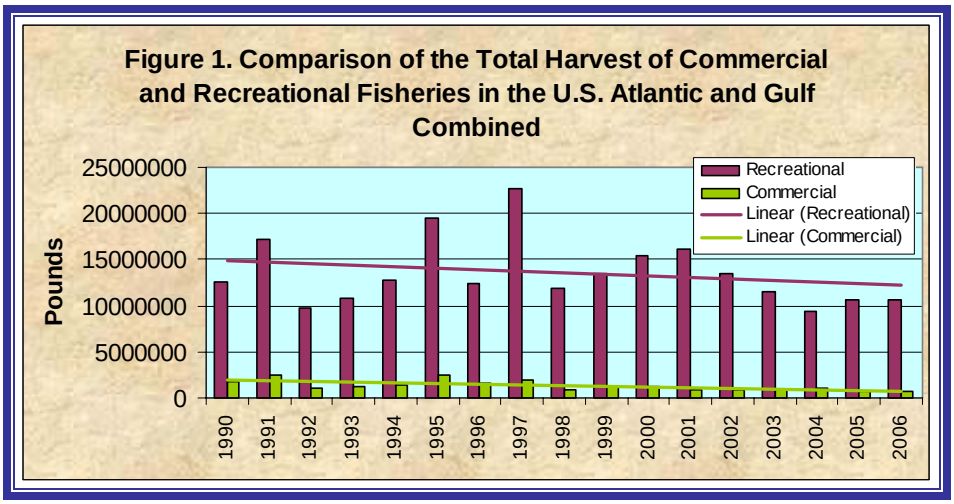
Is the U.S. Dolphinfish Fishery Changing?

By Donald L. Hammond
Marine Fisheries Biologist
Cooperative Science Services, LLC

Since the start of the Dolphinfish Tagging Study fishermen have been asking whether the dolphin fishing is declining. This is a hard question. The biggest issue faced in the management of the U.S. dolphinfish stock(s) is the absence of credible harvest data from domestic fisheries as well as foreign fisheries in the Bahamas and Caribbean Sea. Few coastal states collect data on oceanic pelagic game fish, and those that do use diverse sampling procedures making it impossible to combine their data sets for a comprehensive look. Only one recreational fisheries survey captures data on the dolphin fisheries on the entire U.S. Atlantic and Gulf coasts. The Marine Recreational Fisheries Statistical Survey (MRFSS) is a national survey contracted out by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS).

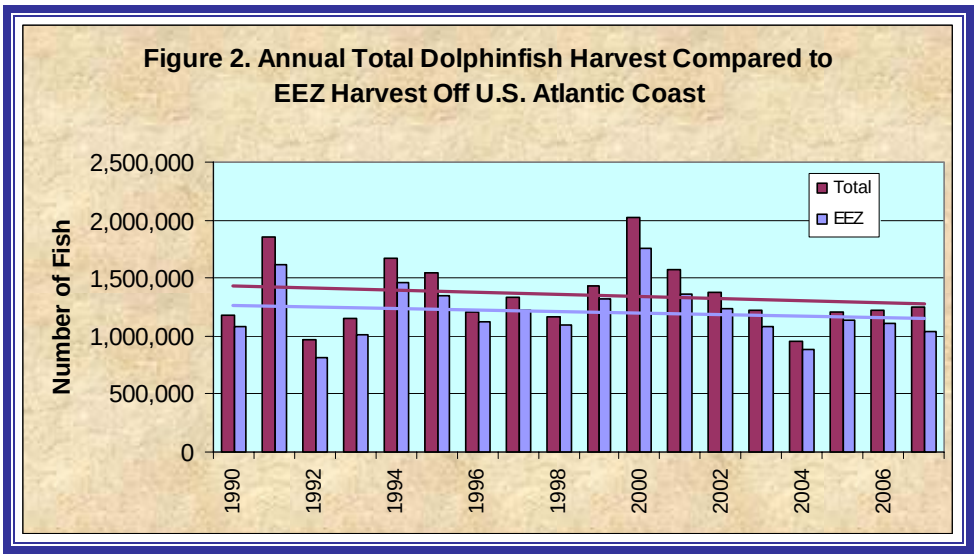
MRFSS utilizes direct intercept of fishermen at the end of their fishing day and telephone surveys to generate the basic fisheries catch and effort data. These data are then expanded by a large multiplier determined from the telephone survey results. Types of fishing efforts and areas fished are classified into very broad categories that do not allow the data to be broken down into specific types of fishing trips, such as blue water trolling. The typical low level of sampling conducted in each state means that the chance encounter or two by a surveyor of a single specimen of fish could result in hundreds or even thousands of that species being shown harvested for that state during a period. Because of these problems state fisheries managers place little credibility in this survey when looked at on a state level. Its greatest value results from its use on a regional or coast-wide basis, but even this is questionable.

