

Effects of the 2005 Red Tide Event on Recreational Fisheries in Southwest Florida



K. brevis cell

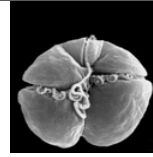


Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute

In 2005 a massive red tide event occurred in southwest Florida, starting offshore in early January and ending by mid-December. High concentrations of the red tide organism (*Karenia brevis*) were also found in the lower regions of Tampa Bay from July through December. The magnitude of the 2005 event and its impact on marine resources caused scientists as well as recreational anglers to be concerned about possible short- and long-term effects on fish populations in southwest Florida. This is a brief review and discussion of those effects on recreational fisheries in southwest Florida.

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Background

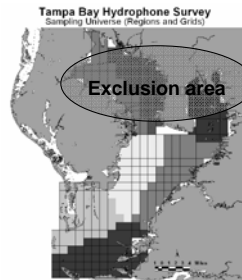


Documented along Florida Gulf coast since 1840's



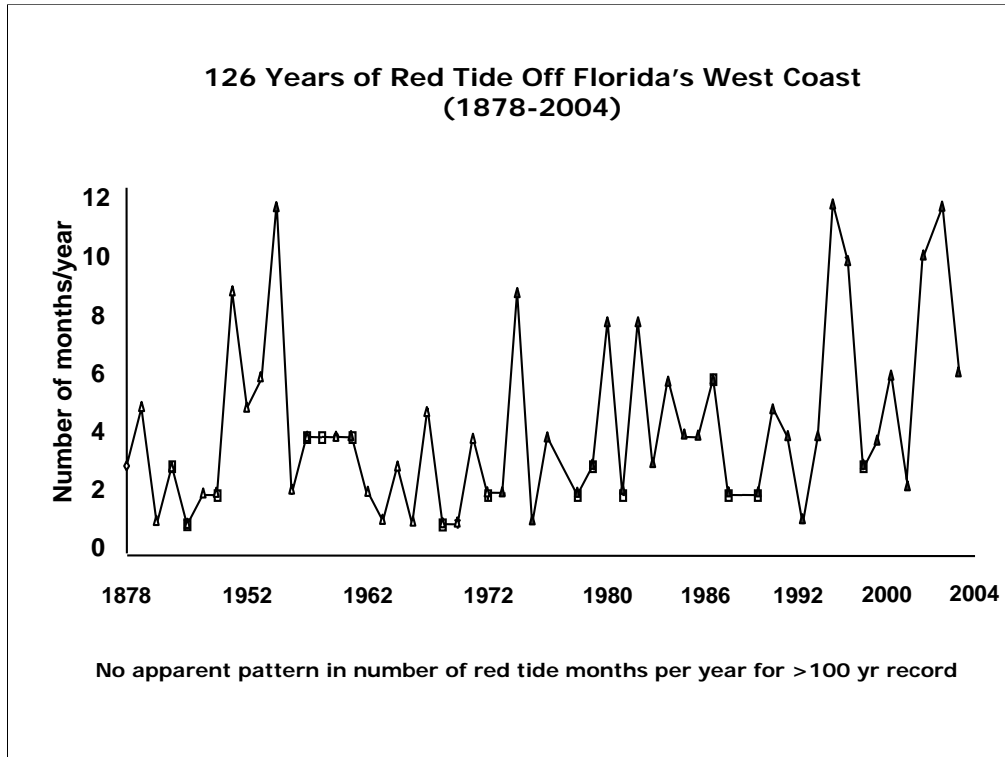
Annual mortalities of millions of fish

Dead and debilitated marine mammals, birds, turtles

