

Tortugas 2000 Ecological Characterization Forum
April 16 & 17, 1998
Holiday Inn Beachside, Key West

This document is a Summary of the information presented at the Ecological Characterization Forum held on April 16-17th, 1998 as part of the Florida Keys National Marine Sanctuary's Tortugas 2000 process. This Summary is meant to provide an overview of the information presented and the questions and answers discussed at the forum only; this Summary does not include the details of every comment during the discussions. Videotapes of this Forum are available for viewing by contacting the FKNMS office in Marathon, Florida at (305) 743-2437.

Billy Causey, Florida Keys National Marine Sanctuary: Introduction and Welcome

- We are here to work on a process of establishing an Ecological Reserve in the Tortugas area.
- A system of marine zoning was established in the Florida Keys National Marine Sanctuary's Draft Management Plan. Following a public input and review process, a system using five zone types was developed. One ecological reserve, located at the Western Sambos, was included in the Final Management Plan.
- A proposed Ecological Reserve in the western portion of the Sanctuary was removed from due to Public Comments indicating that many felt the proposed Ecological Reserve was located in the wrong place.
- The Final Management Plan includes a commitment to establish a more appropriately located Ecological Reserve in the Tortugas area within two years.
- The Tortugas 2000 Working Group consists of agency representatives with jurisdiction in the Tortugas area and eight Sanctuary Advisory Council (SAC) representatives. The SAC subcommittee will serve as the conduit to public in this process.
- The Working Group will help to develop recommendations for this planned Ecological Reserve.
- Information on the critical aspects of the Tortugas area is being sought from a number of scientists who have conducted research in the area.
- Sanctuary staff will also be investigating the importance of the Tortugas area to area local and regional businesses.
- The proposed boundaries and percent of the total Sanctuary area to be included in the planned Ecological Reserve have not yet been addressed by the Working Group. No lines will be put on the maps at this time.

Michael Eng, Facilitator, NOAA Coastal Services Center

- The purpose of the Tortugas 2000 public forums is for the Working Group to learn more information about the area so that they may make more informed recommendations.
- The Working Group will be considering several perspectives on the Tortugas area based on experience and studies. This evening should be used to listen to information. Our judgment should be suspended and instead questions should be asked of the presenters.
- Two thirds of the time for questions of the presenters will be devoted to Working Group members with the remaining one third devoted to questions from the general public in the audience.

Physical Characterization Panel

Tom Lee, University of Miami

- The larval import map developed by Dr. Callum Roberts could be expanded.
- Tortugas Gyre and Loop Current were discussed.
- There are many opportunities for interaction between coastal waters and possibly Mississippi River waters.
- Sometimes the Loop Current disappears or separates off as a ring-shaped circulation formation.
- Such a ring circulation pattern can function as a retaining mechanism for larvae.
- Florida Bay Circulation and Exchange study:
 - There may be a connection between water from the Tortugas area and freshwater runoff from the Everglades.

Joan Browder, National Marine Fisheries Service

- There are 60,000 to 100,000 sooty terns and 3,000 noddy terns nesting on Bush Key whose life expectancy can be as long as 34 years.
- Data from the 1960s and 1970s show that young bluefin tuna and their relatives were important in the birds' diet.
- Recent data from the past 6 years can provide some information about offshore fish communities.
- Comparing the data from the 60s and 70s with current data shows that the juvenile tuna populations have declined and that there are major differences in population numbers between years.

Ron Jones, Florida International University

- Water quality in the Tortugas is very good.
- The Tortugas is the only place that can be used as a reference area for evaluating water quality and human impacts in other areas. Since it is relatively immune from nearshore human populations numbers, the area is ideal for measuring the influence of bird populations on factors such as nutrient levels and comparing these impacts with those of human populations.
- Chlorophyll a and nitrate levels in the Tortugas are low and stable.
- Silicate can be used as an identifier of freshwater; Silicate activity in this area may be attributable to natural events.
- The Tortugas information is important in understanding water quality in the rest of the Florida Keys.