As questionable as this data base may be, it is the only information available that we can examine to see what might be going on with the U.S. dolphin fisheries. Historically, recreational fishermen have harvested more than 90% of the dolphinfish taken by the U.S. domestic fisheries, and nothing suggests that this has changed as of 2006. Comparison to the combined Atlantic and Gulf commercial landings (NMFS commercial landings data) versus recreational landings (MRFSS) (Figure 1) shows that commercial landings accounting for 9.6% of the total harvest for the period of 1990 through 2006. Average annual commercial landings represented 10.3% of the total harvest during the 1990s but since 2000, it has declined to an average of 6.8%. Examination of the MRFSS data at the level of the U.S. Atlantic and Gulf of Mexico coasts respectively does suggest changes within the recreational fishery.

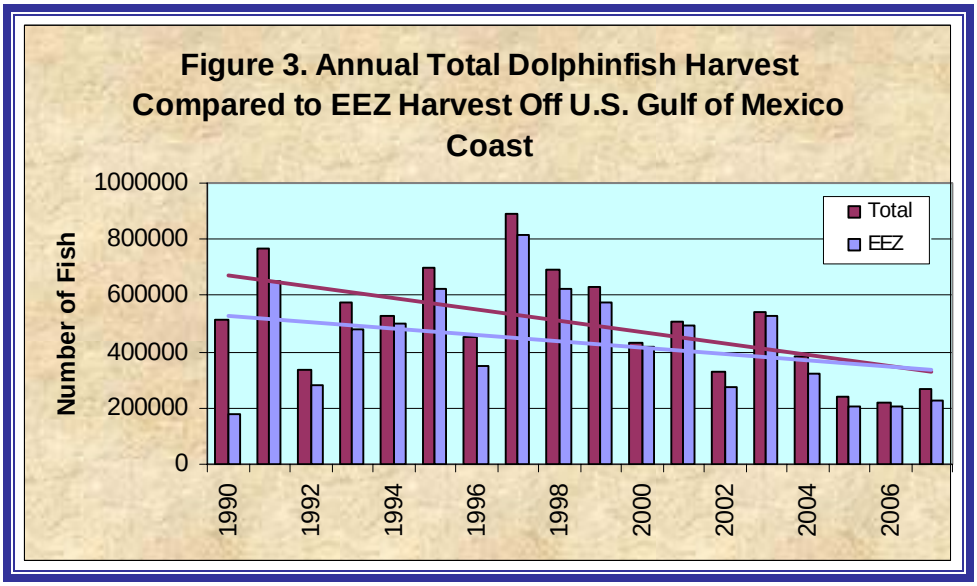


The following discussion will be based solely on information taken from the MRFSS data base. For the purpose of this analysis we will look at the number of dolphin harvested from the East and Gulf coasts separately from 1990 through 2007. The annual harvest will be examined for each coast from all fishing areas combined (state and federal waters) and from only the Exclusive Economic Zone (EEZ), which is the federal waters from three miles out to the end of federal jurisdiction, usually 200 miles. (The EEZ is the area for all states where the vast majority of the dolphin are caught.) Limiting the analysis to the EEZ also allows exclusion of more types of fishing effort that are not directed at or likely to catch dolphinfish. This gives a more realistic projection of angling effort likely to catch dolphin, which should aid in a more accurate catch-per-unit-of-effort calculation.