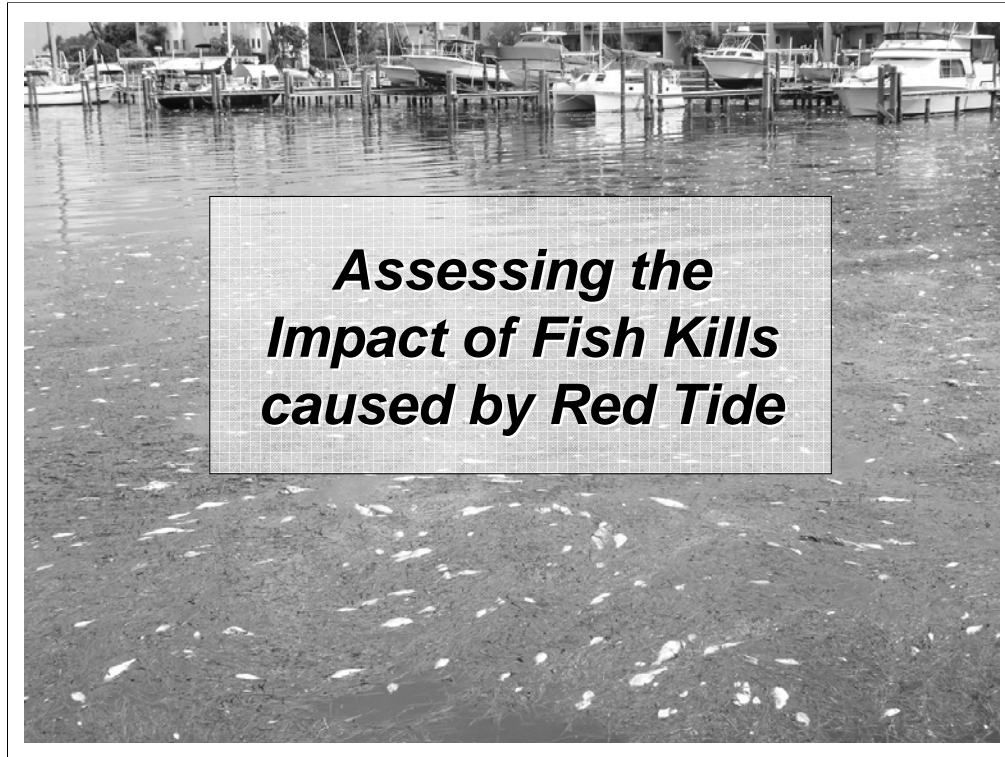


Cannot survive in salinity <24 ppt

Red tides caused by the toxic dinoflagellate *Karenia brevis* are natural phenomena in the Gulf of Mexico. In west Florida, they occur almost annually, resulting in extensive fish kills and, less frequently, marine bird, mammal, and turtle mortalities, and requiring the State to close shellfish beds to protect the public from Neurotoxic Shellfish Poisoning. Massive fish kills are perhaps the most evident result of coastal red tides, leaving beaches and bays choked with dead and decaying carcasses impacting tourism and significantly affecting the State's economy. During the 2005 event thousands of dead fish were sited offshore and throughout bay waters and shorelines.

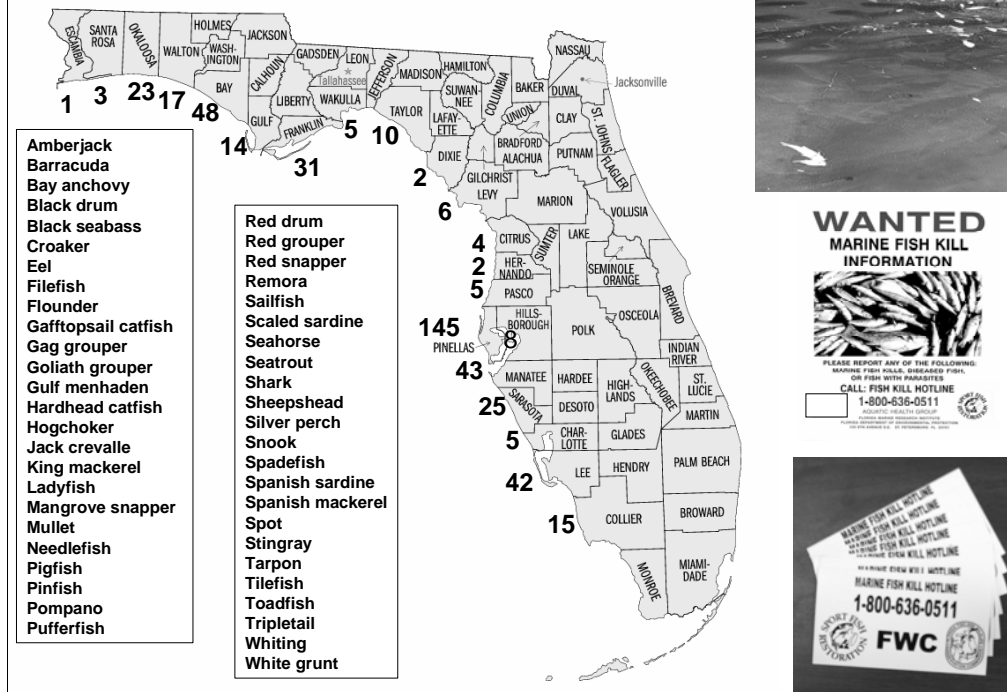


FWRI also has a long term red tide database dating from 1954 with over 64,053 records of concentrations of *K. brevis* in Florida waters. Some years red tides only last for a few months and in other years they can persist for up to 18 months. Red tide has been documented since 1844 with records shown here since 1878.