Dave Mallinson, University of South Florida

- 46-foot Montastrea annularis (boulder star coral) banks may be 8,000-9,000 years old.
- These are established on top of the Keys Limestone which formed 80,000-125,000 years ago.
- Why did the Tortugas reefs keep up with sea level rise while the reefs on the Tortugas Banks did not?

QUESTION AND ANSWER SESSION

Q: In what time frame do gyres exist? Are there similar gyres up the coast?

A: Gyres can exist for 1-1.75 months. Eddies form all along the boundary of the Gulf Stream and subsequently break off forming gyres. The Tortugas Gyre is much stronger and more persistent than many. Eddies such as these can serve to entrain planktonic larvae.

Q: Could currents serve as a criteria for ecological reserve selection?

A: Yes

Q: What and where are the smaller currents around the Tortugas?

A: Loggerhead and Garden Key have strong tidal currents and wind currents which are more important.

Q: What are the forcing functions for the Loop Current and can it effect the Tortugas Gyre?

A: It takes 8.5 months for the Loop Current to form, pinch off, and go back to the Yucatan, called "ring separation". The Loop Current eddies either bump, pass, or merge with the Tortugas Gyre.

Q: How would having an ecological reserve be an advantage to scientists working with seabird bird populations? On what scale would a meaningful ecological reserve have to be?

A: An ecological reserve would be more advantageous to a marine biologist as an area where species have the opportunity to grow, develop, and so forth. The gyre can be very large (100 miles in diameter) and act as a persistent upwelling feature for marine food chain. This has been seen in fast developing eddies, too.

Q: Are there any water quality differences in front of Garden Key?

A: We don't see any human influences. They are overshadowed by the bird populations on Bush Key. The impact doesn't ever extend past 1 km.

Q: Where are the terns going to feed on juvenile bluefin?

A: They are seen going in all directions. There are 3 ideas:

- 1) The deep water near shelf,
- 2) Where shallow waters meet the shelf,
- 3) Wrack (floating seaweed) areas.

Q: Is there a high likelihood that a lot of species would be recruited to the Tortugas area or back to the Keys?

A: Yes. A shrimp study shows a larval group which followed drifter.

Q: Do Mississippi delta floods, hurricanes, and so forth impact the gyres?

A: They may not influence the gyre itself, but mixing would occur and flood water would be entrained in the gyre.

Q: Is water moving from the Shark River slough out to the Tortugas?

A: Yes. Water moves out through the Keys in a westward flow. It is very diluted. Our data sets are based on concentrations of nutrients and are probably not significant.

A: There are two pathways to the Tortugas. Through the Keys and west or the fall pathway which is more direct. The water is very diluted. The Shark River Slough water makes up 1/100 of the water which passes through the Tortugas zone. Water flow is not as well understood in the northern passages of the Caribbean.

Q: What is the nature of the tidal flow through Rebecca Shoal?

A: There are a few current meters in that channel. The Middle Keys passages are better understood.

Panel: Local Knowledge

Karen DeMaria: Changes in the Florida Keys Marine Ecosystem based on Anecdotal Reports by Residents

- There were 75 interviewees with a minimum of 15 years experience.
- Interviewees commented on fish, water quality, Florida Bay, algae blooms, and corals.
- Overall the interviewees expressed that there are too many boats, fishers, and people using the resources.

Peter Gladding: Commercial handliner

- Fisherman at Ft. Jefferson since the early 1970s.
- Fishing has declined up and down the Keys.
- In 1976, there were 3 boats in Fort Jefferson. Now there are 50-75 commercial boats including the recreational dive boats.
- Fort Jefferson has pressure, but so do all of the Keys.
- Peter wants to take part in the process of determining the size and location of the Ecological Reserve. It is not possible to rule fish from behind a desk.

Don DeMaria: Commercial spearfisherman

- Commercial fishers will be most impacted by a reserve.
- Has seen diseased angelfish on 200 ft. wreck past the Tortugas.
- Bottom is densely covered compared to the Key West area.
- There are rare species and protected/endangered species such as turtles and Nassau Grouper.
- Sherwood Forest has hybrid snappers.