Figure2 compares the total East Coast harvest to the harvest originating in the EEZ with an associated linear trend line added. Total dolphin harvest for the U.S. East Coast was found to range from less than 1 million to more than 2 million fish harvested annually during the 18-year period. The table shows that the EEZ harvest accounted for 800,000 to 1.7 million fish annually. Overall, 89% of the East Coast dolphin harvest came from the EEZ. The linear trend/regression line suggests the fishery is changing, with the number of fish being caught each year declining in both data sets at the same rate over the 18-year period. Both data sets indicated a peak in the fishery in 2000. The annual harvest exhibited a greater rate of decline in the number of fish harvested annually following this peak.

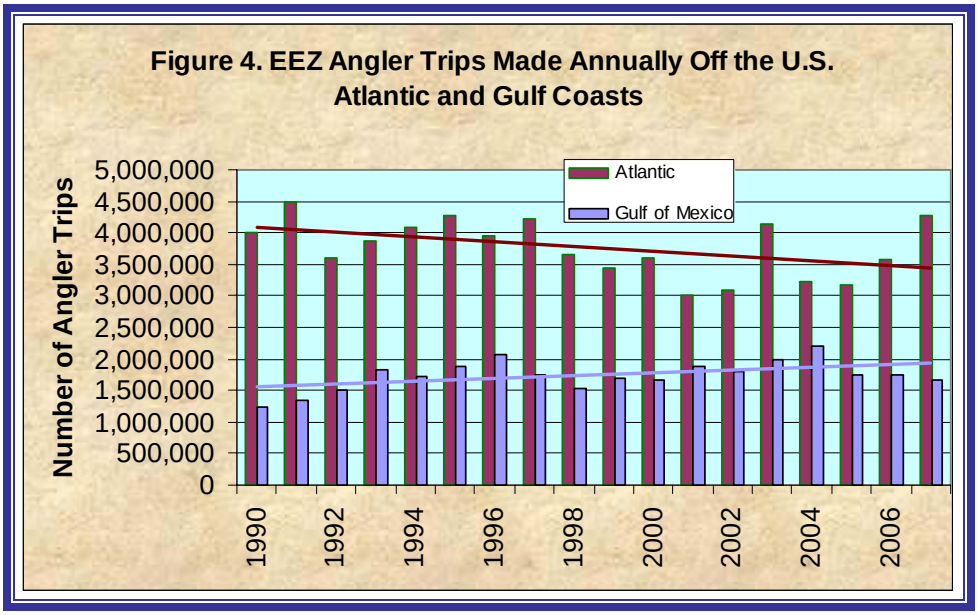


The dolphin harvest in the Gulf of Mexico (GOM), while much lower than the Atlantic coast, exhibited a similar pattern (Figure 3). During the 18 years examined, the harvest in the GOM EEZ averaged 86% of the total dolphin harvest. The Gulf's total annual harvest fluctuated from 217,000 to 892,000 fish per year with the EEZ harvest accounting for 175,000 to 812,000 fish. The peak harvest in the Gulf occurred earlier, 1997, than in the Atlantic and exhibited an even sharper decline in harvest than the Atlantic coast fishery during the subsequent 10 years. While the decline in the number of fish being harvested will certainly raise many people's eyebrows, by itself it does not warrant concern until we relate it to how much fishing effort was expended to harvest fewer fish.