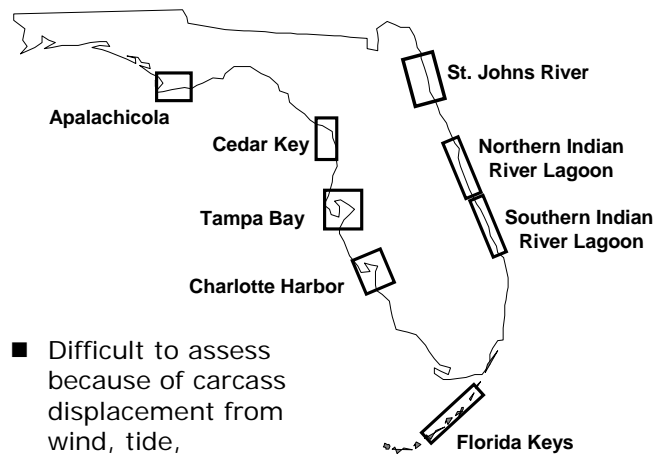
A number of scientific studies have been conducted to evaluate the effectiveness of different survey methods for estimating the magnitude of fish kills caused by severe environmental impacts—such as widespread and persistent red tides. Results from these studies clearly show that on-going fisheries monitoring programs provide a much more accurate picture of the population-level impacts of fish kills than the use of “dead fish counts.” Surveys for dead fish—either washed on beaches and other shoreline or floating—may severely underestimate actual mortality, in part because only a fraction of the dead fish are ever observed or counted (many decompose on the bottom or are eaten by scavengers).

Red tide fish kill reports 1 June – 11 October 2005



The health of sport fish stocks are best monitored through cooperation and communication among various governmental agencies, anglers, volunteers, and the public. Florida requires a program whereby biologists trained in evaluating, documenting, and coordinating a response to fish kills and fish disease related events, can communicate directly with concerned citizens. In response to this need, the FWC launched the Marine Fish Kill Hotline (1-800-636-0511) in 1995. In 2005, FWC's Marine Fish Kill Hotline received 791 reports from members of the public regarding fish kills presumed to be related to red tides. The hotline, together with a new web-based fish kill reporting form, has provided the FWC with an invaluable tool to communicate with the public, to receive information and handle inquiries, to monitor fish disease and parasite conditions, and to respond to mortality events throughout the state.

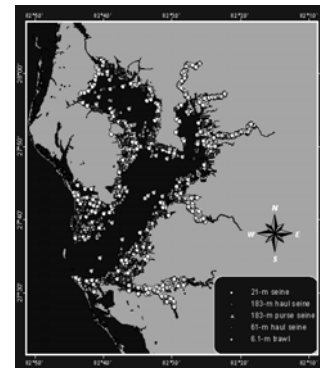
Juvenile Monitoring Program



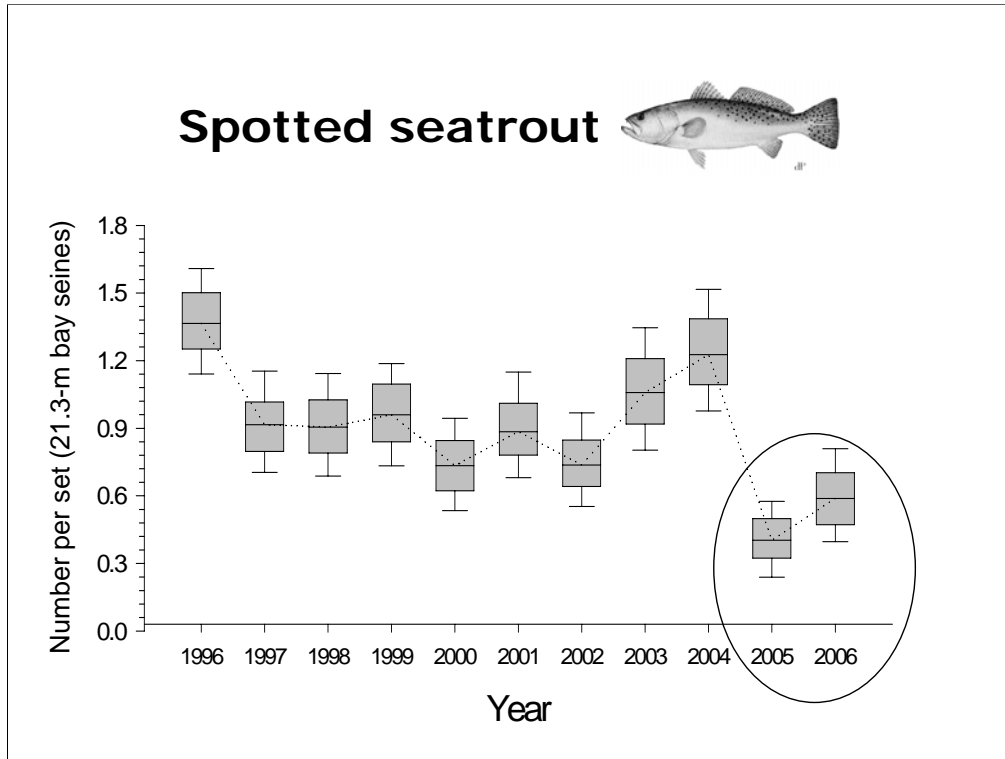
- Difficult to assess because of carcass displacement from wind, tide, decomposition, scavengers
- Best to use on-going monitoring programs instead of "dead fish counts"



