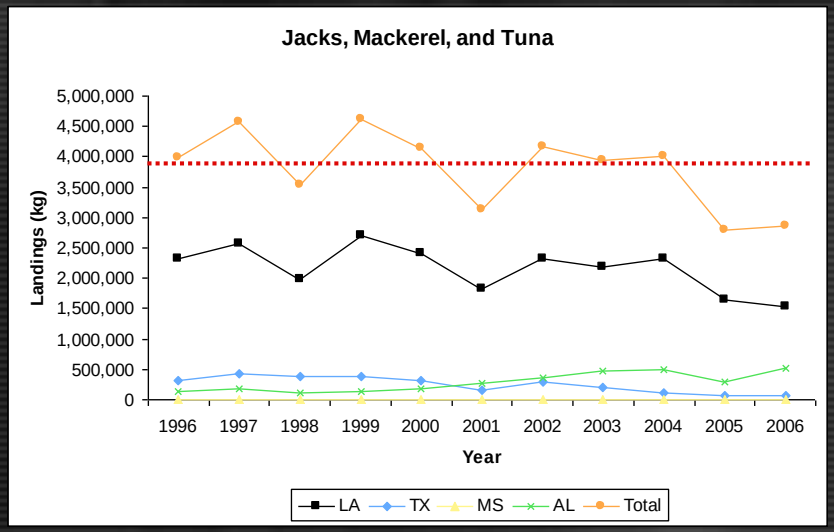
Cumulative landings (top 4 fish groups): Overall, statistical differences were detected among fish groups, but no significant differences were detected between the two time-series.

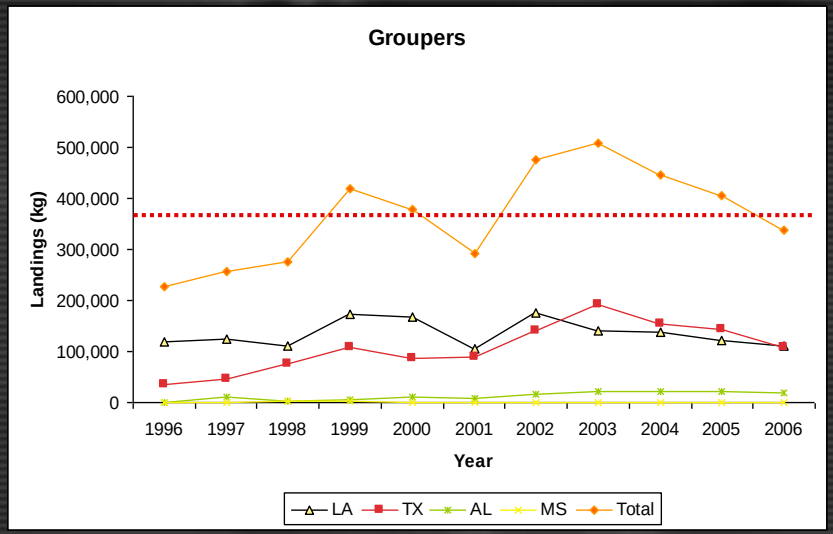


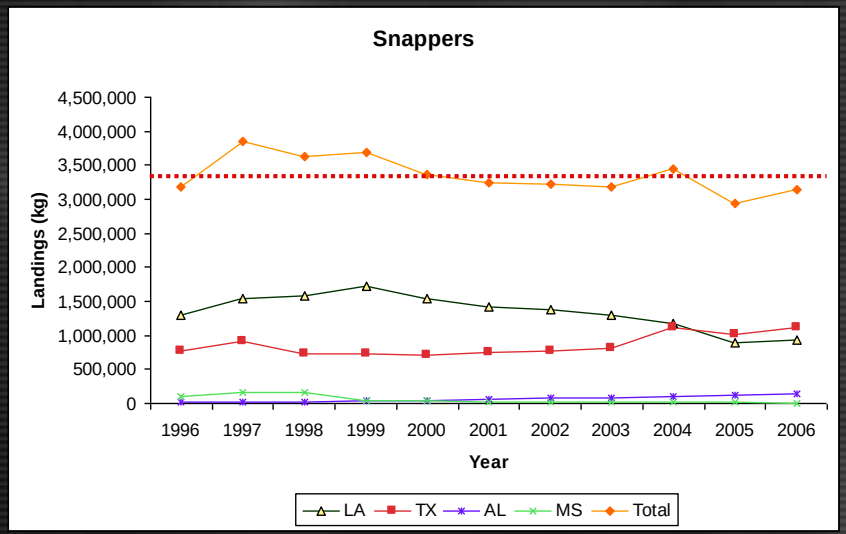


RESULTS

Cumulative landings (top 4 fish groups): Statistical differences in landings were detected among fish groups, according to Gulf State.

