# RESTORATION OF STRIPED BASS IN THE STATE OF MAINE

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## INTRODUCTION:

From New Hampshire to the Canadian border, migratory striped bass support an important recreational fishery in the inshore coastal waters of Maine. Coastal anadromous striped bass inhabit Maine waters as far inland as the first upstream dam on major river systems and seaward to the outer Maine islands. The species is seasonally available to Maine anglers from May through October, although striped bass are occasionally caught in Maine waters as early as mid-April and as late as the latter part of November. The availability of striped bass to the Maine fishery is highly variable from year to year and depends upon year class strength and migratory patterns of stocks originating from south of Maine. Based on recent tag return data, the origins of striped bass in the Maine fishery are primarily Hudson River and Chesapeake Bay fish, although the proportional contribution of these stocks has yet to be determined. During the past 60 years, the annual relative abundance of migratory striped bass has been highly variable. The major sport fishery occurs in southwestern Maine adjacent to the urban areas of Portland, Saco, Biddeford, and Bath/Brunswick. Striped bass surf fisheries occur primarily from sandy beaches and rocky promontories south of the Kennebec River. Estuarial striped bass fisheries occur in the Saco, New Meadows, Kennebec, Sheepscot, Damariscotta, St. George, Penobscot, Union, Narraguagus, and St. Croix Rivers. With the exception of the Sheepscot and Damariscotta Rivers, striped bass fishing pressure east of the Kennebec River is considered to be light. As an example of the magnitude of the fishery, Otto (1970) estimated that the total 1969 striped bass fishery effort for mid-coastal Maine (Kennebunk to Port Clyde) of 176,000 angler hours produced a catch of 23,500 striped bass and a 1970 effort of 114,000 angler hours produced a catch of 6,500 fish.

**HISTORICAL FISHERIES** - Prior to the late 1920s and early 1930s, native spawning populations of striped bass were known to occur in the Kennebec/Androscoggin River estuary. Although historical accounts indicate that small commercial fisheries occurred in the Penobscot, St. Croix, and Saco Rivers, the Kennebec/Androscoggin estuary was considered to be the major production area in Maine. The large expanse of tidal freshwater in the Kennebec/Androscoggin estuary was well suited to the reproduction of striped bass. These two large rivers [Kennebec and Androscoggin], in addition to three smaller tributaries (Eastern, Cathance, and Abagadasset) form an 8,154 acre tidal complex which includes "Merrymeeting Bay," a large freshwater tidal bay. Prior to construction of the Augusta Dam, striped bass ascended the main stem as far as Waterville and the Sebasticook River, a short distance above its mouth (Atkins, 1887). The construction of this dam in 1837 reduced the potential spawning habitat in the main stem of the Kennebec River by almost 50%. Historically, young striped bass two to three inches long were noted to be plentiful during the winter months in the Kennebec River as evidenced by the fact that they were commonly caught in bag nets set for smelt and tomcod. Larger individuals were found in the freshwater tidal sections of the Kennebec and tributaries in a state of semi-hibernation (Atkins, 1887). As late as 1830, striped bass catches in the Merrymeeting Bay district exceeded the capacity of markets to absorb them. Some weirs were known to take 1,000 pounds on a single tide. Winter gill net fisheries on the Eastern and adjacent Sheepscot River remained active as late as the 1920s. The native spawning population of striped bass in the Kennebec/Androscoggin estuary was believed exterminated in the late 1920s or early 1930s due to heavy industrial and municipal pollution. From the 1930s to the mid 1970s, dissolved oxygen levels in this estuary routinely dropped to zero throughout late summer and during low river

flow periods. Flagg (1974) evaluated the potential of Maine river systems to support a native stock of striped bass and concluded that the Kennebec River system was the only system that still has viable spawning habitat because of the large amount of tidal freshwater available. The only limiting factor at the time of the evaluation was water quality. The freshwater tidal section of the Kennebec River from the dam in Augusta to the outlet of Merrymeeting Bay is 20 miles in length. Although the tidal sections of the Androscoggin River (six miles), Eastern River (ten miles), Cathance River (six miles), and Abagadasset River (four miles) are not as long as the Kennebec River, it is possible that the strong tidal currents may keep the striped bass eggs suspended.

