SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES
Division of Wildlife and Freshwater Fisheries
Environmental Programs Office

MEMORANDUM

To: Water Quality Technical Committee
From: Ron Ahle
Date: 3-24-06
Subject: Striped Bass Fish Kills on Lake Murray

The following is a summary of the history of striped bass "die-offs" due to oxygen/temperature squeeze in the lower lake area of Lake Murray.

In reports by Ortho May in the late 1970's, it was stated that "annual die-offs" of striped bass were so regular as to be "predictable" and had occurred for the "past 10 years or so". Ortho studied the water quality conditions from 1977 through 1979 in an effort to determine the cause of the annual die off, but unfortunately (or fortunately) no striped bass die offs occurred during the study.

The occurrence of striped bass "die-offs" during the 1980's were largely not reported, however a significant event occurred in August 1989 and two events exceeding 1000 individuals were reported in 1990. On August 17, 1990, a single event was reported to have 1, 157 individuals ranging in length from 12'' to 37''. This event plus several herring entrainment events resulted in the completion of a study report prepared for SCE&G entitled "An Evaluation Of Recurring Fish Kills In Lake Murray and the Saluda River, SC". The conclusion of this report was "Any striped bass using the deep portion of Lake Murray near the intake towers in late-summer 1990 would have been affected to some degree by thermal and/or oxygen stress."

The summer of 1991 was a particularly bad year for striped bass "die-offs". Dead fish were reported from July 19th through August 9th with 3,139 fish ranging in size from 12" to 41". It was reported that the kill area was much larger than in past years and that there was no way to count all the fish that perished. Parasite and disease examination results were negative thereby supporting the theory of thermal/oxygen stress as being the probable explanation for the mortalities. After this event, SCE&G agreed to operate Unit 5 in a "last on/first off" mode and that was soon to prove an important factor in avoiding or shortening the duration of periods of poor habitat.

In September of 1993, a small but significant fish "die-off" was reported where 580 individuals with lengths of 15" to 23" were found between the intake towers and Jake's Cove. Another "die-off" was reported in August 1998 where 456 individuals with were found. It was reported in both instances that the "last on/first off" operation mode was

an important factor in reducing the duration and the magnitude of the fish kill.

A die-off of adult striped bass occurred over a several week period in August of 2005. The kill was confined to the forebay area of the lake, extending several miles out from the dam. The exact magnitude of the event was not determined but transect counts during the period confirmed the death of at least 742 fish ranging in size from 17"-38" in length. Numerous dead fish were observed along the shoreline area outside the transect areas over the entire lake.

REMBERT C. DENNIS BUILDING * P.O. BOX 167 * COLUMBIA, SC 29202
TELEPHONE: (803) 734-2728 * FACSIMILE: (803) 734-6020

News Releas

P.O. Box 167
Columbia, S.C. 29202

News Contacts
Columbia 734-395
News Section Chief, Mike Cree
Greg Luca
Beth Jennings Maso
Charleston 795-635
Bob Campbe
Pete Laur

SPECIAL NEWS RELEASE #93 - 66

September 10, 1993
For Immediate Release

LAKE MURRAY STRIPED BASS DIE-OFF
LINKED TO HEAT, LAYERING OF LAKE

State wildlife department fisheries biologists have counted nearly 600 dead striped bass near the Lake Murray dam in a natural die-off caused by poor late-summer water quality in the lake.

And while the number of fish killed may increase during the next week, state wildlife officials say an agreement with South Carolina Electric and Gas on the operation of its Lake Murray hydro station has likely lessened the severity of the fish kill.

Gene Hayes, district fisheries biologist with the S.C. Wildlife and Marine Resources Department, said 580 stripers were counted Thursday in an area from the Lake Murray dam to just past Spence Island. The fish ranged from 15 inches to 23 inches, with 80 percent of the stripers less than the legal length limit of 21 inches.

Hayes said summer die-offs like this one have occurred regularly at Lake Murray since 1973, and a condition called the "temperature-oxygen squeeze" is to blame. Some hooking mortality of fish caused by anglers also occurs in this area, but to a much lesser extent.

During hot weather Lake Murray becomes stratified, or divided into several layers, with the upper layer being the warmest and

--more--

highest in oxygen. Deeper levels are cooler but contain less dissolved oxygen.

During the early summer months striped bass concentrate at depths containing the best balance between cool temperatures and high levels of oxygen. As summer progresses, the upper layer becomes too warm for stripers, which generally prefer water less than 78 degrees, and the fish move to deeper and cooler waters. As the oxygen levels in the lower layers are depleted to around 2 parts per million, the striped bass become stressed and some eventually die. Biologists call this condition the "temperature-oxygen squeeze."

Fisheries biologists have documented a steady decline in oxygen levels since mid-July in the deeper waters near Lake Murray dam, so Hayes said they were not surprised when the fish kill occurred.

South Carolina Electric and Gas (SCE&G) for the past two years has agreed to a "last on, first off" operation schedule for its No. 5 hydro unit at the Lake Murray dam. When habitat conditions for striped bass are at their worst, the 80-foot-deep area around the intake of the No. 5 hydro unit seems to be one of the last, best refuges for the fish. Not operating the hydro unit seems to prolong the quality of this refuge. Hayes said SCE&G has used the No. 5 hydro unit few times this summer.

"We think the agreement with SCE&G is a definite factor in improving habitat for striped bass," said Hayes. "Without SCE&G's cooperation, we could have had this die-off earlier in the year. In fact, the die-off has historically occurred between mid-July and mid-August, and because we are moving into a cooler time of year, with the lake layers beginning to break up, this fish kill should not be as large or as long as some we have seen in the past."

In July-August 1991, an estimated 3,139 stripers were killed in a die-off attributed to temperature-oxygen squeeze.

(Writer - Greg Lucas)