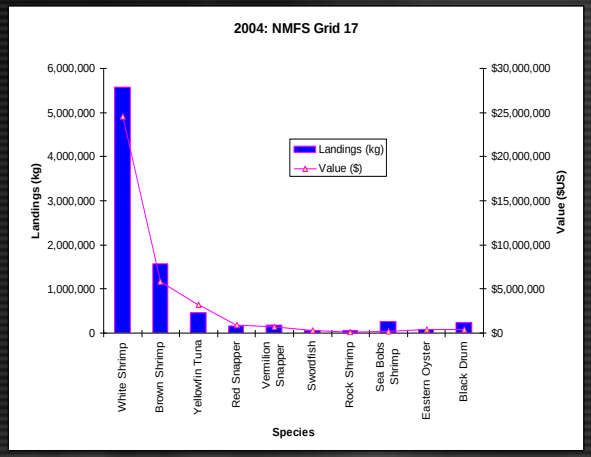


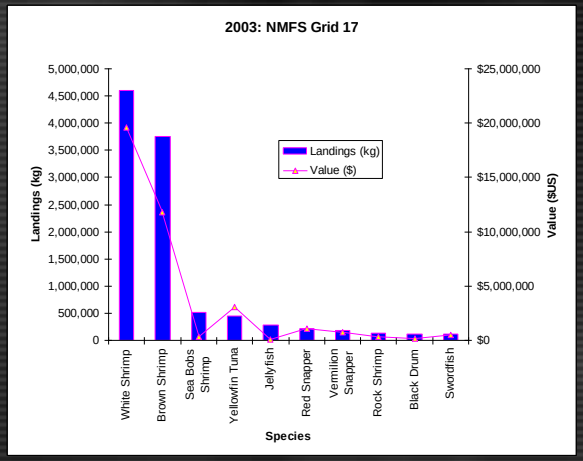


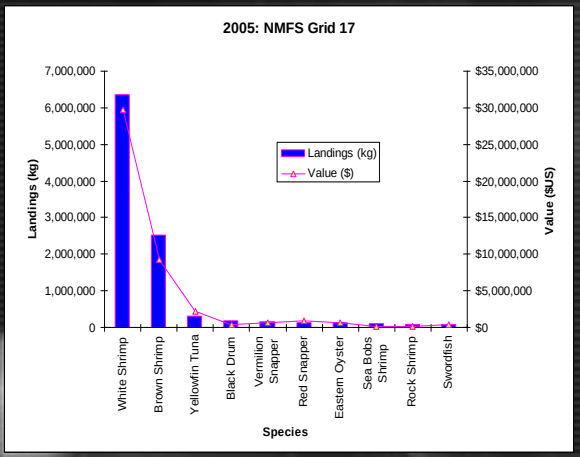


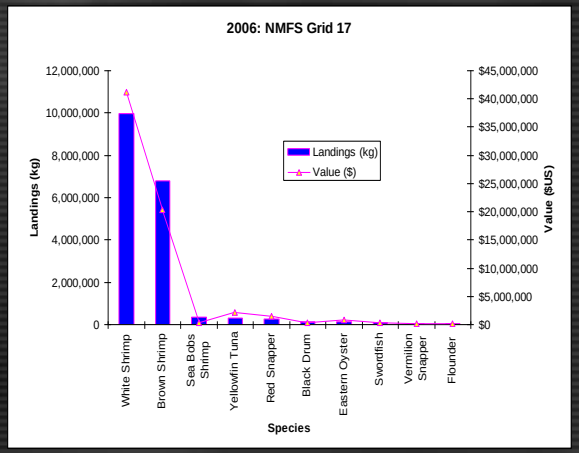
RESULTS

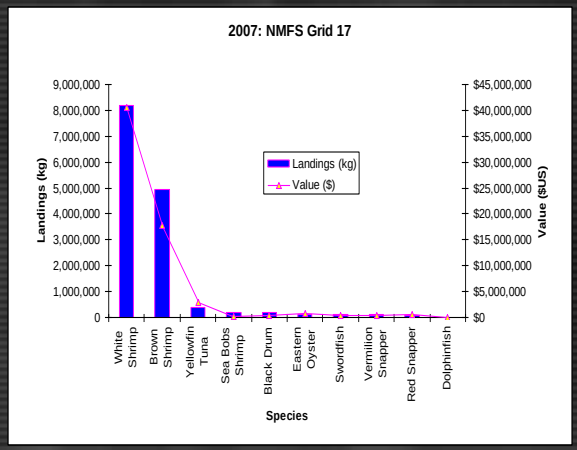
NMFS Statistical Grids: 17 and 18 (closest to the FGBNMS): Statistical differences were detected by grid and fish groups. Also, statistical differences were detected among fish group and years. Landings in NMFS grid 17 were dominated by white and brown shrimp.