Tampa Bay monitoring stations sampled in 2005

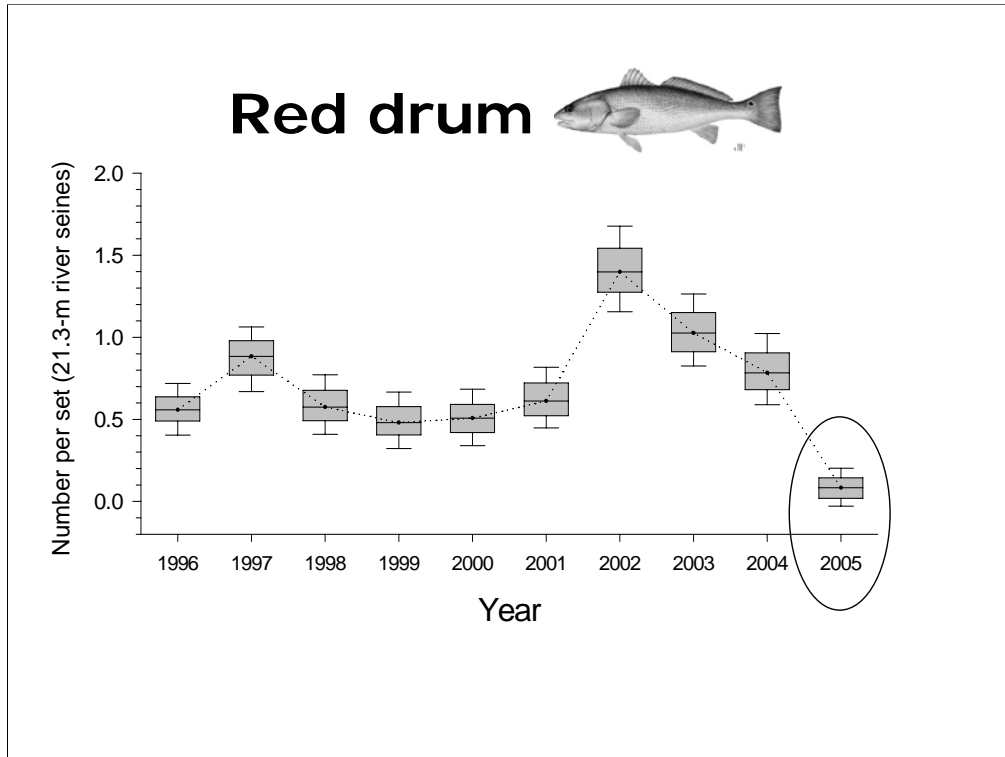


FWC-FWRI's Fisheries Independent Monitoring program (FIM) has a long term monitoring database on juvenile fish in estuarine nursery habitats that can be used to examine the impact of red tide-related fish kills. For the purposes of this report, FIM data for the 3 most popular sportfishes found along the West-Central Florida coast, red drum, common snook, and spotted seatrout, were analyzed. Juveniles were collected in 21.3-m seine hauls deployed in three different ways: 1) the seine was deployed offshore in open-water habitats, and hauled a distance of 9.1 m, with the seine wings held apart; 2) the seine was deployed perpendicular to the shoreline, and hauled a distance of 9.1 m, with the seine wings held apart; and 3) the seine was deployed along a shoreline from the stern of a boat in a semicircular pattern and retrieved onto the shore. The offshore and shoreline sets were used in sampling the bay regions, and the boat sets were used in sampling riverine regions. Adults were also collected in the bay using a 183-m haul seine deployed along a shoreline. These gears have been used to sample Tampa Bay shoreline habitats since 1996.



