1999 STRIPED BASS CATCH AND RELEASE RESULTS

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INTRODUCTION

The popularity of catch-and-release fishing for striped bass has increased substantially. Along the Atlantic Coast from Maine to North Carolina, 16.5 million striped bass were caught in 1998 and more than 90% were released. A constant 8% mortality rate for released striped bass is incorporated into state and federal management plans, therefore the mortality of released fish can be a significant component of overall fishing mortality.

Since 1996, Maryland Department of Natural Resources Fisheries Service has been conducting studies that evaluate the factors that influence the survival of fish that are caught and released by recreational anglers. Studies have included hickory and American shad, white perch, summer flounder and striped bass.

These studies have shown there are two main factors influencing survival of fish that are caught and released: physical injury and stress. Fish can be physically injured from hook wounds, and during handling and release. They can be physiologically stressed by the exertion from the fight.

Numerous studies with a variety of species have shown that the location of the hook wound (physical injury) is the single most important factor influencing the survival of released fish. If the wound site is a vital organ, the mortality, as expected, is high. The wound site can be affected by hook size or configuration, bait size, the use of natural bait verses artificial lures (natural baits tend to be swallowed more frequently), angler experience or fish behavior.

Stress-related mortality can be affected by variations in the environment. Temperature, salinity and fish size are three important and interactive factors that affect survival of caught and released striped bass. High temperatures, low salinity and larger fish size have been shown to increase, individually or in combination, the mortality of released striped bass.

METHODS

The Fisheries Service conducted a study last summer that evaluated the survival of deep and shallow hooked striped bass caught in different environmental conditions in the Chesapeake Bay. The study was conducted with the cooperation of the Maryland Charter Boat Association, the Maryland Coastal Conservation Association and the Maryland Saltwater Sportfisherman's Association.

- Striped bass were caught by hook and line at Love Point, at the mouth of the Chester River and the Diamonds near the Choptank River.
- They were held in pens off Love Point and at the Cooperative Oxford Laboratory.

- Two 2-day trials were conducted at each location from June through October.
- Conventional bait hooks were used the first day and similar sized, non-offset circle hooks were used the second day.
- Fifty striped bass was the target number for each day. Striped bass were caught by chumming and anglers were instructed to hook, play and land the fish in a normal manner.
- The location of the hook wound was identified when each fish was landed.
- Fisheries Service biologists removed the hook if the fish was shallow hooked, but left the hook in place in deep hooked fish by cutting the line.
- Each fish was marked to identify hook location (shallow or deep) by hole punching the tail fin.
- The fish were placed in tanks on board DNR transport vessels.
- Oxygen, temperature and salinity measurements from surface, mid-water and bottom depths were taken at each site several times each day.
- The most optimal conditions for survival (lowest temperature and highest oxygen) found at each site were duplicated in the tank.
- When 25 fish were captured, they were transported to the net-pens.
- The striped bass were held for 72 hours and checked daily for mortality.
- Temperature, dissolved oxygen and salinity were monitored in the pens each day. Dead fish were measured and had hook location (hole punch position) recorded.
- All dead fish, marked as deep hooked, were dissected to determine the nature and extent of the internal damage that caused death.
- All surviving fish were measured, had hook location recorded and were released after 72 hours.

RESULTS

- Four hundred seventy six striped bass were caught with conventional bait hooks and 640 were caught with non-offset circle hooks.
- The average size and the size range of striped bass caught with conventional bait hooks were similar (16.7 in; 10.5 - 36.6 in) to those fish caught with non-offset circle hooks (16.4 in; 11.4 - 36.3 in).
- The **deep hooking rate** for conventional bait hooks over the course of the entire study was 17.2% and was 3.4% for non-offset circle hooks. This magnitude of deep hooking reduction has been documented in several other Fisheries Service studies (24% for conventional hooks vs. 4% for circle hooks in summer 1996 and 46% vs. 11% in spring 1997).
- The **deep hooking mortality rate** for striped bass caught with conventional bait hooks in this study was 53.1%. The deep hooking mortality rate with non-offset circle hooks was 23.5%. Studies done here in Maryland have consistently shown the deep hooking mortality rate of striped bass caught with conventional bait hooks to be about 50% regardless of temperature or salinity (57.7% in 1995; 41.0% in 1996 and 56.3% in 1997).

DISCUSSION

Post mortem examinations of deep hooked striped bass caught with conventional bait hooks showed hook points penetrating heart and/or liver in most dead fish, and severe internal hemorrhage in all dead, deep hooked

fish, even when major organs had not been penetrated. Post mortem dissections of fish deep hooked with circle hooks showed tears in the esophagus were caused by the outside bend of the hook not the point. Non-offset circle hooks orient the point away from the direction of travel when the line is pulled tight. The point does not penetrate organs as a conventional bait hook with its point facing the direction of travel. Long term survival of deep hooked fish is not well documented.

A profound effect on shallow hooking mortality was documented in relation to air temperature. When air temperatures were below 95 F, the mortality of shallow hooked striped bass, those fish only stressed by physical exertion not by lethal hook wounds, was 0.8%. When air temperatures ranged from 95 to 105 F in July, mortality rose to 17.2%. The mortality rate of all shallow hooked fish combined was 3.5% for the entire study period.

Death in these studies is rapid. More than 75% of the fish that die, die in less than 6 hours and 95% die in less than 24 hours. Other catch-and-release studies with striped bass, shad and white perch show the same mortality pattern. This strongly suggests that mortality of these fish reflects hooking injury or angling stress, not confinement because mortality is rapid and usually associated with severe internal damage from hook damage. Mortality from caging stress would be expressed over time as fish languished in confinement. All fish that survive are extremely vigorous at release.

Catch-and-release mortality studies in Maryland have shown that under most circumstances this activity is a relatively non- consumptive practice that is compatible with fishery management plans. However there are circumstances under which release mortality can be high.

In the 1999 Study, we determined that overall 9.1% of the fish caught on conventional hooks died whereas only 0.8% of the fish caught on circles hooks died. Dramatic differences in mortality between deep and shallow hooked fish, consistently documented in catch-and-release mortality studies, should encourage anglers and fishery resource managers to strive to reduce deep hooking rates. Non-offset circle hooks not only reduce frequency of deep hooking, but deep hooking mortality is lower with non-offset circle hooks than conventional bait hooks. Combining deep hooking rates with deep hooking mortality for each style of hook indicates a theoretical reduction in mortality throughout the season for all fish from 9.1% to 0.8% using circle hooks.

When environmental conditions are likely to be stressful for released fish (high temperature, both air and water, and low salinity) anglers should minimize the practice of catch -and-release fishing. When angling during periods of extreme air temperatures (>95 F) keep the fish in the water when releasing it. It was the intent of this study to evaluate release mortality at two significantly different salinity levels. Drought conditions this summer prevented mortality trials from being conducted at low salinity sites. An identical study will be done this summer to evaluate striped bass catch-and-release mortality under a low salinity environment.