

A review of predation on blue crabs in Chesapeake Bay

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In recent years the recovery of striped bass populations in the Chesapeake Bay has fueled concern about the effect of their predation on blue crab abundance. Fishermen reported finding large numbers of small crabs in the stomachs of striped bass and worry that high populations of stripers may be responsible for the decline of crabs. There are a number of current and historical studies which can be used to evaluate the potential for excess predation. Blue crabs were present in 13.6% of the stomachs of 2410 striped bass examined Baywide during 1997-1998 but were less than one percent of the total weight of all food items (Austin and Walter 1998). In other open water samples from the Bay, Overton et al. (2000) found that 14.7% of the striped bass that he examined in 1999 had crabs in their stomachs. In 2000 only 9.6% of striped bass had crabs in their stomachs. Crabs made up seven percent and four percent, by weight, of total food items in 1999 and 2000 respectively. Fish made up 94% by weight of steeper food items in 2000.

Orth, et al. (1999), on two days in 1998, sampled striped bass, croaker and red drum in seagrass beds in the York River where juvenile blue crabs were abundant and found that 60% of the striped bass, 100% of the channel bass and 34% of the Atlantic croaker had consumed juvenile blue crabs. Further limited studies in Virginia grass beds in 1999 found 55% of striped bass, 64% of red drum and 10% of croaker ate crabs. Crabs made up 45%, by weight, of the diet of striped bass feeding in grass beds. Data from a more intensive and extensive study in the fall of 2000 are being analyzed and will be reported in February of 2001. From preliminary analysis of the 2000 data, the average number of crabs in striped bass varied from 1.9 to 15.1 and averaged 3.5 crabs per stomach. The proportion of striped bass eating crabs appears to be similar to previous years.

Booth and Gary (1993) reviewed research conducted on the food habits of striped bass in Chesapeake Bay between 1937 and 1992. With the exception of one study, only a small fraction (about 4%) of the diet of striped bass was composed of blue crabs. The exception was a researcher working in the James River in Virginia (Hollis 1952) who found that crabs accounted for 17% of the striped bass stomach contents.

These studies illustrate the large difference in striped bass predation on crabs between striped bass sampled in grass beds and striped bass sampled in open waters of the Bay. The grass beds in Virginia waters are where the crab larvae, which are moving back into Bay waters from offshore, settle to molt into young crabs. The grass bed offers food and shelter for the growing crabs and densities of young crabs have been found to average 30 per square meter in grass beds and only one per square meter on adjacent unvegetated habitat (Orth et al. 1996). Predators in the grass beds would find greatly increased opportunities and increased striped bass feeding on crabs is a not surprising consequence. Crab size in the stomachs of striped bass averages about 0.85 inch and is double the 0.45 inch average size of crabs measured from the grass bed (Orth et al. 1999). This difference indicates that striped bass are selecting for the larger young crabs. However, Orth et al. (1996) found that survival increased significantly in vegetated habitats with increasing crab size until about two inches when survival in vegetated and unvegetated habitats did not differ.

Seagrass is a very important habitat for young crabs as evidenced by their abundance in grass beds. However, consumption rates of predators and the magnitude of Baywide effects of predation cannot be based solely on studies of crab consumption in these areas. Striped bass and crabs are distributed throughout the tidal Bay and tributaries which covers some 2,816,000 acres (Lippson 1973). Densities of the various sizes and ages of both species vary seasonally by area. Grass beds covered only 2.3% of the Bay bottom in both 1990 and 1999 (60,300 and 64,700 acres respectively. Orth et al. 1999). The acreage available for foraging is much greater outside the grass beds.

As crabs grow they move progressively northward into Maryland waters. They utilize grass beds, when available, for shedding and hardening but they are not limited to grass beds as they forage throughout the Bay.

Hines and Ruiz (1995) identified shallow water and the associated structural features as an important habitat for juvenile crabs. Predation mortality rates for juveniles were lowest in shallow (less than three feet) water. They determined cannibalism by large crabs was the major cause of juvenile mortality and accounted for 75 to 97% of the loss of the age 0 year class (2-3 inches). Predation mortality is highest for smaller crabs in waters deeper than three feet.

From comparison with historical studies, there are some indications that presently crabs are more commonly found in striped bass stomachs and that they may make up a larger portion of the weight of all food items (Anthony Overton, Univ. Md. Eastern Shore, personal communication). The increased consumption of crabs is probably not sufficient to account for the decline in crab abundance over the past four years. Work on modeling the effects of striped bass predation is continuing and a report will be available sometime in 2001. This modeling will consider the seasonal differences in food preference and area differences in prey and predator densities to give an unbiased accounting of annual prey consumption by striped bass.

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