The impact of the 2005 red tide event on spotted seatrout juvenile recruitment in Tampa Bay was assessed by reviewing annual indices of abundance during the last 10 years. Since seatrout juvenile recruitment in Tampa Bay occurs during April-October, preliminary data for 2006 is available for analysis.

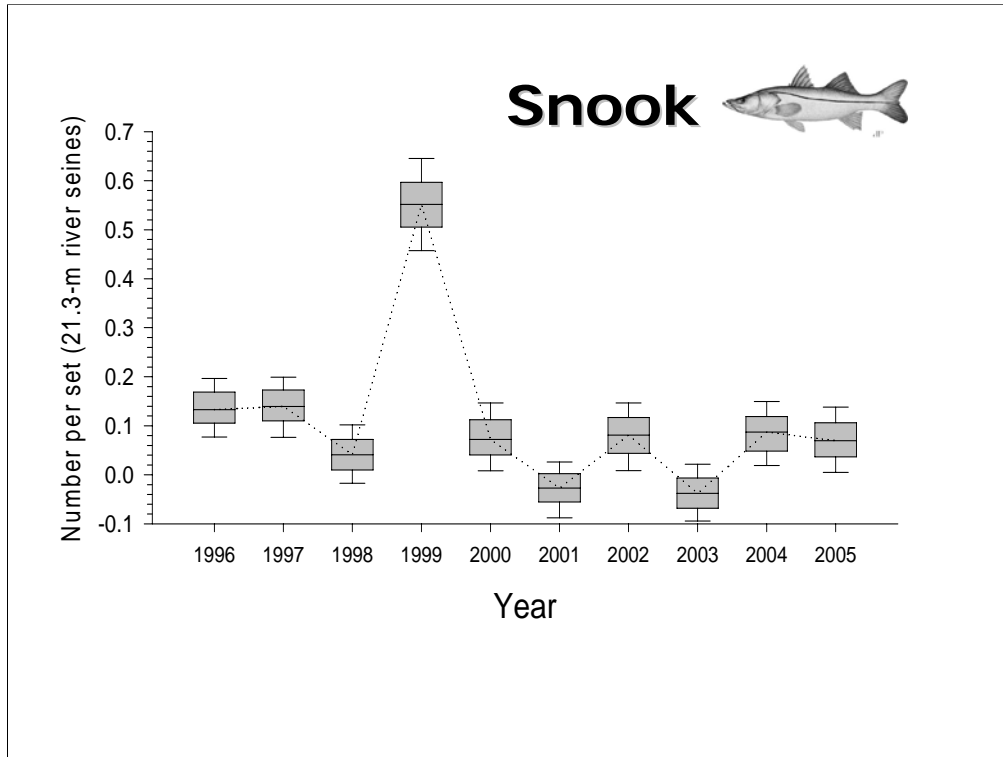
Annual indices of abundance for the period 1996-2006 show a sharp decline in seatrout juvenile recruitment in 2005. Preliminary data for 2006 would suggest another year of relatively lower abundance in Tampa Bay. However, the small increase in recruitment from 2005 to 2006 suggests that spotted seatrout populations in the Tampa Bay area may be recovering.



Recruitment of juvenile red drum in Tampa Bay also showed a significant decline in 2005 coinciding with the prolonged red tide event in this area.

In Florida estuaries recruitment of juvenile red drum usually begins in September and continues through February, with peaks occurring in October and November. Therefore, a complete set of red drum juvenile abundance data for 2006 is not yet available.

FWRI will analyze red drum recruitment data in early 2007 to evaluate whether the pattern of low juvenile abundance observed in 2005 continues during 2006.



Relative abundance of juvenile common snook in Tampa Bay were relatively stable between 1996 and 2005 with the exception of 1999 which showed a significantly higher value. No decline in abundance was evident for 2005 suggesting that juvenile snook in Tampa Bay did not suffer a severe red tide related mortality during the 2005 prolonged red tide event. Juvenile recruitment data for 2006 is not yet available for analysis.