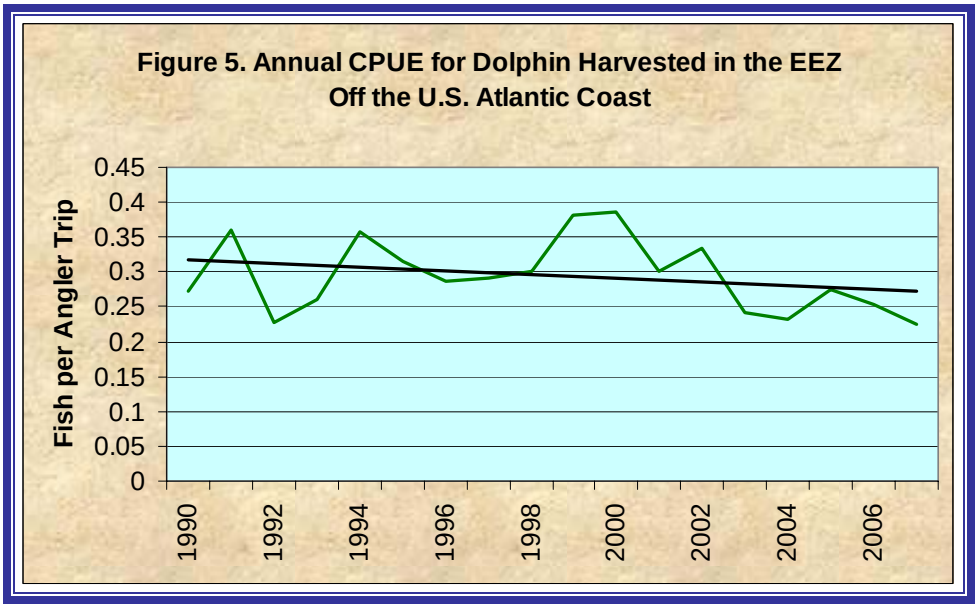


The MRFSS program uses the number of angler trips determined by intercept and telephone surveys to express the fishing effort. Figure 4 presents the annual fishing effort projected in the EEZ for the Atlantic and Gulf coasts. According to this table, more than twice as much fishing effort was exerted on average each year off the East Coast than in the GOM. Linear trend lines for the study period suggest that while fishing effort in the EEZ off the Atlantic coast is declining

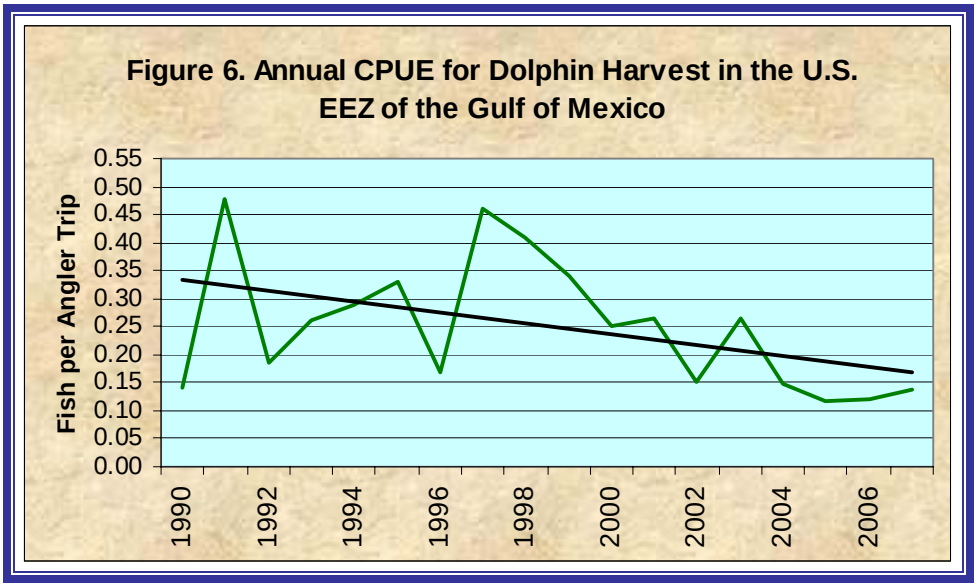
the EEZ fishing in the Gulf is on the increase. The principal question is what role did these changes in fishing effort play in the declining harvests.



