EXECUTIVE SUMMARY

Socioeconomic Impacts of the Tortugas Ecological Reserve: A Five-year Pre-Post Implementation Assessment

By

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Socioeconomic Impacts of the Tortugas Ecological Reserves

There have been many reports and journal articles addressing the social and economic (socioeconomic) impacts of marine protected areas (MPAs) and the special class of MPAs, marine reserves (MRs) or no-take areas (Berman et al 2008, Holland 2000, Mascia 2003 and Sanchirico et al 2007). However, all of these efforts have not addressed the question of what actually happens. Past efforts have focused on expected possible outcomes based on either theory and/or have modeled behavior based on reasonable assumptions. To actually determine what happens, in most cases, requires a pre-post implementation assessment requiring monitoring data.[1]

In this assessment, we report the results of the first pre-post integrated assessment of the socioeconomic impacts of a marine reserve, the Tortugas Ecological Reserve (TER) in the Florida Keys National Marine Sanctuary (For the Full Report see Jeffrey et al 2012). At the time of its creation (July 2001), it was the largest MR in the U.S. (151 nautical square miles). Five-year pre implementation and five-year post implementation periods were used for the assessment with five years serving as the period for determining short-run impacts.

Most of the literature assumes that for those who are displaced from MRs, there will be short-run losses, which economists refer to as opportunity costs. Our findings run counter to all of the theoretical papers and modeling efforts that assume there will be short-run opportunity costs associated with MRs. ***We found that, in the short-run, neither those who participate in the commercial fisheries or the recreational fisheries experienced any financial losses due to implementation of the TER (Table 1). And, given that there were no financial losses, we conclude that there were no wider social costs. There were no major disruptions that could lead to family and community problems as indicated by unemployment, general crime rates, domestic violence and substance abuse.***

In the recreational fisheries, effort did shift to other areas away from the larger Tortugas area closer to home ports, but this was due to rising fuel costs and new grouper regulations that made the trip to the Tortugas area a less preferred choice. It was simply not worth the cost to go all the way out to the Tortugas area for a couple of grouper. None of the charter fishing guides thought that the TER affected their business.

For the commercial fisheries, there was also a shift in effort away from the Tortugas area towards fishing grounds closer to home ports due to fuel price increases. But, the actual changes in catch and revenues received by fishermen from the Tortugas area pre to post varied considerably by fishery (Table 1).

The most interesting finding was that for the reef fish fishery. During the design and evaluation phase of the TER (initial assessment), the biophysical scientists had concluded that reef fish in the Tortugas area, as well as in the rest of the Florida Keys, were overfished. This assessment led the socioeconomic team to conclude that there would be losses to the reef fishermen since they would not be able to relocate to other fishing grounds and make up for lost catch from the TER. However, reef fish catch from the Tortugas area actually increased pre to post TER and is on an increasing trend. The reason for this disparity was that displaced fishermen found new

areas previously unfished and these areas were not sampled by biophysical scientists, and were therefore not in their stock assessment. We conclude the current upward trend in reef fish catch from the Tortugas area reflects the expansionary phase of a new fishery. The projection of losses in the initial assessment was based on the assumption of perfect knowledge by both the scientists and the fishermen. For the fishermen, we assume they knew all the available fishing grounds and the fishing choices they made in the pre TER period were the profit maximizing choices. In reality, fishermen did not have perfect knowledge and displacement from the TER led them to discover new fishing grounds (necessity is the mother of invention).[2]

For the shrimp fishery, the initial assessment concluded that losses would not likely occur because of the low dependence of shrimping operations on the TER for their total catch. In the post TER period, total catch from the Tortugas area actually increased, but revenues for that catch significantly declined due to large reductions in shrimp prices resulting from large increases in imported shrimp.

For the king mackerel fishery, the initial assessment projected no losses because king mackerel is a pelagic species and therefore is highly mobile. In addition, there were no special features in the TER which attracted or aggregated them. Catch lost from displacement from the TER could be made up by relocating to fishing grounds outside the TER. In the post TER period, king mackerel catch increased as did revenues received from the catch. So again, there were no losses due to the TER.