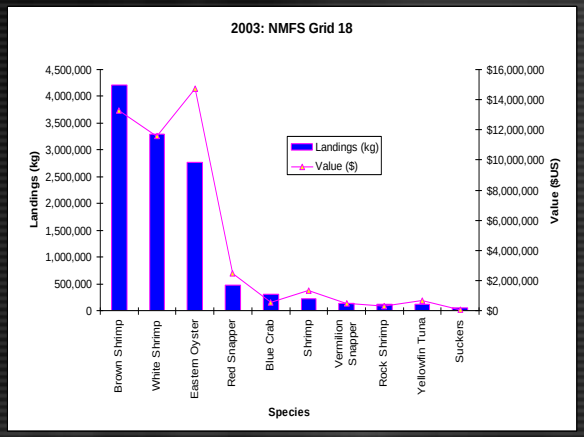


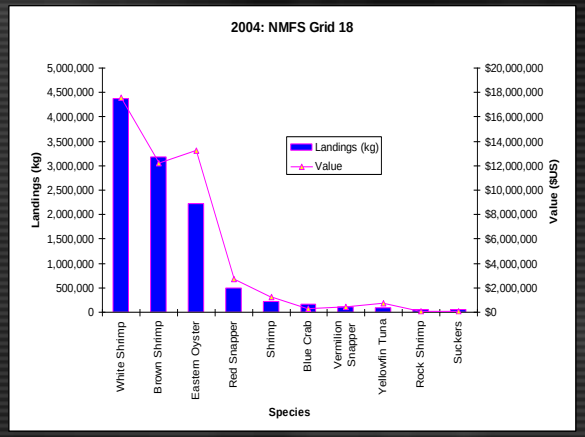


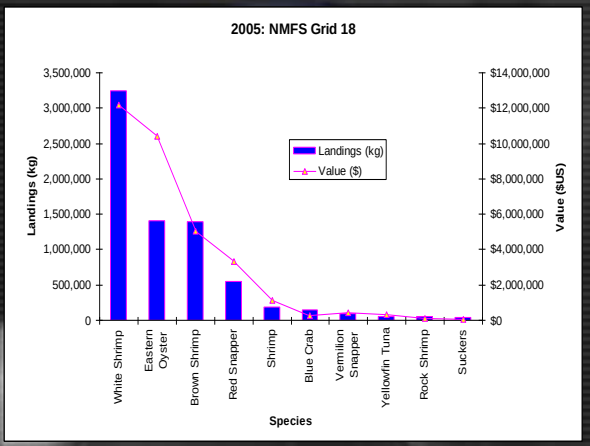


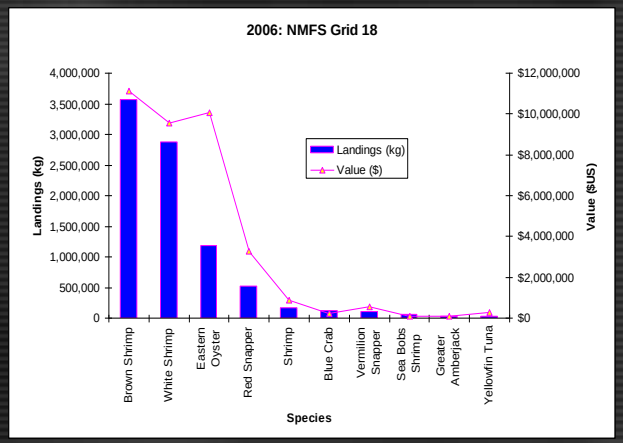
RESULTS

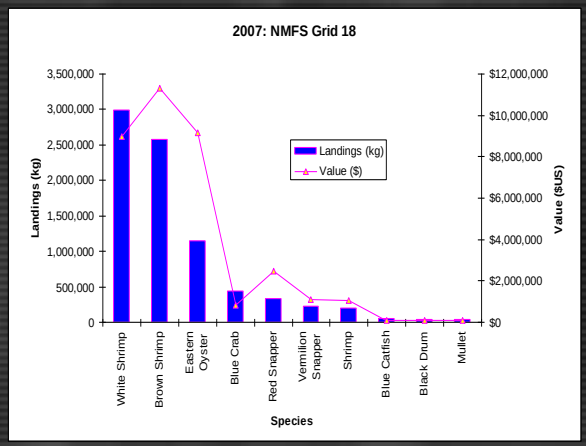
NMFS Statistical Grid: 18: Dominated by white and brown shrimp.







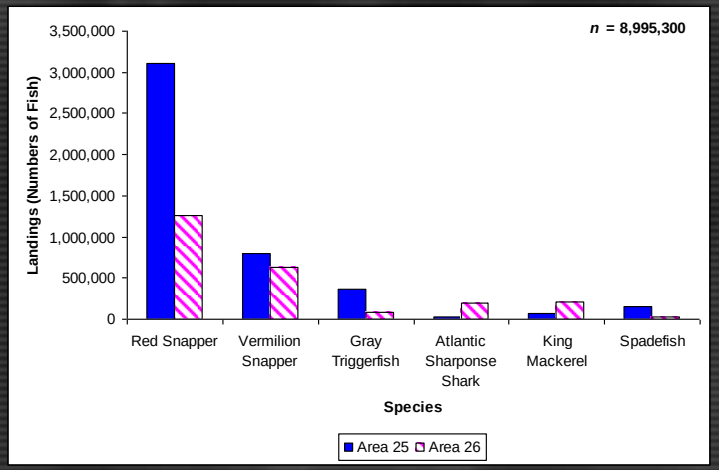




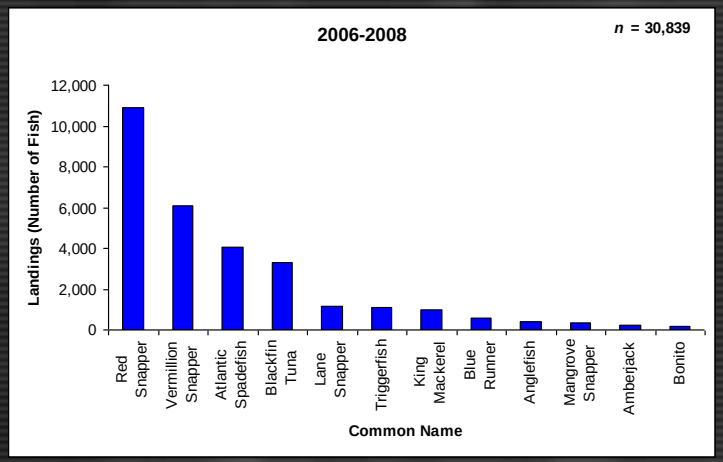
RESULTS

RECREATONAL DATA (Headboat and Galveston Charter Vessel):

- 15 (13%) headboats (1986-2006) reported landings in Areas 25 and 26. Red snapper (49%) vermilion snapper (16%), and gray triggerfish (5%) were the primary species taken. Significant differences were detected among species.



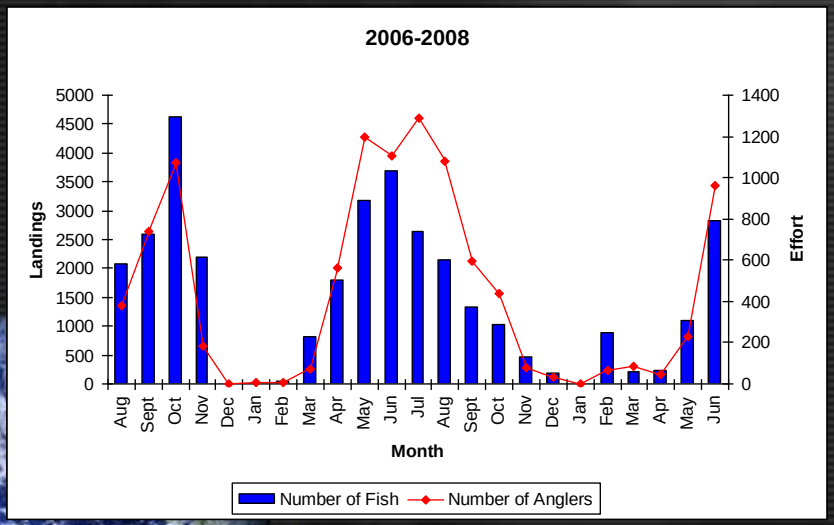
- Similar findings for Charter Vessels. Anglers caught red snapper and vermilion snapper (55%), but also Atlantic spadefish (13%).