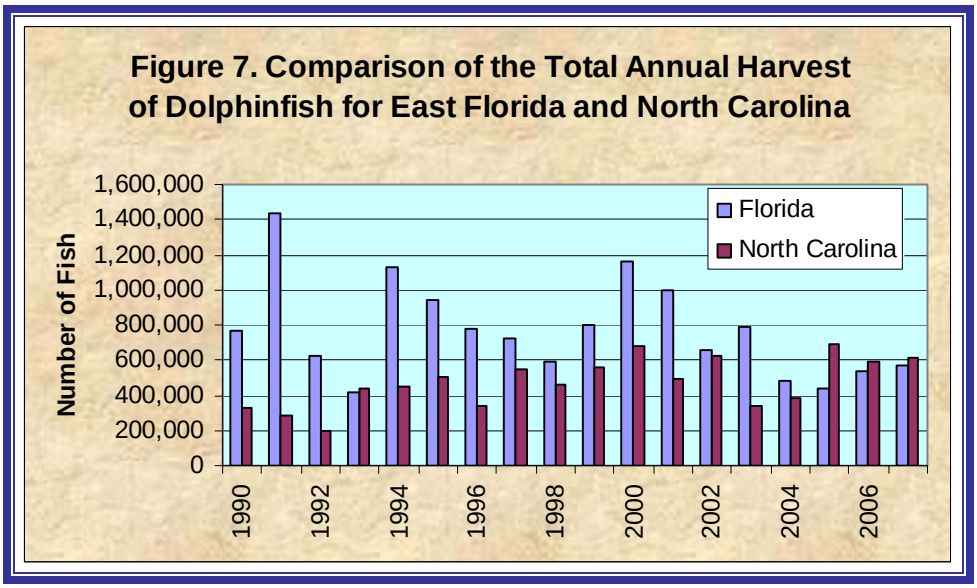
One of the tools used by fishery managers to assess the health of a fishery is look at the catch-per-unit-of-effort (CPUE) for the fishery over a long period. By generating a uniform catch unit comparison, changes in fishing effort from year to year can be filtered out. In this case, by dividing the number of dolphin harvested in the EEZ each year by the number of angler trips made in that area each year, a uniform yield per effort is achieved allowing the fishing success to be directly compared year to year. Figure 5 shows that the dolphin CPUE in the U.S. Atlantic EEZ varies from 0.22 to 0.39 fish per angler trip over the years examined. The linear trend line suggests that the fishery has been steadily declining during this period. Looking at the annual CPUE line, the angler success rate in the Atlantic has been in a sharper decline since the peak in 2000 and reached its lowest point in 2007.



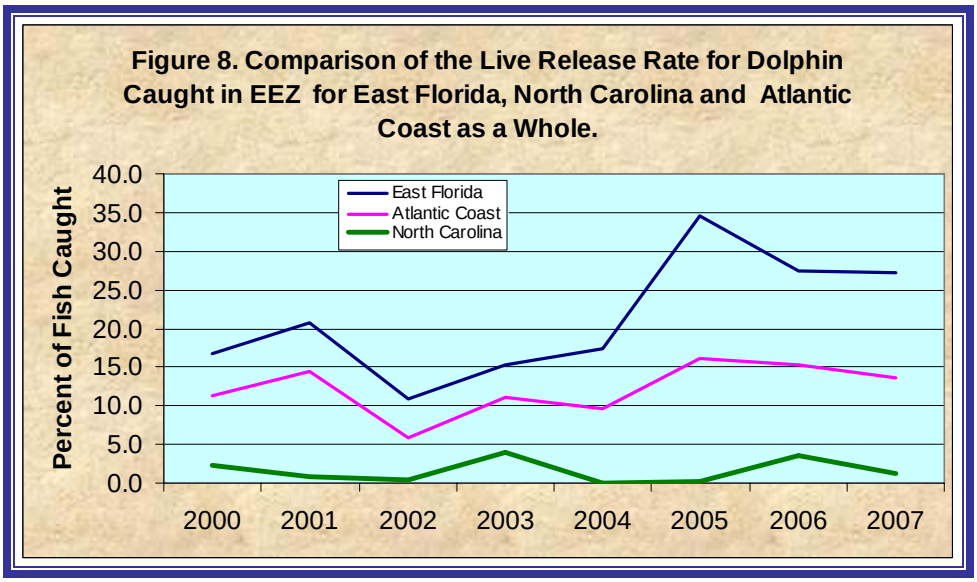
Annual CPUEs in the Gulf's EEZ exhibited a much wider range, varying from 0.12 to 0.48 dolphinfish per angler trip (Figure 6). This is a 400% fluctuation in the success rate for the GOM as opposed to the 77% variance among the years observed for the Atlantic EEZ fishery. As in the Atlantic, the linear trend line indicates a steady decline in angler success at catching dolphin during the 18 years. The Gulf fishery also shows a sharper decline since the fishery's peak, 1997. Over the last 4 years, 2004 -2007, angler success in catching dolphin was at its lowest level, with the worst fishing occurring in 2005.



