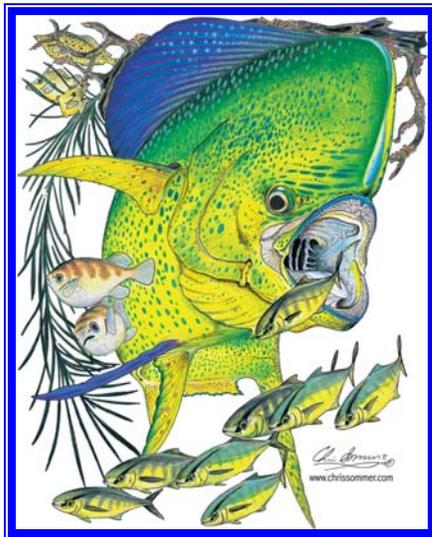


Cooperative Science Services, LLC Dolphin Tagging Research Project

April 2007



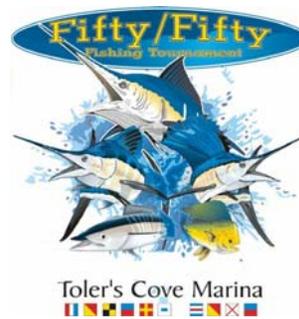
Revelations Via Satellite

The program's use of pop-off satellite tags to study dolphinfish has provided an exciting first-time glimpse into the world of the dolphinfish. These high-tech instruments indicate that fish off south Florida and those off South Carolina have many behavioral similarities. However, the data from each area also exhibited subtle differences that could be a function of the region's seasonal ocean hydrology. Readers are reminded to keep in mind that these study specimens represent large and old members of the species during a specific time in a specific region. These results may not represent the behavior of smaller, younger members of the species.

Large bull dolphin in both areas clearly spent the majority of their time, both day and night, in the surface layer extending down 33 feet. Fish in both regions were found to use a larger portion of the water column, down to 300 to 400 feet deep, than previously suspected. They made deep dives, below 98 feet, during both daylight and darkness but made more frequent and deeper dives during the night. It was during these deepest dives that they entered their coolest waters. Water temperatures utilized by the fish varied 21°F overall but showed a common use of the temperatures between 72°F and 83°F and shared a use of surface waters in the range of 77°F to 83°F. After these common points, the behavior of the fish in each area showed possible temporal and spatial adaptations.

Water temperatures used by the Florida fish during the May/June period were warmer, up to 86°F, than the fish off Carolina which never entered waters above 83°F during the June period. However, the South Carolina fish regularly used waters with much lower temperatures, down to 61°F, than did the fish off south Florida, which never entered waters below 72°F. The preferred water temperature range, as gauged by the frequency recorded, indicated that Florida fish spent the most time in waters of 82°F to 84°F while those off the Palmetto state used waters of 79°F to 80°F most frequently. Variations were exhibited even in the preferred surface water temperatures with the Florida fish preferring waters in the 81°F to 84°F while the fish off South Carolina preferred waters in the 79°F to 81°F range. The dive tracks showed that the fish would only spend short periods in waters below 73°F before returning to warmer waters. It is likely that future satellite tag tracks will adjust the lower thermal limit only slightly but a significant rise is to be expected in the up limit when dolphin are tracked into the tropical latitudes.

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CSS Dolphin Tagging Newsletter

April 2007

Page 2.

Diving behavior between the two groups of fish also showed marked differences. Fish off south Florida made deep dives (below 98 feet) during daylight hours on only one out of every four days, spending more than 97% of the lighted period in the surface layer. The dolphin off South Carolina made deep dives during daylight on three out of every four days spending 62% of the daylight period in the surface layer. On the days when Florida fish did make a deep dive they averaged making four deep dives. Off South Carolina, the fish averaged 12 such dives on the days when they did make deep dives. During the night, diving frequency of the two groups were very similar, averaging 11 to 12 dives per night when deep dives were made. South Carolina fish averaged spending more time below 98 feet per dive, nine minutes, than did the fish off south Florida which averaged five minutes.

The dive tracks of the four dolphinfish provide the first look into the temperatures naturally selected and their use of the vertical water column. However, these tracks show a lot more than a physical temperature or a maximum depth. They indicate a consistent behavioral pattern never before known.

A Circumstantial Case

Could it be that the noted nighttime diving behavior is actually a record of the dolphin's feeding? On most nights dolphin in both regions would make many dives into the deeper water layers. These dives would be as short as three minutes or could last 15 minutes or more. It was common to observe that a fish would return to the same depth multiple times during a night but this depth would change from one night to the next.

My own observations along with reports from numerous fishermen indicate that squid, rock shrimp and paper nautilus regularly show up in the stomachs of dolphinfish. These animals are known to spend the daylight period hiding in the great depths of the ocean and even burrowing into the sand as in the case of the rock shrimp. However, these animals rise toward the surface during the night much like swordfish. So the question becomes, are the dolphin diving down during the night in search of food? It would be logical that, when the fish finds food at a particular depth, it would return to that same depth looking for additional food. It is also unlikely that dolphin would go rooting through the bottom sediment during the day looking for shrimp. If they did, then scars and scratches would be prevalent on their jaws, which is not the case.

