

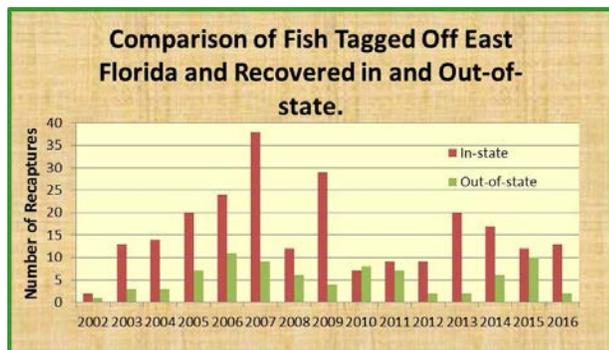
# Cooperative Science Services, LLC Dolphinfish Research Program

Made possible by a grant from the Guy Harvey Ocean Foundation  
December 2016



## Annual Variations in Dolphin Migration Speed

Dolphinfish found off the east coast of Florida offer us our best opportunity to identify annual variations in the speed at which they travel northward. This is possible because more than 14,000 dolphinfish have been tagged off this area of the U.S. Atlantic coast. This has resulted in 239 complete recapture reports for fish recovered within 90 days off Florida's east coast (in-state) and another 81 complete reports for fish recovered in the same year as tagged off the U. S. Atlantic coast north of Florida (out-of-state).



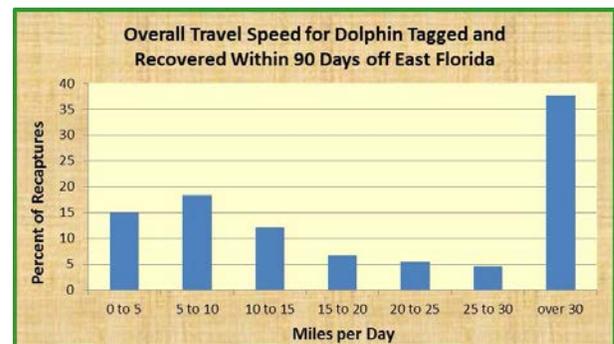
The 320 complete recapture reports represent a significant number of documented movements but spread over 15 years mean an average of just 15.9 in-state and 5.4 out-of-state recaptures were recorded each year. The

The Dolphinfish Research Program needs your financial support. No federal funds support this important research. This program exists because of private donations.

graph above shows that the annual in-state recoveries ranged from two to 38, while out-of-state recoveries ran from one to 11. This indicates that of the fish tagged in Florida and later recovered along the U.S. Atlantic coast the same year as tagged, 75 percent were recaptured before they made it out of Florida.

The speed of travel for dolphin migrating northward along Florida's east coast was found to be highly variable. Fish that were tagged and recovered off Florida's east coast within 90 days were found to travel as slow as less than one-half mile per day to as fast as 130 miles per day. The reason we say recaptured within 90 days is because there are many recoveries of fish out for longer liberties, even as long as four years, that were likely to have traveled to other parts of the western North Atlantic before returning to the Florida coast.

The following graph depicts the distribution of the travel rate noted for the 239 in-state recaptures. This figure shows that 33.5 percent of the fish moved 10 miles or less per day, while 37.7 percent of the fish sped along, traveling at a rate of more than 30 miles per day. Interestingly, fish traveling at the intermediate speeds of more than 10 to 30 miles per day represented the smallest segment of the recaptures, 28.8 percent.



This indicates that overall about one-third of the recaptures moved northward rather slowly while one-third of the fish traveled more than three times faster than the slow group. These variations could possibly be linked to their normal predator instinct to swim into the current in open water to intercept prey being carried by the current. The Gulf Stream commonly flows at the rate of two to four miles per hour, resulting in a drift rate for flotsam of 48 to