Data collected by MRFSS indicate other changes have also occurred within the U.S. dolphin fishery. One of the most prominent changes concerns a shift in state dominance on the East Coast with regard to dolphin harvest. Historically, Florida and North Carolina have been the two major harvesters of dolphinfish on the U.S. Atlantic coast. In the 1990s, Florida averaged harvesting twice the number of fish harvested by Tar Heel anglers (Figure 7). From 2000 through 2004 Florida's dominance fell with the state harvesting an average of only 62% more fish annually than North Carolina. Now, for the past three years, MRFSS data indicate that North Carolina fishermen are harvesting more dolphin than anglers in the Sunshine state. The average annual harvest in Florida from 2000 through 2007 dropped 14.5% from the annual average during the 1990s. The opposite was shown for the dolphin harvest off North Carolina from 2000 through 2007, with an increase of 15.2% over the average harvest of the 1990s.

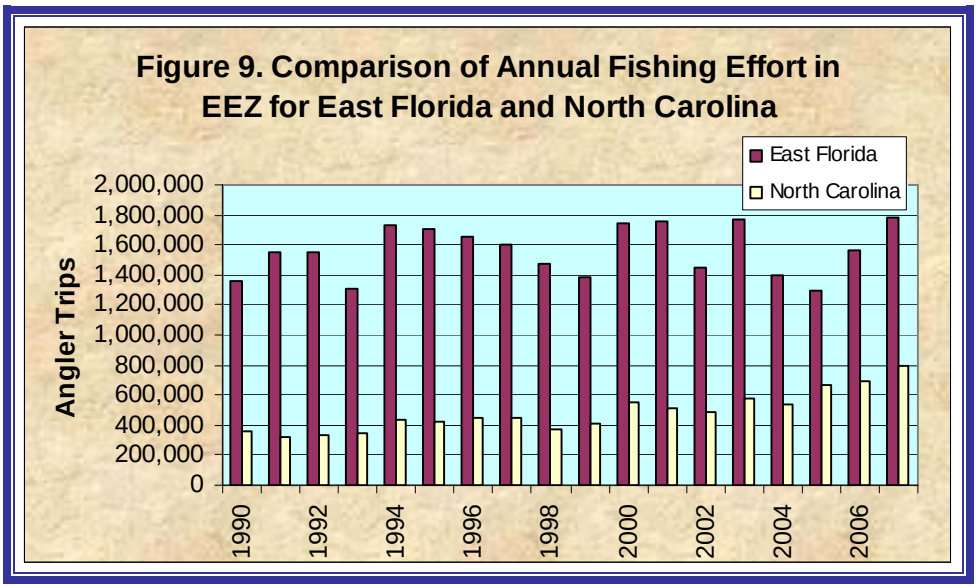


Some anglers credit Florida's minimum size limit with allowing more dolphin to get to North Carolina to be caught by the Tar Heel anglers. Examination of the live release rate for dolphin caught in the EEZ off East Florida, North Carolina and the Atlantic coast as a whole (Figure 8) clearly shows Florida with the highest release rate. The figure shows a significant increase in the rate of release off Florida following 2004, when the federal minimum size restriction was enacted for Florida and Georgia. However, the release rate for North Carolina basically remained unchanged. More fish escaping Florida fishermen could contribute to more fish making it to North Carolina to be caught.