Wayne Hoffman: National Audubon Society, Key West

- The Tortugas are home to a guild of tropical seabirds that prey on fast moving baitfish in clear water areas.
- Four of these bird species (sooty terns, noddy terns, frigate birds and boobies) breed in the Tortugas.
- The sooty tern colony is the most productive in the West Indies.
- The Tortugas is the only place in the US where masked boobies have ever nested.
- The Tortugas has economic benefit as a major draw for bird watchers to the Keys; nearly 500 people come on three day trips.
- Several thousand people come on single day trips.
- Non-nesting birds that are rare elsewhere but can be seen in the Tortugas include the red booby and black noddy. The Tortugas is a refuge for migratory birds.

QUESTION AND ANSWER SESSION

Q: How is now a better time than before for the implementation of a marine reserve?

A: Commercial fishers and other users are included and have a say so this time. There are going to be closed waters - users want to be a part of the process.

A: The last time lines were randomly drawn on the chart. This time there will be positive reason for picking certain areas. It is clear that the Sanctuary is here to stay, and users need to work within that framework.

A: The number of closed areas decreased and shrunk from the Draft to Final Management Plan. The fact that we wound up with only one reserve is attributable to the voice of the commercial fishers.

A: Commercial fishers were not involved last time. It is critical to find a way for fishers to be involved. This is a spectacular area and it needs to be left unimpeded, but we need to craft a way to do that without harming the commercial fishers.

Q: If the location of the proposed reserve was based on spawning aggregations and habitat; where would the best place be?

A: No matter what area is closed, a lot of people will be impacted.

Q: What is the shrimp bycatch interaction with gulls?

A: Small benthic fish have been found in sooty tern diets from shrimp nets. Gulls eat sooty tern eggs. Terns are good protectors if they are left undisturbed. Earlier nesting of terns each year increases their exposure to gulls (which are there as wintering birds).

Q: Where do you catch the greatest variety of fish? At what depths?

A: West of Rebecca Light, and it depends on the weather and the time of year, but usually in 50-90 ft. of water.

Billy Causey (providing a clarification)

The Dry Tortugas National Park is under the jurisdiction of the National Park Service, which will be represented in the planning process. The decision to include any National Park areas within in the proposed ecological Reserve will need to be made by the National Park Service. The Sanctuary is focusing its attention on areas of the Sanctuary which are located outside the Park. These are two different areas of jurisdiction.

Q: Is anything being done or planned to eliminate fish traps in the area?

A: Fish traps cause more headaches for commercial fishers than any other gear type.

A: In 1983 fish traps were made illegal in Florida waters. In 1990 they were made illegal in South Atlantic waters. In 2001 they will be eliminated from Shark River south in Gulf of Mexico . Fish traps are not allowed in Sanctuary.

Q: I have spent 10 years learning the Tortugas area and have put my whole life into those resources and the needed gear. The Tortugas are the best place to fish, so where are fishers supposed to go? How would a “no-take” area affect the birds of the area?

A: I don't know. I was asked to come here to talk about the Tortugas' resources; I would suggest that a major bait fishery could have an impact on the bird populations.

A: All user groups aside from commercial fishers are able to change over to another profession. As such, this regulation will hit commercial fishers harder than anyone else.

Q: Can the Dry Tortugas National Park be considered a large replenishment zone?

A: Yes. The Dry Tortugas National Park is larger now that it was originally.

Panel: Benthic Characterization

Michael Crosby, National Oceanic and Atmospheric Administration

- To draw an accurate map we need all the available data, including that from fishers.
- There needs to be a gross level characterization of what is on the bottom in this area (dead coral, gorgonians, sludge, etc.) along with a side scan sonar overlay.
- Using Department of Defense information with provided by laser line scans may be very useful for conducting recruitment studies.
- The Sanctuary currently has some side scan sonar data for some of the area which will lead to a better understanding of the area.

Steven Miller, National Undersea Research Center: Keys-wide Coral Reef Expedition

- The idea behind this cruise was to sample a lot of reefs at a minimum level to be able to see differences between reefs (there were 20 sites).
- On a spatial scale, we wanted to answer if reefs that lie next to each other are more similar than those farther away?
- The Tortugas site was different enough that it fell out as a separate group when compared to all the other Keys reefs.
- The Tortugas sites are higher in terms of percent coral cover.