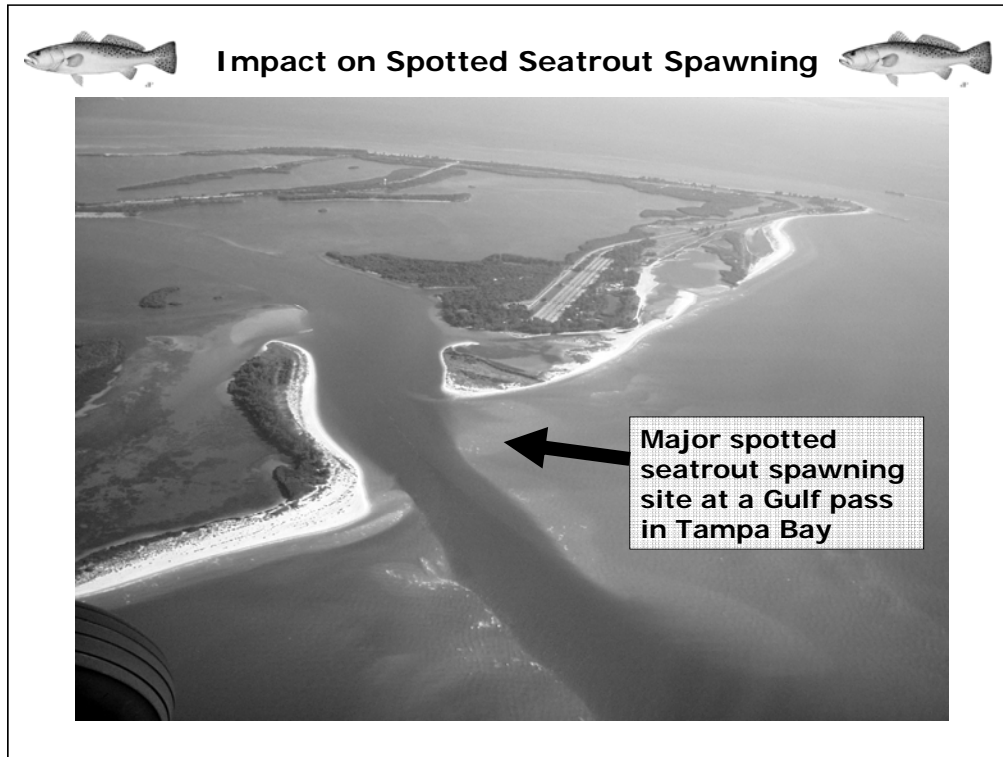
The use of low salinity nursery habitats by juvenile common snook may explain the good survival observed during the 2005 red tide event in West-Central Florida. Red tide is common in high salinity areas but does not survive in mid-range salinities less than 24 ppt and brackish water. Fish that have life history stages in low salinity areas are therefore less susceptible to red tide-related mortalities.

Impact on Sportfish Catches

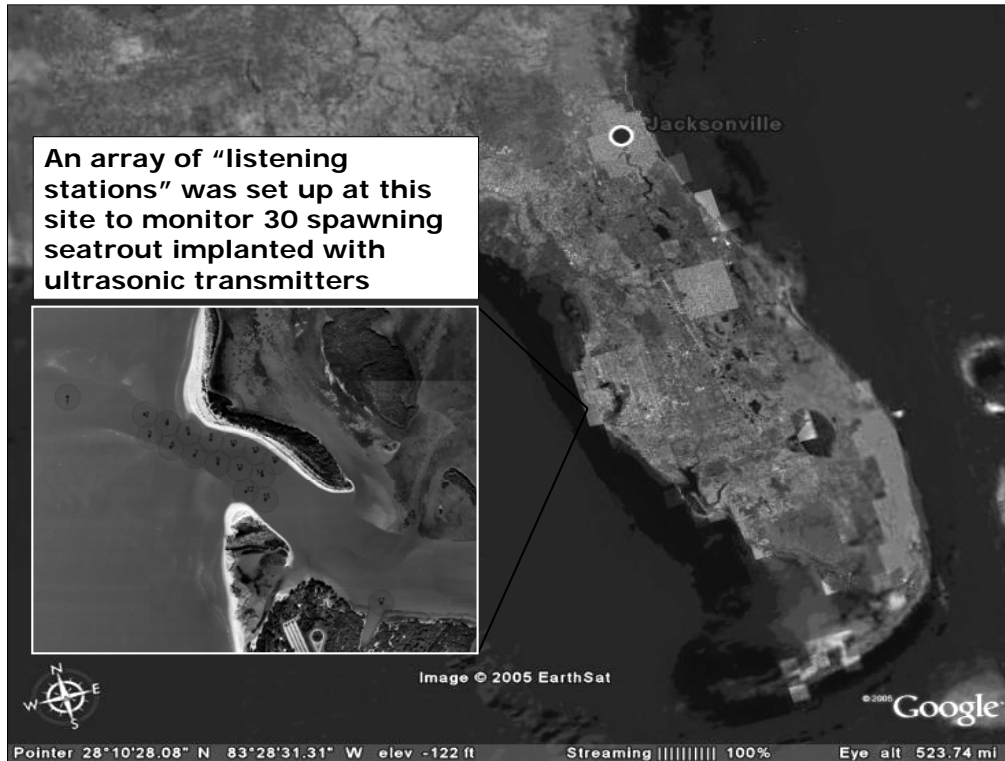
- Of the “Grand Slam” species, spotted seatrout showed the strongest evidence of a red tide related impact
- Intercept data showed that Tampa Bay anglers were 5 times less likely to catch a spotted seatrout during Jan-Mar 2006 than for the same period in 2005
- This trend was not evident for red drum or snook