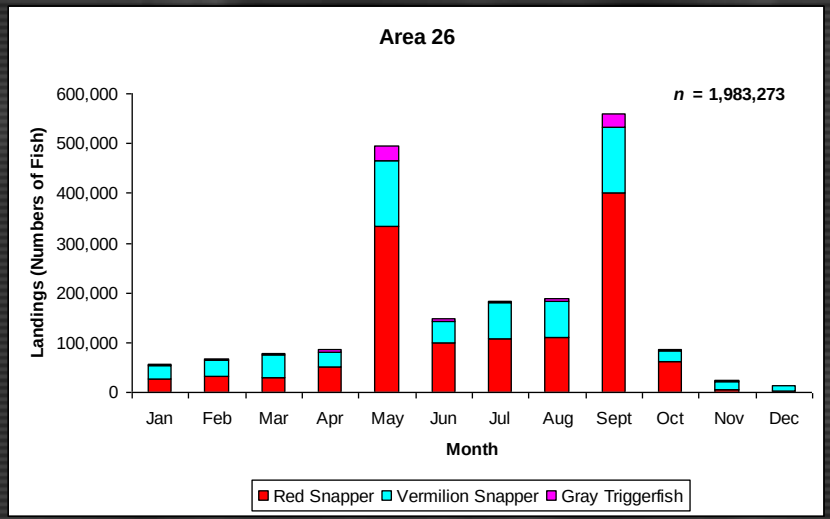


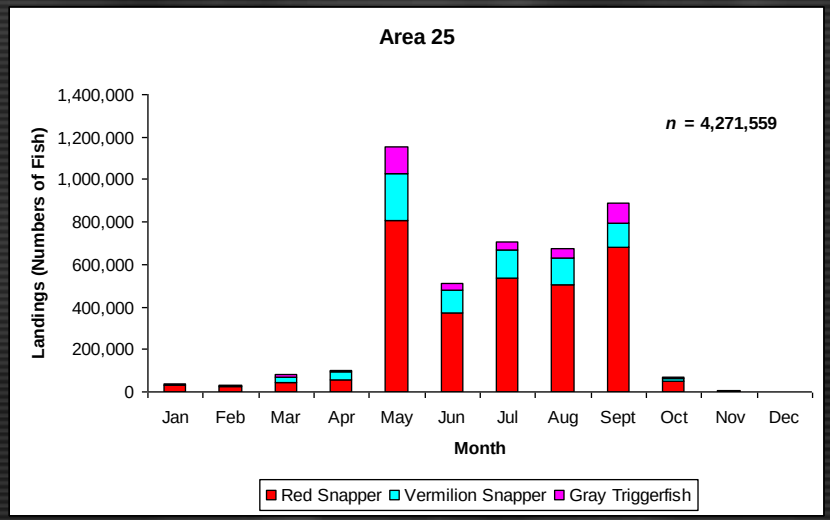
RESULTS

RECREATONAL DATA

Significant differences were detected in monthly cumulative landings and by individual species .



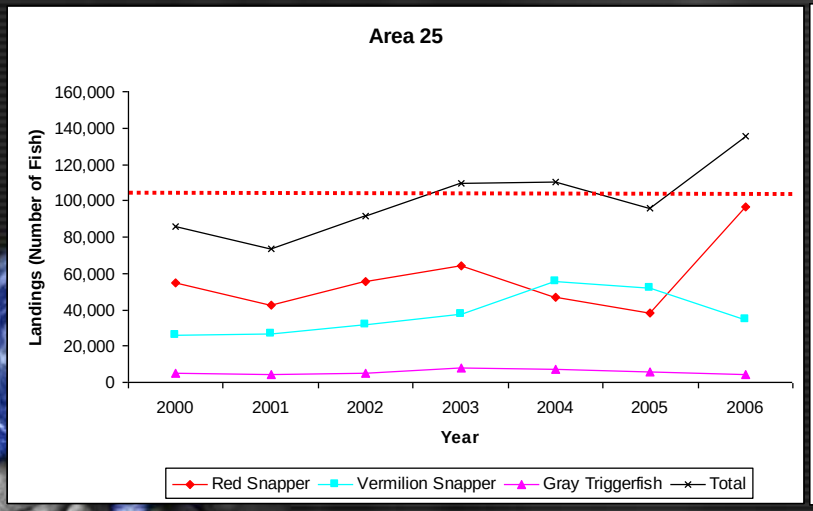


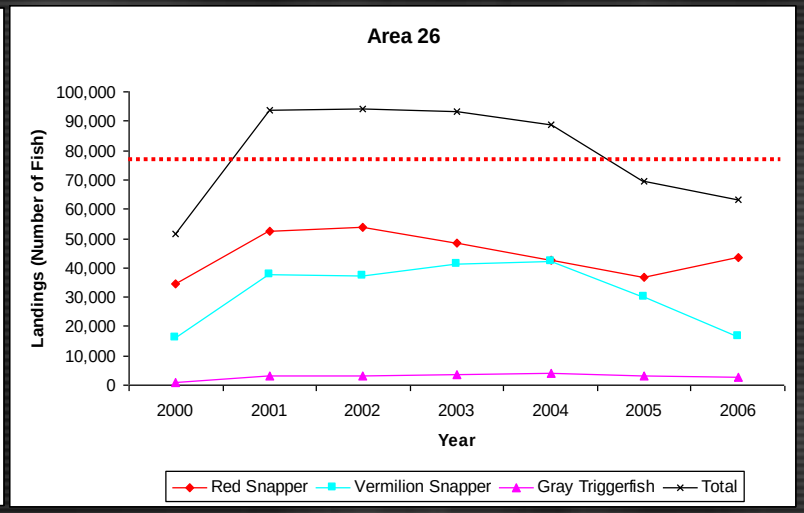


RESULTS

RECREATONAL DATA (Headboat)