Walt Jaap, Florida Marine Research Institute

- There is similar coral fauna in the Tortugas as to the rest of the Keys, but some species are more abundant.
- Compared to Agassiz's data from 100 years ago, there has been an increase in the amount of staghorn coral and a decrease in the amount of elkhorn coral.
- Staghorn coral has not come back in some areas.
- Monitoring has been conducted since 1989 at Fort Jefferson.
- Cold water events in the area may affect coral spawning.

Jenny Wheaton, Florida Marine Research Institute

- Hardground areas are dominated by octocorals.
- Bird Key Reef is characterized by different zones of coral types.
- A 20 m sample will pretty much pick up all octocoral species.
- The diversity of an area depends on what depth, zones, and so forth one is sampling.
- A 1989-1991 Dry Tortugas National Park Service Project indicated:
 - 20+ taxa of octocorals in quadrats from Pulaski Shoal and an increased number of individuals;
 - There are not any octocoral species that occur in the Tortugas that don't occur elsewhere in the Caribbean;
 - 37 species in less than 100 feet of water, and another 31 species in over 100 ft. depths.
- The Tortugas has all the elements from other areas but has a unique combination of species of octocorals.
- There is a tremendous exchange of information that occurs between researchers Fort Jefferson.

QUESTION AND ANSWER SESSION

Q: How were the transect sites for the coral surveys chosen?

A: They were selected by Gary Davis, and placed every 10 meters.

Q: Where is the greatest diversity of overall habitat types(from shallow to deep water)?

A: The northwest side is quite unique but it is hard to pinpoint.

A: The elkhorn and pillar coral areas deserve special emphasis.

A: The Tortugas Bank area has a higher amount of staghorn but low relief overall.

Q: Are there areas outside the Dry Tortugas National Park that are of “low value” with respect to diversity?

A: It depends largely on the species.

A: There are low diversity/low coral areas. There is somewhat of a gap in data for this area which the Sanctuary will attempt to fill.

A: It is important to note that the term “low diversity” could be used to characterize a healthy patch of elkhorn coral.

Q: At what depth do you collect benthic data?

A: It is collected mostly at 60 feet, though we are trying to get data outside the Dry Tortugas National Park but inside the Florida Keys National Marine Sanctuary.

Q: Do you have benthic data from the Tortugas Bank area?

A: A randomly determined site map should spot check all areas, not just “good” sites. We know there is a gap in information.

Q: If the mission of this project was to protect biodiversity, would there be a need to include a more representative group of habitats?

A: That is an issue. Do we draw one big area or lots of little ones?

A: Picking the very best spots for an ecological reserve will not fully show change over time.

A: We need to not be anthropocentric in picking “good” spots. For example, is high biodiversity necessarily good? We need to protect all representative communities if our interest is in preserving the whole ecosystem, plus the socioeconomic aspects of choosing an area must be considered.

Q: Can the Dry Tortugas National Park currently be considered a replenishment area?

A: Yes, I believe it can be considered as a replenishment area.

Panel: Fish Community Panel

Jim Bohnsack, National Marine Fisheries Service

- Has spent many years conducting research in the Tortugas area.
- Has worked for many years on the concept of marine reserves and their benefits to fishermen and non-fishers.
- Has spent ten years visually sampling fish in the Florida Keys.
- Has five years of sampling data for the Tortugas.
- The habitat and fish communities inside the Dry Tortugas National Park differ from those outside.

Jerry Ault, University of Miami

- There has been explosive growth in recreational fisheries.
- Commercial fishers have increased technology.
- Data on species, number, size have been collected.
- Fish are exhibiting a varying sensitivity to exploitation.
- Federal government has a definition of overfishing.
- Fishing pressure has shifted the ecosystem toward more barracuda and less of other species.
- We are in the midst of a complex, dynamic, multi-species system.