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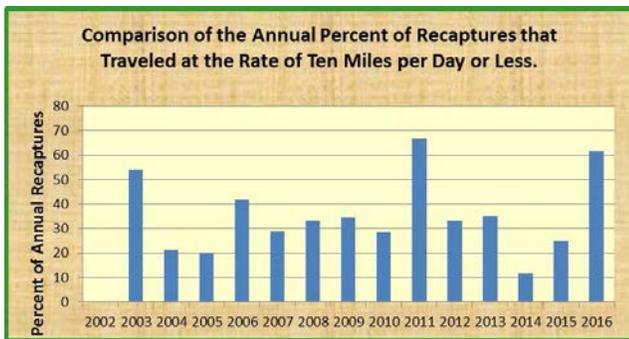
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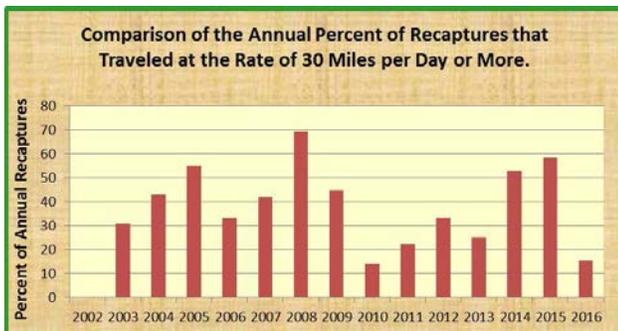
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96 miles per day. This means that fish traveling at rates slower than the flow rate spent at least part of their liberty swimming into the current. The fastest travelers spent more time either drifting with the current, probably in association with Sargassum or flotsam, and may have even spent time swimming with the current. This would suggest that the variations in their speed of travel could be related to how much time was spent in open water or associating with floating objects.

While the overall recaptures may have been almost evenly divided among the three categories of speed, the proportion of the annual recoveries traveling at the various speeds varied greatly. The following figure shows the percentage of the annual recaptures traveling at speeds of 10 miles per day or less. More than half of the Florida in-state recoveries traveled at these slower speeds in 2003, 2011, and 2016. During these peak years of slow travel there was a lower level of fast-traveling fish, more than 30 miles per day, 31, 22 and 15 percent of the annual recaptures respectively.



Annual recaptures shown in the figure below indicate that more than 50 percent of the annual in-state recoveries of Florida dolphin in 2005, 2008, 2014, and 2015 traveled distances of more than 30 miles per day. In these years fish traveling at the slow rate accounted for 20, 33, 12 and 25 percent of the in-state recoveries respectively.



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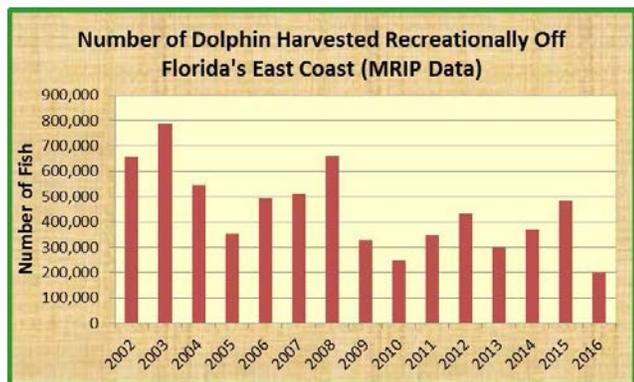
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Interestingly, the 2008 level for fish moving at a slow rate was equivalent to the overall annual average of 33 percent. Fast-moving fish represented 38 percent of the overall recoveries. So the question is whether the speed of travel for the dolphin off Florida's east coast relates to the number of fish caught by recreational anglers. In the years when the most dolphin were moving slowly, were more fish caught? We have to turn to the National Oceanic and Atmospheric Administration's Marine Recreational Information Program (MRIP) for the projected number of dolphin harvested on Florida's east coast each year. See the following figure.



Remember that the peaks in slow-moving dolphin occurred in 2003, 2011 and 2016. The above figure shows a peak harvest of dolphin in 2003, but shows the harvest for 2011 and 2016 (preliminary data) well below the average annual harvest of 448,000 fish. If the hypothesis is that more fish should be caught in the years when more fish are moving slowly, then fewer fish should be caught on years when the major proportion of the fish are traveling fast: namely 2005, 2008, 2014, and 2015. The MRIP data shows 2008 had the second highest annual harvest within the period depicted and the 2015 harvest was above the overall average of 448,000 fish. The years of 2005 and 2014 showed a harvest below the overall average harvest. These findings would indicate that there is probably no correlation between migration speed and the number of dolphin harvested each year by recreational anglers off Florida's east coast.

Another pertinent question is whether the annual dominant travel speed correlated with the proportion of the recaptures being made north of Florida along the East Coast (out-of-state recoveries). The first figure in this article depicted the number of east Florida fish recaptured both in-state and out-of-state. During this study 239 recaptures were recorded for in-state and 81 recoveries came from along the East Coast north of Florida. This shows that overall out-of-state recoveries accounted for 25 percent of the domestic recoveries of east Florida fish. Peak in-state recoveries occurred in 2007 and 2009. The graph shows that of out-of-state recoveries did not follow this pattern, with the largest number of recaptures in 2006

and 2015. This leaves the relationship between the numbers of recaptures in and out-of-state unclear. There may be a reverse relationship or they may be independent of each other.