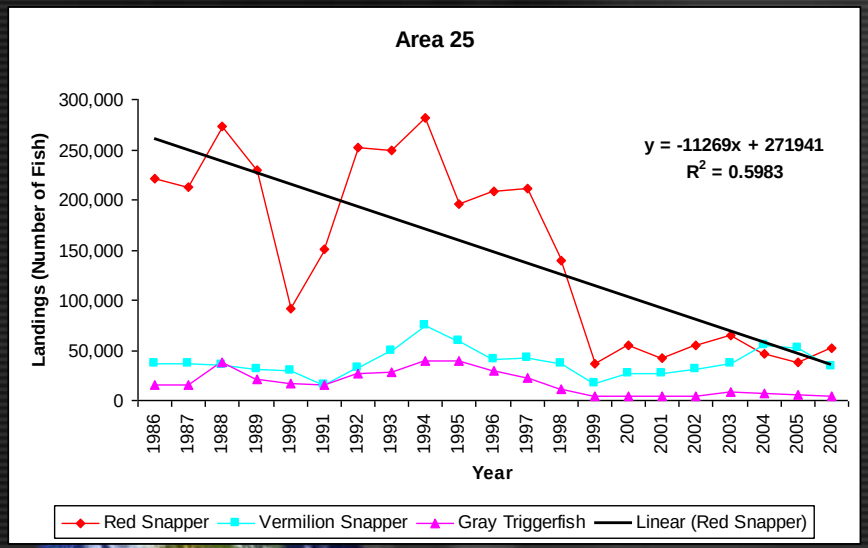
No significant differences were detected in cumulative landings by year, but differences were detected among species.

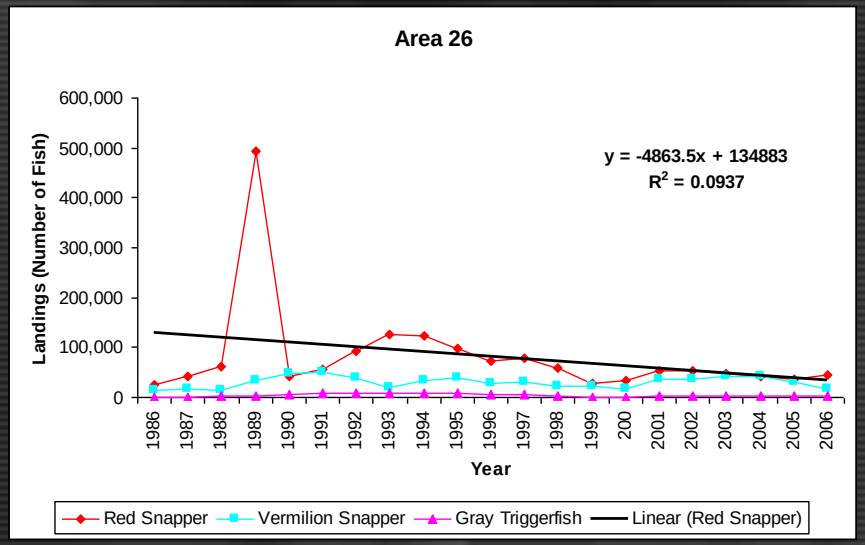




RESULTS

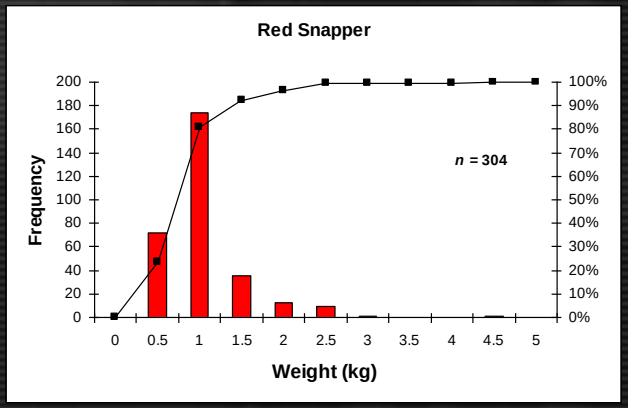
RECREATONAL DATA (Headboat)

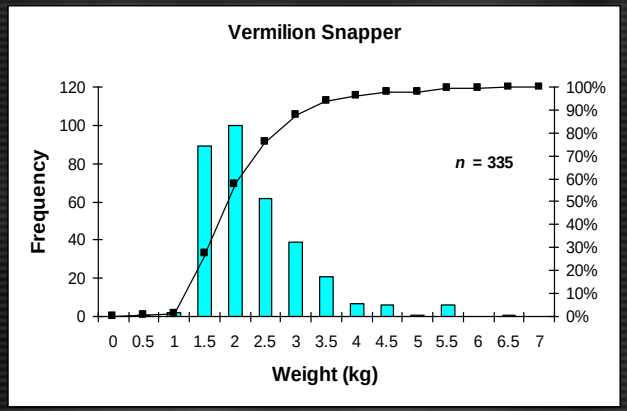


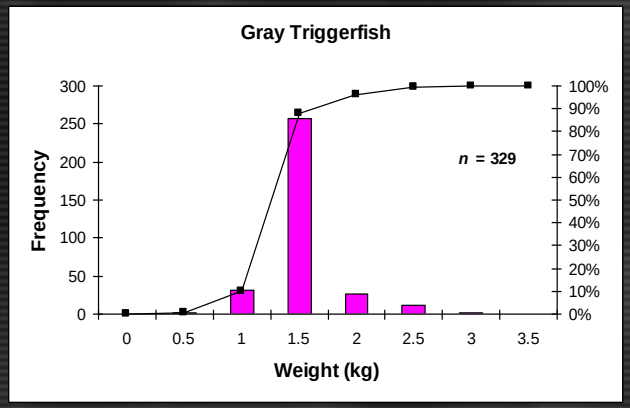


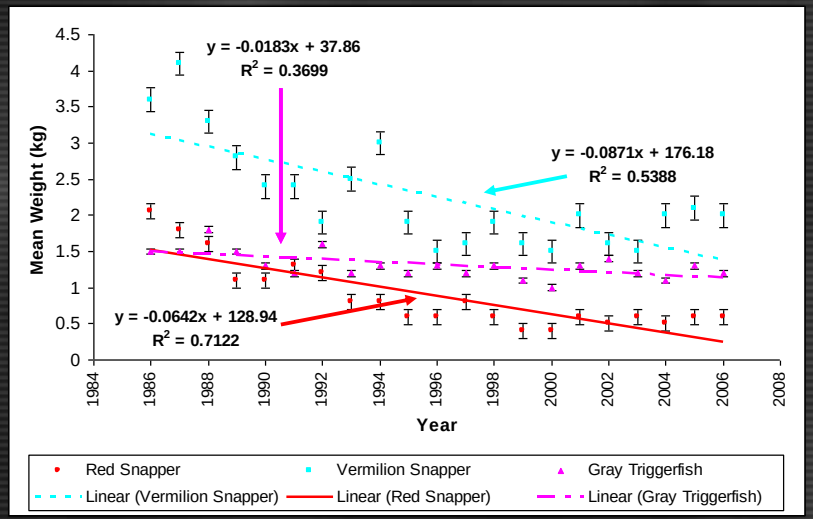
RESULTS

RECREATONAL DATA (Headboat)