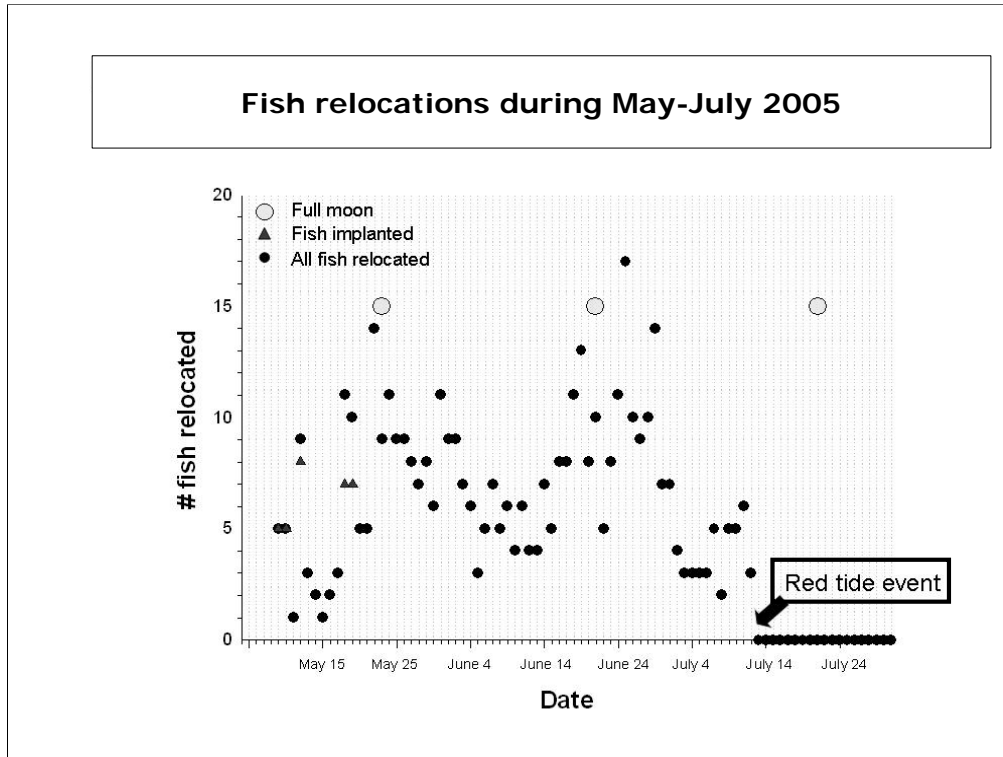
Of the “Florida Grand Slam” species (spotted seatrout, snook, and red drum), only spotted seatrout showed evidence of a red tide related effect on recreational catches in the Tampa Bay area. Angler interviews indicated that the proportion of anglers that caught spotted seatrout there during the first part of 2006 was significantly lower than for the same period in previous years. Although this trend was not evident for snook or red drum, abundance of these species should be closely monitored over the next few years—especially since reports to the FWC Marine Fish Kill Hotline indicate that thousands of large red drum and a large number of large snook washed ashore in the lower Tampa Bay.



A 5-year study of a major spotted seatrout spawning aggregation at a Gulf pass in Tampa Bay provided evidence of the impact of the 2005 red tide event on seatrout spawning in this area.