Don DeMaria (For Ann Marie Eklund, Florida State University)

- Almost 200 jewfish have been tagged in the jewfish project.
- The central question of this project is whether jewfish come back to the same spawning aggregation sites. Also underway is a genetic analysis of sex and age through fin clippings. Jewfish sounds are also being studied.
- Jewfish change color when spawning. There is less activity at night.
- Juvenile jewfish in the Ten Thousand Islands area are also being tagged.

Laddie Akins, Reef Environmental Education Foundation (R.E.E.F.)

- R.E.E.F. is non-profit organization of over 10,000 members.
- The Great American Fish Count is a project which has been conducted since 1996. Similar data has been collected since 1993.
- There have been over 12,000 fish surveys completed since 1993.
- The focus of these surveys has been on Marine Protected Areas.
- R.E.E.F. uses the roving diver technique to survey fish.
- Fish are surveyed by groups of six divers. Surveys include the number of species seen and their relative abundance.
- There are 229 species in the Tortugas database, surveyed from 18 sites.
- R.E.E.F. surveys have not seen groupers as often. When they are seen, they are in low numbers.
- Some species were seen in the Tortugas which were not commonly seen elsewhere, and a few species were not seen anywhere else but the Tortugas.

QUESTION AND ANSWER SESSION

Q: What are the findings on spawning areas, larval habitat, and so forth in Sherwood Forest?

A: Not a lot has been done in that area; almost every species of grouper is found there; the false bottom is very rich/unique. It is protected from severe cold or hot water and has very clear water.

Q: Is there a different suite of fish species in the Dry Tortugas National Park?

A: Yes, damselfish dominate in some areas.

Q: What is the nature of the headboat catch?

A: The majority of grouper coming out of headboat industry are from the Tortugas. The R.E.E.F. surveys look at other areas as well.

Q: The fishing regulations in the Keys have changed over time (for example, grouper). Would a marine reserve system give insurance against more regulations?

A: It is possible that the spawning potential ratio may increase. We must either close areas or reduce effort (i.e. increase restrictions). Increased size limits, by removing the most prolific spawners, may do more damage than good in protecting stocks. For example, one large female fish is equal to 212 smaller female red snapper in terms of fecundity.

Q: Is there proof of larval replenishment?

A: There are lots of reasons why the Tortugas is attractive for a reserve. The data on decreasing fish size and higher fishing effort shows bad news down the road.

Q: Where are some known spawning aggregations? Have larval tagging studies been conducted?

A: Identifying spawning areas may not be helpful in the development of a reserve except for one or two species. Many fish may spawn anywhere.

A: Models to simulate larval movement have been used. Studies have been attempted but are very difficult. Many larvae have been shown to move somewhat.

A: The behavior of larvae may facilitate retention in local areas.

Q: Why isn't there a maximum size limit on most fishes? Are larger fish more territorial? Maybe mapping fishes territories and behavior would be helpful.

A: Large individuals of deep water species may die from embolism when brought to the surface or through bycatch mortality. Territoriality depends on the species, oceanography, and topography. Mapping may be too difficult. There have been 519 species identified in the Keys. Marine reserves may be a valuable tool to protect us from our own ignorance. There is very good evidence of this from around the world including over 300 peer reviewed papers.

Q: Would larger fish species be stocked or introduced into a reserve?

A: No, this generally doesn't work.

Q: Is Sherwood Forest outside the Florida Keys National Marine Sanctuary?

A: Yes, we were not sure it was outside the boundary until it was recently charted.

Q: Why was headboat data used to estimate grouper in the Tortugas area?

A: All available data was used in this report, from commercial and recreational fishermen. Visual data coupled with headboat data gives us a good estimate of populations.

Q: Based on operating marine reserves and the current literature, how long will it be before we can expect to see measurable improvement outside of an ecological reserve?

A: The data currently suggests the area needs to be large enough (10-15% the fished area) to see any effects at all.

Q: If that percent existed, how long would it take?

A: It would take the longest for groupers and the shortest for grunts. This is assuming average recruitment.

Q: Was spearfishing occurring in the area where you were surveying fish populations?

A: One technique involves sitting still. By remaining motionless, one doesn't need to get as close as spearfishing to observe the fish. In sites where spearfishing occurs, there is the problem of scaring fish away during surveys.