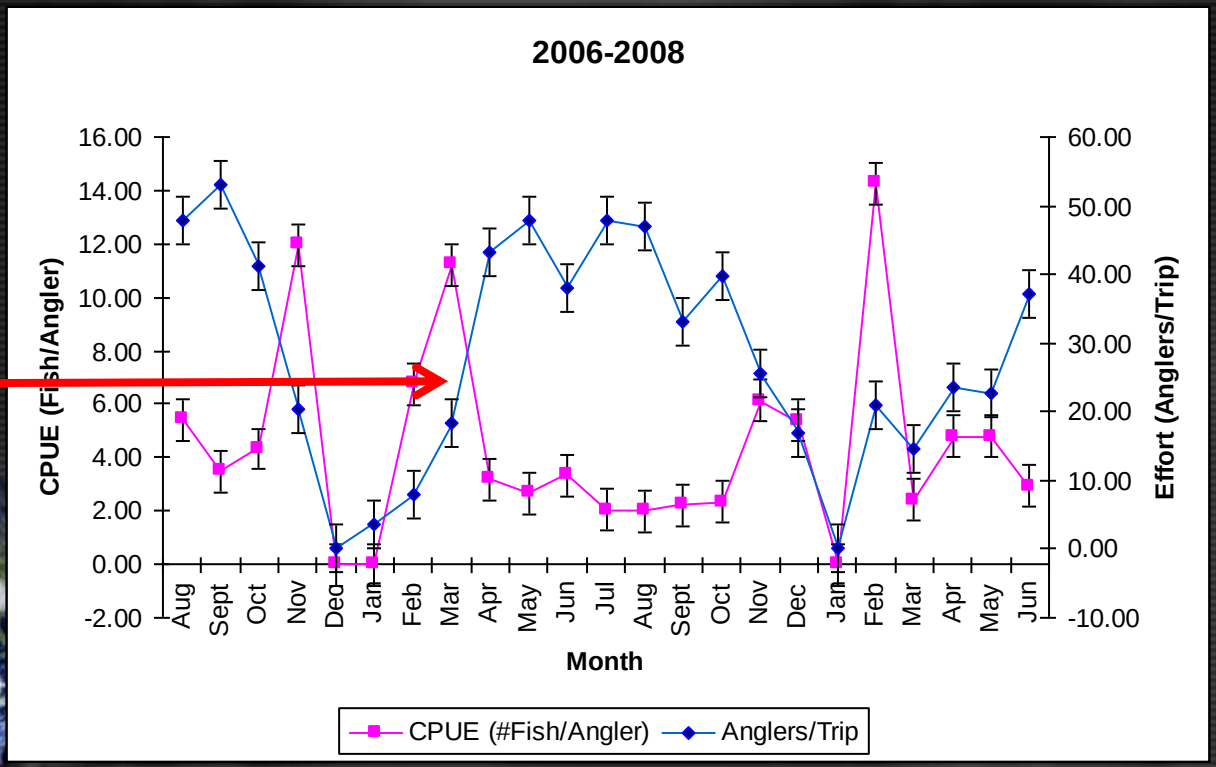




RESULTS

RECREATONAL DATA (Galveston Charter Vessels)

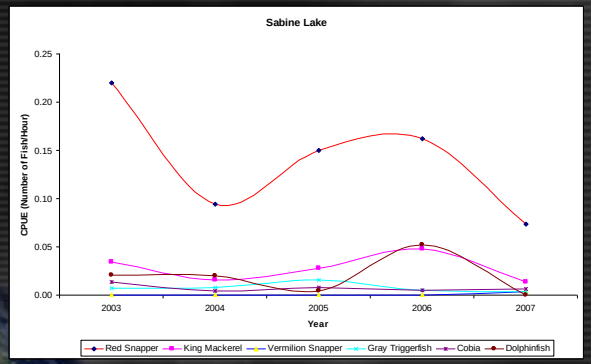
Inverse relationship between CPUE and Fishing Effort; CPUE ranged from 0 to 14.27 fish/angler and the mean CPUE was 4.42 fish per angler.

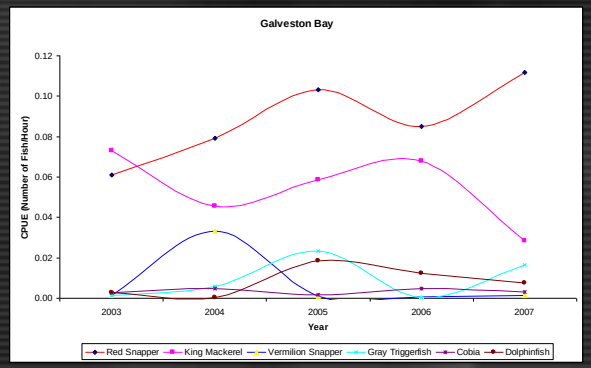


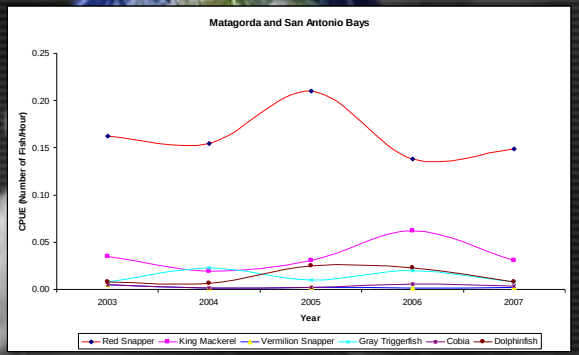
RESULTS

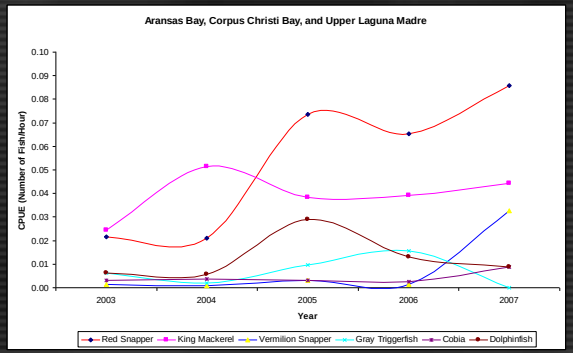
RECREATONAL DATA (TPWD-Private Vessel):