The search for food could also explain the increased daytime diving off South Carolina. It is likely that dolphin have separate daytime and nighttime dining menus. In daylight they focus on flyingfish, sardines and the myriad of small jacks and filefishes that abound under sargassum. Because the Florida Current/Gulf

Stream is basically channeled between the Bahamas Banks and the U.S. continental shelf, the dolphin's surface or daytime prey could occur in such abundance as to provide sufficient food to sustain the fish during the day. Hence, they spend virtually all daylight in the surface layer. However, as the current moves north beyond the Bahamas Bank, it spreads out, likely dispersing the surface prey along with its waters over a larger area. With the decrease in day-prey density off South Carolina, it would be logical for the dolphin to go seeking food in the other area where they normally feed, down deep.

Studies on the food habits of dolphinfish have relied on recreational vessels returning in the evenings for their samples. No distinction was made as to the time of day that the fish was caught. Because of the dolphin's fast growth rate, it would have a high metabolic rate along with a fast digestion process to support the metabolism. Subsequently, it is likely that specimens caught from late morning on would only have food present in their stomachs that had been consumed during the daylight period. These studies have concluded that dolphin are opportunistic feeders, feeding on whatever prey organisms are abundant in the surface waters. None of the food habit studies addressed the possibility that dolphin might feed heavily at night. It is likely that future studies will show two facts; (1) Food habits change as they grow, selecting larger and fast-moving prey as they themselves increase in both size and swimming capabilities. (2) They two different menu lists, one by day and one by night, for each area where they occur.

Only through a detailed food habit study will my theory be shown to be fact or fiction. But this clearly demonstrates the value of using the pop-off satellite archival tags to study dolphinfish. You just do not know what the data is going to reveal next.

This study is made possible by a grant from the South Carolina Sea Grant Consortium and the SC Department of Natural Resources to the Hilton Head Reef Foundation. Three satellite tags from this study remain to be deployed in dolphinfish in 2007. Two additional satellite tags will be placed in cobia to conclude this study.

Exuma Sound Tagging Excursion

I recently participated in a four-day dolphin tagging cruise in the Bahamas as a guest of Dr. Thomas McMurray aboard his sports fishing vessel, *Makara*. Fishing out of Highborne Cay, the trip had multiple goals, to film the proper handling and tagging of dolphin, to test methods of tagging large dolphin in the water, and to tag dolphin in Exuma Sound.

Capt. Steve Unsell and mate Billy Gerlach, who have extensive knowledge of fishing throughout the Bahamas chain, recommended Exuma Sound as a good choice for finding concentrations of dolphin during early March. This area is of special interest since no dolphin had ever been tagged in the area and these fish could be part of the

CSS Dolphin Tagging Newsletter

April 2007

Page 3.



Dr. Thomas McMurray prepares to release a tagged bull dolphin captured during a recent cruise in Exuma Sound, Bahamas aboard his boat, Makara.

stock that moves through the Bahamas northwestward to the U.S. East Coast.

In spite of the typical late-winter weather, winds of 15 to 25mph, waves of 3 to 8 feet and intermittent rain, these hard-core fishermen still managed to fish three of the four days allotted. The efforts of the crew were rewarded in the successful tagging of 24 dolphin that ranged in size from 7 to more than 25 pounds. As many as ten additional fish were lost before the tag could be applied (the learning curve). Everyone received an education about subduing an excited dolphin so that a tag could be applied. It may not have been the most enjoyable fishing the crew has experienced but it did have its excitement and adventures.

The other purpose of this trip was to give the crew experience in the intricacies of handling and tagging large dolphin. Dr. McMurray, who serves as chairman for the Marine Ventures Foundation, a non-profit organization that promotes and helps fund marine fisheries research, has stepped forward to help sponsor research into the origins of dolphin entering U.S. waters. The *Makara* will be made available to conduct a two-week tagging effort in the Yucatan Strait during the area's peak dolphin season in late spring of 2007. Information on fishing in the area indicates that most fish will be in the 8 to 20 pound size and that small-school dolphin will be rare. Hence the need to perfect handling large fish.

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Your Financial Support Is Needed

The target budget for 2007 is only slightly higher than 2006 at \$56,600. This budget will provide funding to continue the existing tagging study along with expanding the study into new areas.

At this writing only about one third of these funds have been received. I hope that you will give positive consideration to donating to the CSS Dolphinfish Research Program to ensure this important work continues in 2007. Donations to the Dolphin Tagging Study are fully tax-deductible, thanks to the help of the Hilton Head Reef Foundation. Contributions should be made out to the Hilton Head Reef Foundation (HHR Foundation/Dolphin Study) and sent to the address below.

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For More Information, Contact

Don Hammond

Cooperative Science Services, LLC
961 Anchor Rd.

Charleston, SC 29412-4902

Telephone – FAX (843) 795-7524

Email CSSLLC@bellsouth.net

Web Site www.dolphintagging.com