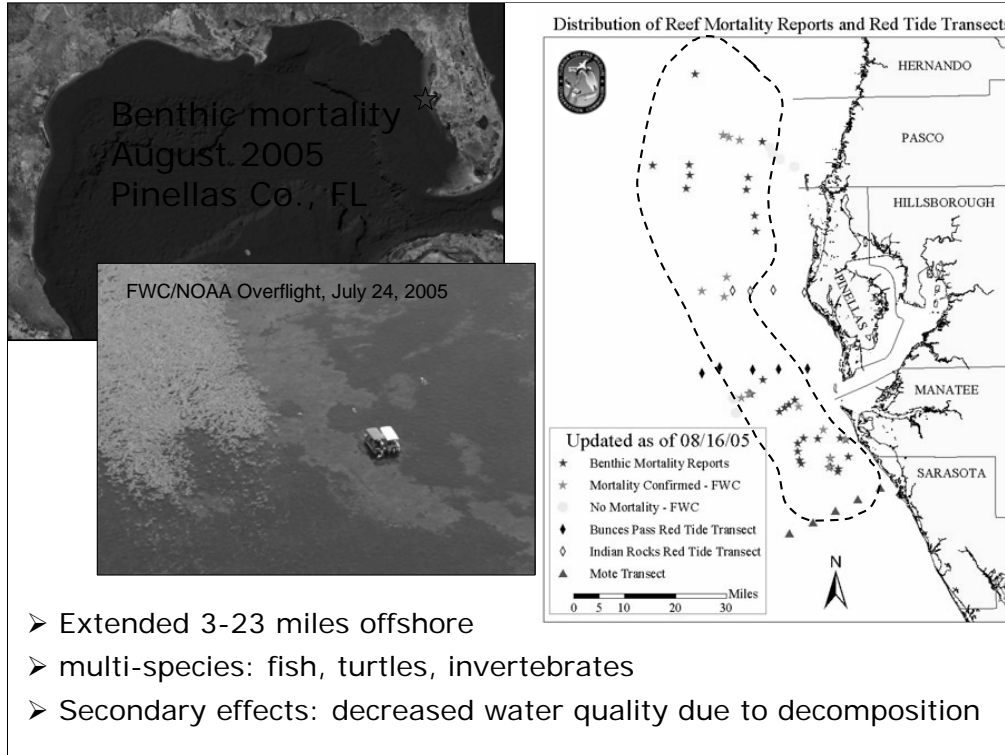


Spotted seatrout spawning activity at this site has been monitored by tracking 30 spawning fish (13 males and 17 females) implanted with ultrasonic transmitters as they move through an array of receivers ("listening stations") set up in the pass.



Spawning seatrout were implanted with transmitters during the month of May (the beginning of the spawning season) and monitored thereafter. Prior to the 2005 red tide bloom these fish were consistently relocated within the receiver array. However, by July 12, 2005, no implanted fish were ever relocated again despite the fact that the spotted seatrout spawning season continues through September.

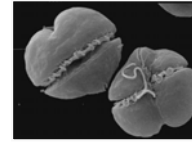
Monitoring of this spawning site in 2006 indicates that spawning spotted seatrout have not repopulated the area following the 2005 red tide bloom. We will continue to monitor the pass spawning site to determine whether this spawning site will come back to the levels of spawning activity seen before the 2005 red tide event.



The 2005 red tide event also caused mass mortalities of benthic hardbottom communities off west central Florida. Red tide related mortalities were exacerbated by subsequent hypoxic/anoxic (oxygen depletion) water conditions caused by widespread decomposition of dead organisms. In response to reports from stakeholders, FWC's Fish & Wildlife Research Institute (FWRI) and Mote Marine Laboratory conducted surveys in an area from Tarpon Springs southward to Sarasota and seaward for 30 miles. The results of these surveys indicated that some reef communities had a complete loss of both sessile and motile residents while some reefs in the area appeared to be unaffected.



Summary



- Although the 2005 event was particularly intense and prolonged red tides are a common occurrence along Florida's Gulf coast.
- The low abundance of juvenile red drum and spotted seatrout in Tampa Bay in 2005 may reflect red tide-related mortality. Data from 2006 show seatrout may be recovering.
- Snook juvenile abundance showed no evidence of a severe red tide-related mortality. This may reflect their use of low salinity nursery habitats which are generally outside the range of red tide occurrence.
- Of the "Grand Slam" species, spotted seatrout showed the strongest evidence of a red tide-related reduction in recreational catches. This trend was not evident for red drum or snook.
- An important spotted seatrout spawning site in Tampa Bay was greatly impacted by the 2005 red tide. Data from 2006 shows recovery may be slow.

