

CHAPTER 1: INTRODUCTION

The red snapper fishery of the Gulf of Mexico is an important economic asset. In 2000, commercial harvests of red snapper were valued at nearly \$12.0 million from 5.08 million pounds (U.S. Department of Commerce, 2001). Recreational harvests in the same year were estimated at 4.15 million pounds (Gulf of Mexico Fishery Management Council, 2001) and, undoubtedly, were responsible for substantial economic impacts throughout the region. This fishery, however, is classified as an overfished stock and the Reef Fish Fishery Management plan requires a rebuilding of the stock to a 20% transitional spawning potential ratio (SPR). The decline in the red snapper populations has had direct economic consequences in commercial and recreational fishery. Two forces are responsible for the decline of red snapper stocks in the Gulf. First, the commercial and recreational fisheries harvest mature red snapper, which directly diminishes the stock. Second, the Gulf's shrimp fleet harvests juvenile red snapper indirectly as bycatch in its trawls. It is widely agreed that the recovery of the red snapper population will require policies directed at both the directed and bycatch fisheries.

However, policies to achieve the recovery of the red snapper fishery are not without costs. In the directed fishery, since 1990 there has been a gradual reduction in the length of the fishing season. For example, in 1997 the commercial season lasted less than 2 months, down by more than 50% from the season only four years earlier. Similarly, the recreational fishery, which had been estimated to exceed its quota for several years, was closed for the first time on November 27, 1997. In 2000, the recreational fishery was only open from April 21 to October 31. Such shortening of the fishing season is known to create a wasteful "derby" in which fishermen race to harvest the fish quickly. The directed fishery has also been subjected to various regulatory policies. For example, the Gulf of Mexico Fishery Management Council (Council) has implemented commercial quotas, commercial trip limits and limited entry on the commercial red snapper sector. Similarly, the Council has implemented a suite of recreational regulations including a recreational quota, recreation bag limits, minimum sizes and special management zones where bag limits and minimum sizes are more restrictive.

Regulations on the shrimp fishery have also been imposed in recent years and in 1997 Amendment 9 to the Fishery Management Plan for the Shrimp Fishery of the Gulf of Mexico mandated the use of certified bycatch reduction devices (BRDs) on all boats. The economic consequences of bycatch policies remain subject to some debate but are clearly nontrivial. It is noteworthy that the economic productivity of the shrimp fishery dwarfs that of the snapper. The total harvest of the Texas shrimp catch is about \$166 million annually (NR97-042). Indeed, the shrimp fishery of the Gulf is the third largest commercial fishery in the country so policies that even marginally affect the fishery are likely to have substantial economic consequences. For example, industry spokesperson, Wilma Anderson, estimated that amendment 9 would lead to a 10% loss in catch (NR97-042). Hendrickson and Griffin (1993) estimated that a 5% reduction in yields would translate into losses over 10 years, with a present value of between \$16 and \$27 million. The other bycatch-reduction policy that has been traditionally considered is that of closures which Hendrickson and Griffin found to be even more costly, with a present value ranging from \$35 to \$54 million. However, according to a study by Griffin and Samonte-Tan (1999), the shrimp fishery is already facing a

significant price-cost squeeze and any new policies could push many boats out of the fishery. The fall in prices in 2001 and again in 2002 has placed the shrimp fishermen in an even tighter financial bind.

We see, therefore, that any program directed at the recovery of the red snapper fishery is likely to have substantial economic benefits as well as costs. Any management plan that seeks to achieve the recovery of the red snapper fishery should seek to achieve this goal at the minimum economic cost. A recent peer review of the problem of red snapper (MRAG Americas, 1997) indicated that there remain a number of basic questions surrounding the red snapper fishery. Among those issues highlighted in the report are:

- The lack of a model in which the commercial and recreational red snapper fisheries are integrated with the bycatch of red snapper by the shrimp fleet (p. xi);
- The lack of studies that have examined alternatives to BRDs (p. xii);
- The lack of comprehensive economic analysis of alternative policies to rebuild the red snapper stocks (p. 27), and
- Ideally, it would be useful to identify the optimal recovery rate for the snapper population, taking into account the economic consequences in the shrimp fishery and the commercial and recreational red snapper and fisheries (Brown 1997).

The lack of analysis in these areas represents an important public concern. The deficiency of models adequate to understand the economic consequences of alternative policies limits the ability of the fisheries management agencies to effectively address the problem of the red snapper. Without an adequate understanding of the economic consequences of alternative policies, regulations may be developed that are unnecessarily costly and the entire effort to achieve the recovery of the red snapper stocks might be jeopardized.

The original objectives of this study were:

- 1) Modify the General Bioeconomic Fisheries Simulation Model (GBFSM) to include fractional license and fractional gear policies in the shrimp fishery and variable quotas in the red snapper fishery;
- 2) Using GBFSM, estimate the present value of the net gains associated with alternative bycatch and red snapper fishery policies;
- 3) Based on GBFSM, develop a dynamic optimization model that incorporates a sustainability criterion;
- 4) Using the dynamic-sustainability model, identify the policy paths that would satisfy three alternative objectives: the minimization of the cost to achieve the goal of a 20% SPR by the year 2019, maximization of the present value (PV) of the fishery and the optimal policy that satisfies an economic sustainability criterion;
- 5) Estimate the increase in red snapper stocks associated with alternative fixed and flexible bycatch and red snapper fishery policies, and
- 6) Based on the results obtained, develop policy guidelines for setting the optimal levels of bycatch reduction and commercial and recreational fishing allocation.

Goals 1 and 2 are addressed in chapter 2 of this report. Goals 3-6 are addressed in chapter 3. As discussed in chapter 2, we found that SPR is not necessarily a strong indicator of the physical condition of the fishery because it can be changed quickly by imposing restrictions on catch. Hence, goal 4 was reinterpreted so that, in addition to evaluating the paths to maximize the PV of the red snapper fishery, the cost-minimizing paths to reach alternative stock targets were also identified.