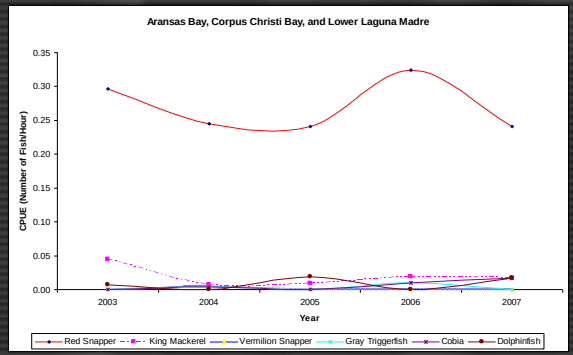
The primary species taken were red snapper, king mackerel, vermilion snapper, gray triggerfish, cobia, and dolphinfish. Cobia had the lowest catch rates and red snapper the highest (0.05-0.27 fish/hr). Lowest fishing effort (9,320 hrs) were from fishing trips originating from Lower Laguna Madre and highest (99,580 hrs) from Galveston Bay. Significant differences were detected among species and by area.







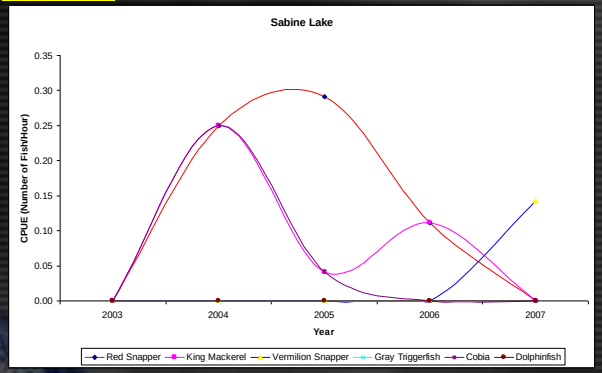


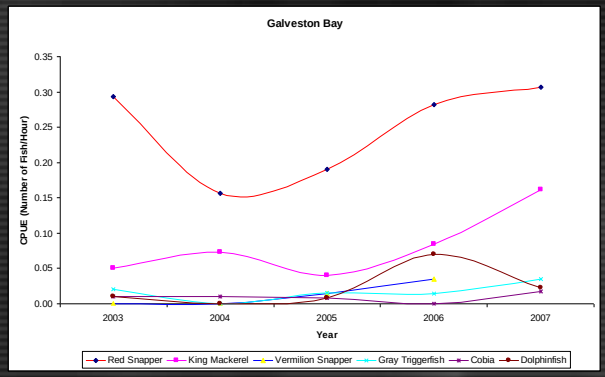


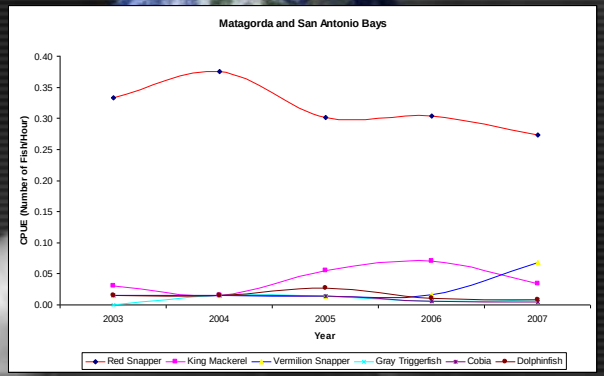
RESULTS

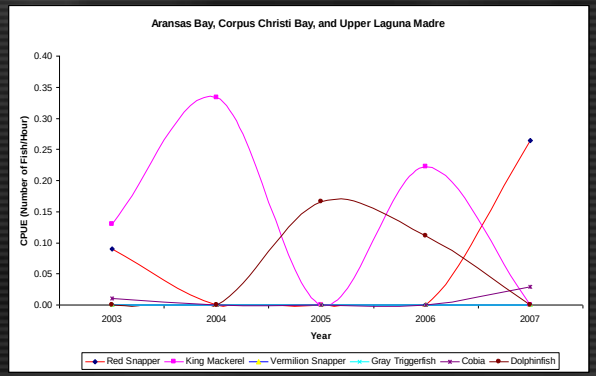
RECREATONAL DATA (TPWD-Party Boat):

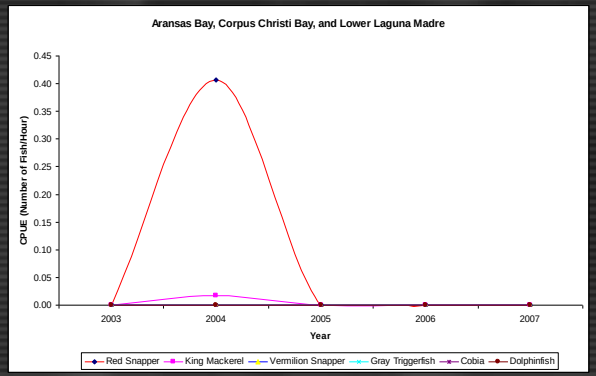
The primary species taken were red snapper, king mackerel, vermilion snapper, gray triggerfish, cobia, and dolphinfish. Cobia and Gray triggerfish had the lowest catch rates and red snapper the highest (0.05-0.27 fish/hr). Lowest fishing effort (1,180 hrs) were from fishing trips originating from Lower Laguna Madre and highest (11,300 hrs) from Galveston Bay. Significant differences were detected among species and in some areas.