The relationship between the total number of fish tagged and the total number of recaptures was clear. The average number of fish tagged annually off east Florida was 976 and the number of those fish recovered domestically was 21.3. When we compared the years as to whether they were above or below averages in the number of recaptures in the two categories, 12 of the 15 years were in agreement, with both either above or below average. The three years where they did not agree saw one where the two numbers were off just slightly from the average, another year had below average tagging, and above average recaptures and the other year above average tagging and below average recaptures.

The discrepancies seen in these three years could likely be the results of the human factor involved in recaptures. Recaptures do not exist unless someone reports them. Past studies have shown that the non-reporting of tag recoveries can be as high as 50 percent, with only one in two recovered tags reported. The apathy of some anglers has been seen in this study with several recoveries reported from six months to more than two years after the fact. Studies have shown that human curiosity is the motivating factor in reporting most tag recoveries. Only when rewards for reporting tag recoveries reach a level of \$100 or more does the level of tag reporting increase.

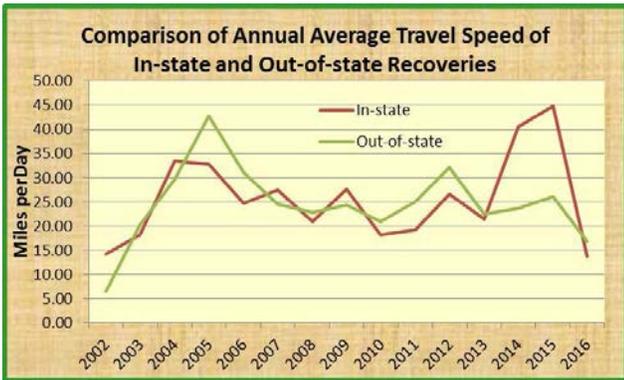
One other facet of interest about out-of-state recoveries of east Florida fish is the speed at which they traveled northward. Because so few fish were recovered in most years on the Atlantic coast north of Florida, it is best to look at these 81 movements collectively. The following figure shows that, like the in-state recoveries, more fish, 34.6 percent, traveled at speeds in excess of 30 miles per day than any other travel rate. However, while a full third of the in-state recoveries traveled at 10 miles or less each day, only 11.1 percent of the out-of-state recaptures moved at this slow rate. It was the mid-range travel rates of more than 10 to 30 miles per day that the majority of the recoveries fell into, 54.3 percent.



When the annual average travel speed for in-state and out-of-state tag recoveries is plotted- see the following graph- a general trend seems to appear for the first 12 years. The average annual speed of travel for both types of recoveries rose and fell in somewhat similar patterns

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from 2002 through 2013. But in 2014 and 2015 when in-state recoveries showed a significant increase in travel speed, out-of-state recaptures showed little to no increase in speed. Then in 2016 the speed of travel for both types of recoveries took a nose dive, slowing to one of their lowest points. Considering that the flow rate of the Florida Current, Gulf Stream, is the major player in affecting the dolphin's travel speed and the same current flows northward to the Outer Banks of North Carolina, it is a puzzle as to the difference in their speed of travel for the two years.



*This is likely one of the largest dolphin known to be captured on rod and reel and possibly the largest. It was caught by Dennis Braid (left in photo) off Tropic Star Lodge, Panama, during a 2010 fishing trip with Tred Barta. It was not weighed on certified scales but marina workers reported that it weighed 60 kg, 132 pounds. Photo by D. Braid.*

*Dolphin Tagging Progress, November 1, 2016.*

Zone	Area	Southern Limit	Northern Limit	Number Tagged
1	Bahamas	22° N	28° N	5
2	FL Straits	23° N	25° N	232
3	South Florida	25° N	27° N	257
4	Central Florida	27° N	30° N	46
5	North FL & GA	30° N	32° N	6
6	Southern SC	32° N	33° N	14
7	N. SC - S. NC	33° N	35° N	0
8	Northern NC	35° N	36.5° N	5
9	Virginia	36.5° N	38° N	2
10	N. Mid-Atlantic	38° N		0
11	Gulf of Mexico			5
12	W Central Atlantic			8
13	Caribbean Sea			27
	Total			607

**Without your financial support this program will cease to exist.**

**For More Information, Contact**

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