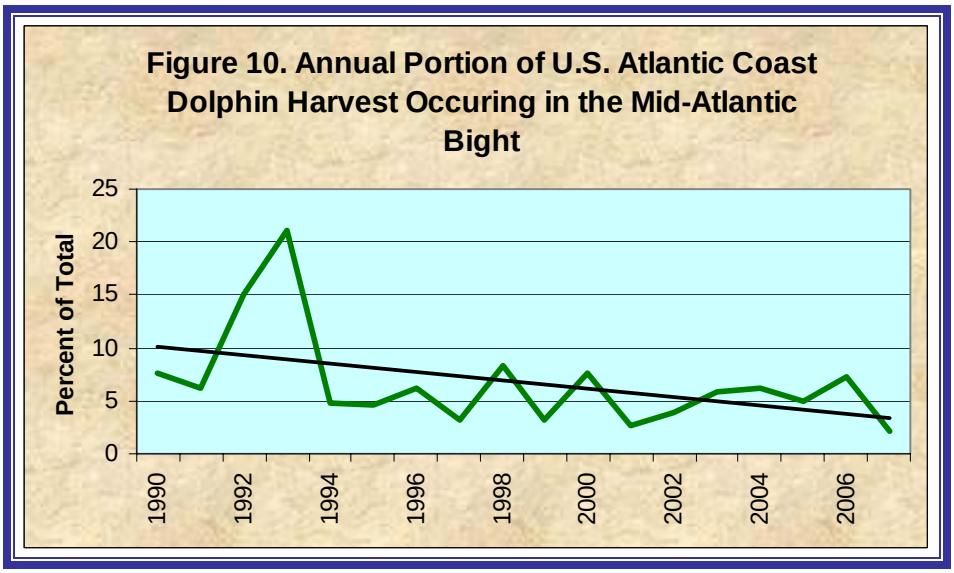


A more probable explanation for North Carolina's increase in dolphin harvest may rest with increasing fishing effort. Comparison of the number of angler trips made annually to the EEZ off East Florida and North Carolina (Figure 9) shows increasing effort trends in both areas from the 1990s to the 2000s. However, fishing effort did not increase at the same rate in the two areas. The average annual fishing effort off East Florida increased 4% during 2000 through 2007 from the average of the 1990s. North Carolina's average annual EEZ fishing effort during the period

of 2000 through 2007 increased 54% from its 1990s average. This rapid growth in fishing effort probably was caused by to an overall growth in the offshore recreational fishing industry in North Carolina. Even with the rapid growth in EEZ fishing effort off North Carolina, it still does not come close to effort expended off East Florida. In the 1990s an average of four times the effort was reported for East Florida as North Carolina. Because of North Carolina's fast growth in EEZ fishing from 2000 through 2007, Florida's effort has been reduced to 2.6 times the effort present off the Tar Heel state.



Another change indicated by the MRFSS data is in the share of dolphinfish that the Mid-Atlantic Bight (MAB), Virginia to Massachusetts, harvests (Figure 10). The trend line for the 18-year period examined indicates an overall decline taking place. The national survey shows the MAB harvesting an average of 8.0% of the total annual Atlantic coast harvest of dolphin from 1990 through 2000. However, from 2001 through 2007 the MAB share fell to 4.7% of the total harvest.



The MRFSS data base is not the most solid source of information on which to base a claim of a fishery decline. However, the fact that similar declines occurred in the dolphin fisheries along the U.S. Gulf of Mexico and Atlantic coasts seems more than a coincidence. It is well documented that specific fisheries can be cyclic, but with seven years of decline in one area and 10 years in the other for a species that is largely an annual crop, it may be time for action on the part of fishery managers.

The shift from Florida to North Carolina as the major harvester is certainly a surprise to this researcher and most likely to Florida fishermen also. Some managers might suggest that this change was the result of a minimum-size restriction that was placed on Florida anglers in 2004 but not on fishermen north of Georgia. But if the Florida minimum-size restriction increased the availability of fish in North Carolina, it would seem that it should also benefit anglers in the Mid-Atlantic Bight, which it did not. The Mid-Atlantic's share in the dolphin harvest has remained well below its 1990s average.

The data presented here should not be taken as a statement of actual decline in the U.S. stock of dolphinfish but rather as reasons that suggest that it is time for closer examination of the health of the dolphinfish stock. Stock assessments do not happen overnight. It takes time and planning just to identify and assemble the data required for the assessment. The NMFS is currently working to increase the accuracy of the landings data by working towards having all saltwater anglers licensed. This should greatly facilitate data collection and should substantially improve the quality of the landings estimates down the road. Development of a national marine recreational fishing data collection program to replace MRFSS should be a top priority for national and regional fishery managers.

Prepared by:
Cooperative Science Services, LLC
961 Anchor Rd.
Charleston, SC 29412
(843) 795-7524
cssllc@bellsouth.net
www.Dolphintagging.com