The spiny lobster fishery highlighted why an integrated assessment is important and also illustrated the importance of accounting for interspecies substitution. In the pre TER period, spiny lobster catch was in decline in the Tortugas area. The decline continued through the first two years of the post TER period, then started to increase with a record year in the fifth year of the post TER period. The biophysical scientists were able to explain the decline in the spiny lobster catch as being the result of hurricanes and a larval disease. The upward trend in catch at the end of the post TER period indicate the fishery has recovered from these effects and is now meeting or exceeding catches experienced in the beginning of the pre TER period. So again, we conclude there were no losses attributable to the TER.

Evaluation at the fishing operation level across all fishing catch and revenues revealed that spiny lobstermen also participate in multiple fisheries and were able to increase their catch of king mackerel and stone crabs to offset any losses from the reductions in spiny lobster catch (interspecies substitution) during the years when spiny lobster were in decline.

		Initial Assessment Projections[1]	
	Step 1	Step 2	Current Assessment
Commercial fisheries[2]			
Reef Fish	116,642 (20.3%)	Projected losses highly likely to occur since reef fish are considered overfished throughout the region. Thus, fishermen not expected to be able to relocate and make up lost catch.	No Losses due to closed areas. Reef fish catch increased from pre to post establishment of the TER. This was opposite of expectations. Reason was that displaced fishermen found new areas previously not fished and these areas were not sampled by biologist and were not included in stock assessments.
Spiny Lobster	108,639 (11.6%)	Projected losses not likely to occur because lobster trap reduction program will allow for relocating traps and fishermen are knowledgeable and fish other locations throughout the Florida Keys.	No losses due to closed areas. Spiny lobster declined from 2001 through 2003 due to hurricanes and disease. Spiny lobster catch recovered 2004 through 2006 reaching record levels. Short-run losses in 2001-2003 offset by fishing for stone crabs and King Mackerel.
Shrimp	58,374 (8.2%)	Projected losses not likely to occur. Shrimp fishermen catch only 10% of their total catch from the Tortugas Area and displacement will impact only 8% of catch from the Tortugas Area and only 1% of total catch from all areas. Should be able to relocate and make up catch from other areas.	No losses due to closed areas. Shrimp catch increased from pre to post establishment of TER. However, prices declined due to large increases in imported shrimp and total revenues received by fishermen declined.
King Mackerel	13,489 (14.0%)	Projected losses not likely to occur. King Mackerel is a pelagic species and are thus highly mobile and there are no special features in closed areas. Expect fishermen can relocate to other areas and make up lost catch from closed area.	No losses due to closed areas. Catch increased pre to post establishment of the TER.
Recreational Fisheries[3]	1,443 (7.2%)	Projected losses are not likely to occur because of the small proportion of the Tortugas Bank included in the closed area allowing for adequate substitution without crowding. Also increased costs not likely because of distribution of activity suggests no change in cost of access by substituting to other portions of the Tortugas area.	No losses due to closed areas. Demand for Tortugas trips did decline, but for hire operators said this was due to increased costs due to fuel price increases and declines in grouper bag limits making trips out to the Tortugas not worth the extra cost.

1. Initial projections of losses from Leeworthy and Wiley (2000). The approach used a two-step analysis. Step 1 was quantitative and simply assumes all commercial catch or recreational activity would be lost from area closed. This represents "maximum potential loss". Step 2 looks at all mitigating and off-setting factors and provides qualitative assessments of how likely step 1 losses are to occur.
2. Pounds of catch from closed area.
3. Person-days of displaced activity.

The most significant factor that explains the outcome of no financial losses is the fact that socioeconomics was used for the first time to advise a stakeholder working group in designing the regulatory alternative. This allowed stakeholders to design the Tortugas Ecological Reserve in a way that users who would be displaced could adjust without suffering future losses.

Endnotes

1. Most cases involve marginal or small changes in the total amount of activity affected. In cases where large changes occur (New England Groundfish Closure) economic and social impacts are clear and real. In the New England Groundfish Closure, it was projected that even after stock recovery, 50% of fishermen would not get their jobs back. The federal government moved to set up compensation and assistance programs to help fishermen transition to new livelihoods.
2. The only caveat to our conclusion is that we are not sure if fishermen are taking bigger risks in fishing new fishing grounds i.e., did they not fish theses new fishing grounds in the past not because they did not know about them, but because winds and tides or other factors made it more dangerous to fish. Regulations often have unintended consequences. See Pendleton et al 2001 for an example of weekend closures of the market squid fishery in California that led fishermen to take more risk going out on bad weather days.

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