CONCLUSIONS

- Specific fishing location data limited the outcomes of this study; however, general trends in landings, gears, and fishing effort for the areas nearest to the FGBNMS was evident;

- Given the data limitations, these results should be applied with caution;

- Total landings within NMFS grids (17 and 18) appear stable, but landings have shifted from one gear to another, which is a common practice for the industry;

CONCLUSIONS

- In both NMFS grids (17 and 18), landings with handline gear have decreased, which is probably a key commercial fishing gear employed near the sanctuary;

- Displacement of commercial fishing effort: It is likely that some gears (e.g., handline) will be used in other comparable locations (reefs and banks)- *The issue is whether commercial fisheries can locate other fishing grounds*.

- According to the data, the key species landed (yellowfin tuna) in NMFS grid 17 would unlikely be impacted, but in NMFS grid 18, red and vermilion snapper landings might be impacted by any future management decisions for the FGBNMS.

SUMMARY

•Based on the available commercial and recreational data, the five-year period (2003-2007) is sufficient for any future decision-making process in regards to baseline assessment

•Recreational data was difficult to assess, in terms of potential future impacts, but it should be noted that the FGBNMS are only accessible to larger vessels during suitable weather. It is highly probable that this recreational fishing vessel population is small (headboats, charter, and private vessels). Based on this notion, decision makers could either exempt certain types of fishing activities (surface trolling; catch and release) or implement a daily fishing permit. It depends on the goal. Maybe the permit would required fishermen to report their activity, which could act as form of enforcement.

FUTURE PERSPECTIVE

- Some data (MRFSS and PLL Logbook) were not included in these analyses; however, it is difficult to guess whether these data would benefit the decision-making process. Because of the location (FGBNMS), it is recommended that the PLL Logbook data (fishing location) be plotted;

- Fishing effort distribution might be able to be plotted, which would help with further defining potential impacts.

- Based on these data, some fisheries are likely to be impacted by any changes to the FGBNMS ; however, these are expected to be short-term assuming one of the decisions is to implement a sunset clause that requires the area to re-open for certain fishing activities once X amount of time passes.

- Regardless of the decisions, it is recommended that law enforcement issues be discussed throughout the MPR process.

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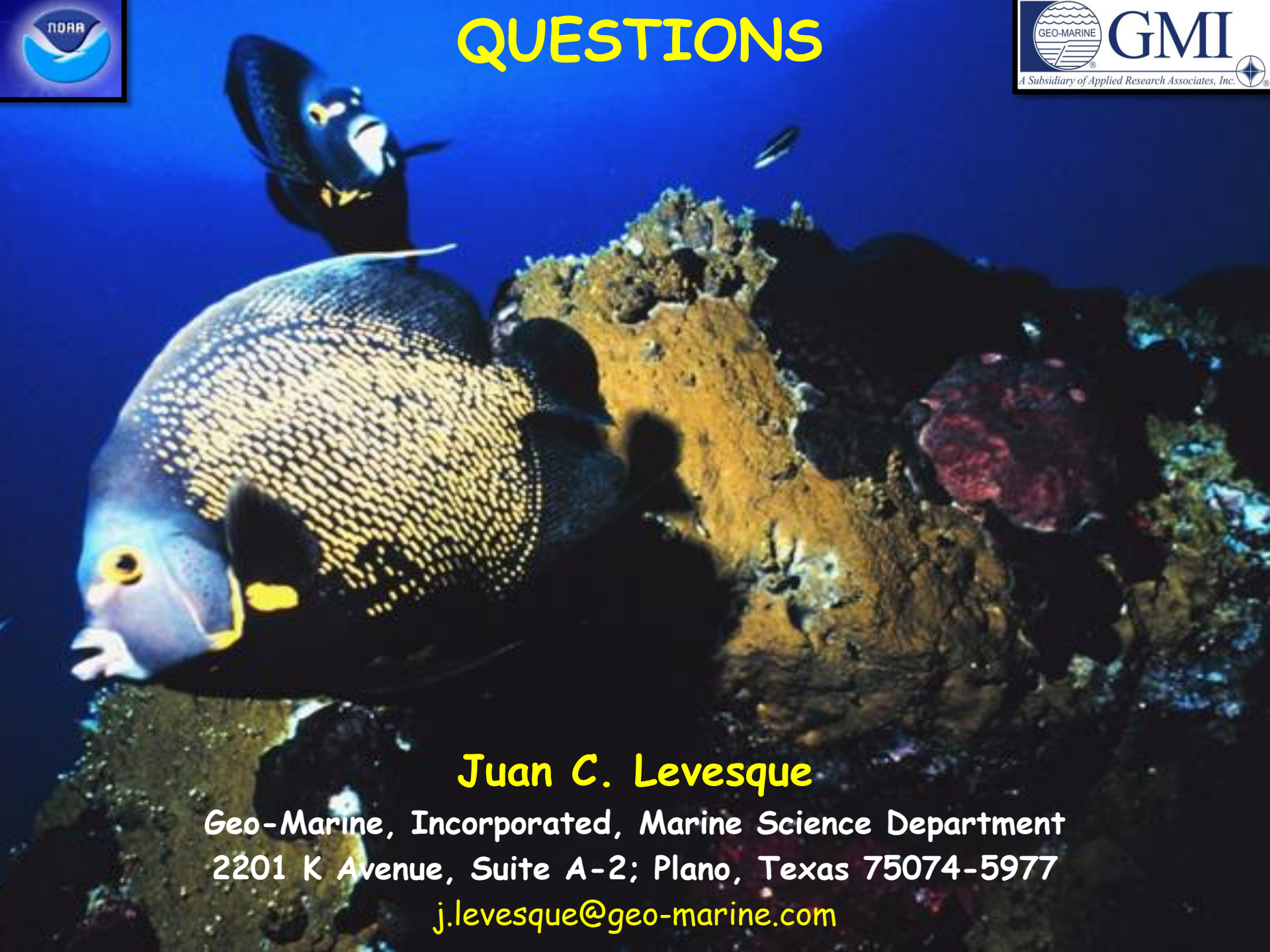
•Geo-Marine Staff: T. Conner, K. Deslarzes, C. Gomez J. Laliberté, and J. See.

QUESTIONS



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