Q: How big does a reserve area need to be to provide benefits?

A: To maintain healthy fisheries there needs to be large areas. This cannot be done all at once, however, but must be phased in over time. The larger number of fish being produced will supplement reduced area of fishing over time.

Panel: Lobster, Seagrass, and Megafauna

Gary Davis, Channel Islands National Park

- In the 1970s, worked at the Dry Tortugas National Park on lobster populations.
- Commercial fishing was banned in 1935 in the Dry Tortugas National Park. There has been a long history of protection in this area.
- These studies compared unfished, sportfished, and commercially fished areas for lobster.
- There is a net movement of juveniles lobsters out to the Tortugas area.
- A 1977 cold water mass killed 90% of *Acropora cervicornis* (staghorn coral) in the area.

Rod Bertelsen, Florida Marine Research Institute

- Has completed two years of a three-year project on lobster reproductive potential.
- Surveyed both fished and unfished areas of the Tortugas.
- Larger lobster were found in the Tortugas. The highest Catch Per Unit Effort (CPUE) was found in the Western Sambos area.
- Smaller lobsters have an extended breeding season while larger lobsters have a compressed breeding season.
- It was found that one animal in Dry Tortugas National Park is producing three times the number of eggs as one animal in the fishery.
- Lobsters in the Dry Tortugas National Park are larger in size when producing eggs than lobsters in the rest of the Keys.

Jim Fourqurean, Florida International University

- Involved in EPA's monitoring effort on seagrass.
- Seagrass provides a major feeding area for reef fish.
- A random diving method is used in Florida Keys National Marine Sanctuary for this sampling.
- *Halophila* (midrib seagrass) species were found in deeper areas including the Tortugas.
- Seagrasses are controlled by the amount of light reaching the bottom.
- There is more inshore nitrogen and offshore phosphorus in the Keys.
- *Thalassia* (turtle grass) was found to be growing deeper in the Tortugas than in the Keys (167' vs. 40'). This could indicate better water quality in the Dry Tortugas National Park.

- Syringodium (manatee grass) was found in the Dry Tortugas National Park while Halophila was found in deeper water.
- In general, seagrasses in the Dry Tortugas area are restricted to Dry Tortugas National Park, occur deeper than elsewhere in the Keys, and have more diverse beds than elsewhere in the Keys and Caribbean.

Ben Haskell (for Skip Snow, Everglades National Park)

- In the early 1900s there was a full-scale turtle fishery.
- The Dry Tortugas National Park has surveyed turtle nests and nesting activities from April through October since 1995.
- The Dry Tortugas National Park may contain the largest loggerhead and green turtle rookery in the Florida Keys.

QUESTION AND ANSWER SESSION

Q: Is there a difference in the size of lobster in the Tortugas when compared to the Western Sambos Ecological Reserve? Is the size of lobster in the Dry Tortugas National Park influenced by the edge of their range?

A: It could be that growth rates are based on age, not size. Lobster movement also needs to be taken into consideration. This also may be why larger lobsters are not found at Looe Key.

Q: What is the name for the most common type of bottom without a lot of seagrass on it?

A: About 33% of the Dry Tortugas National Park is seagrass compared to 85% in the Florida Keys. There is also rubble bottom and hardbottom with coral heads and lots of fish. Many animals leave the reef and go into seagrass beds at night. This occurs in the Dry Tortugas National Park somewhat, and outside the Park this foraging area is smaller.

Q: Why do lobster sizes vary throughout the Caribbean without any relation to fishing pressure?

A: Exact fishing pressure is very hard to measure.

Q: It was said that seagrasses are not affected by fisheries. Is the assumption that the fishing industry does not affect seagrasses at all?

A: It is not clear that grass distribution has been affected by fishing.

Q: Why are the fished lobster of the Tortugas area still larger than in the rest of the Keys?

A: The Tortugas are still a very remote area, and our sample sites are in deep water (70 foot). There are a variety of reasons why there is less fishing pressure out there.

Q: Could the larger and smaller lobster be attributable to a different species of lobster? There are also many different shell colorations.

A: The different colors have to do with what they are eating. Scientists are sure the lobsters are all one species.