**RESTORATION** - Coincidentally with recent efforts to rehabilitate Chesapeake Bay striped bass stocks, local interest arose to restore a native stock of striped bass to historical spawning areas in Maine. Extensive pollution abatement efforts of the early 1970s brought about dramatic improvement in water quality of the lower Kennebec/Androscoggin River estuary. Since 1977, minimum dissolved oxygen levels in this estuary have usually been above 7.0 ppm during worst case conditions of low river flows and high water temperatures. Maintenance of good dissolved oxygen levels from 1977-1981 prompted the Department of Marine Resources to initiate an experimental striped bass restoration program. Prior to the restoration program, Flagg (1974) sampled the estuary during the 1960s with a one-meter plankton net and an otter trawl, but failed to find any striped bass eggs, larvae, or juveniles. In 1982-1983, wild young-of-the-year striped bass were captured from the Hudson River and transferred to the Kennebec River. Because only small numbers (319 in 1982 and 572 in 1983) could be obtained from seining wild fish, the program was shifted to hatchery production in 1984. Striped bass fry were obtained from a private grower (Multi-Aquaculture Systems, Inc. of Amagansett, NY) and raised to fall fingerlings by the USF&WS at its North Attleboro [Massachusetts] National Fish Hatchery. From a lot of 7,500 four-week old fry transported to North Attleboro, 2,306 fall fingerling striped bass were stocked into the Kennebec River at Richmond. An additional 200 fall fingerling striped bass were transferred from Ecological Analysts' [EA] Verplanck Striped Bass Hatchery on the Hudson River. From 1985-1989, with the approval of the New York State Department of Environmental Conservation and the New York Power Authority, striped bass fry were procured from EA's Hudson River Hatchery, raised to fall fingerling size at the USF&WS North Attleboro Hatchery, and stocked into the Kennebec/Androscoggin River estuary. From 1982-1989 a total of 187,600 Phase II fall fingerlings were stocked, ranging from a low of 319 in 1982 to a high of 66,000 in 1988 (Table 1). Due to a fry production deficit at the Verplanck Hatchery, no striped bass were stocked in 1987.

Starting in 1983, a beach seine 17m long, 1.8m deep, comprised of 6.35mm stretch mesh nylon, with a 1.8m x 1.8m bag, has been employed in a juvenile alosid survey of the Kennebec/Androscoggin River estuary. From 1979-1982, a 9.14m seine had been used. A total of 14 sampling sites of the tidal freshwater section of the Kennebec/Androscoggin estuary were sampled every two weeks from mid-July through October; most sites were sampled six times per season. In 1987, while conducting the juvenile alosid survey, 26 wild young-of-the-year striped bass, 2-4" in length, were collected at three separate sample locations. This represented the first documented spawning success of striped bass in the Kennebec/Androscoggin River estuary in over 50 years. Wild young-of-the-year stripers have been collected each consecutive year from 1987-1993. However, recruitment of striped bass in the estuary has been minimal since first

documented in 1987, although many juvenile striped bass were captured by other means in 1993. Eight juvenile striped bass were captured at the mouth of the Kennebec River in early August, 1993, in fyke nets and by beach seine by DMR personnel. Two additional striped bass were taken by beach seine in Phippsburg and four were taken by otter trawl in the Androscoggin River. In November, 1993, over 750 juvenile striped bass were captured and released in three sets of a large fyke net which was being fished by a commercial fisherman. It appears that juvenile striped bass were more abundant in 1993 than indicated by the annual seine survey. The attached map (Figure 1) delineates the locations of the seine sites and the locations where striped bass young-of-the-year have been collected during the annual beach seine survey.

In addition, ichthyoplankton surveys have been carried out on the Kennebec and Eastern Rivers annually since 1988. Analysis of 1988-1991 samples yielded two larval striped bass taken from the mid-estuary area of the Eastern River, one on June 10, 1988, and the second on June 21, 1988, at water temperatures of 17.5 and 24.0 degrees [C] respectively.

SUMMARY AND CONCLUSIONS - Although the full restoration of the Kennebec/Androscoggin River striped bass population has not yet occurred, the modest results to date are encouraging and should be viewed as a positive contribution to the well being of the resource. The Department of Marine Resources is recommending that the Augusta Hydroelectric Dam be removed once its license expires in 1993 in order to allow striped bass, as well as rainbow smelt, Atlantic sturgeon and shortnose sturgeon, to once again migrate to Waterville. The restoration of the 18 miles of former spawning habitat will increase the chances of spawning success for striped bass.

TABLE 1. Striped Bass Stocking Program-State of Maine

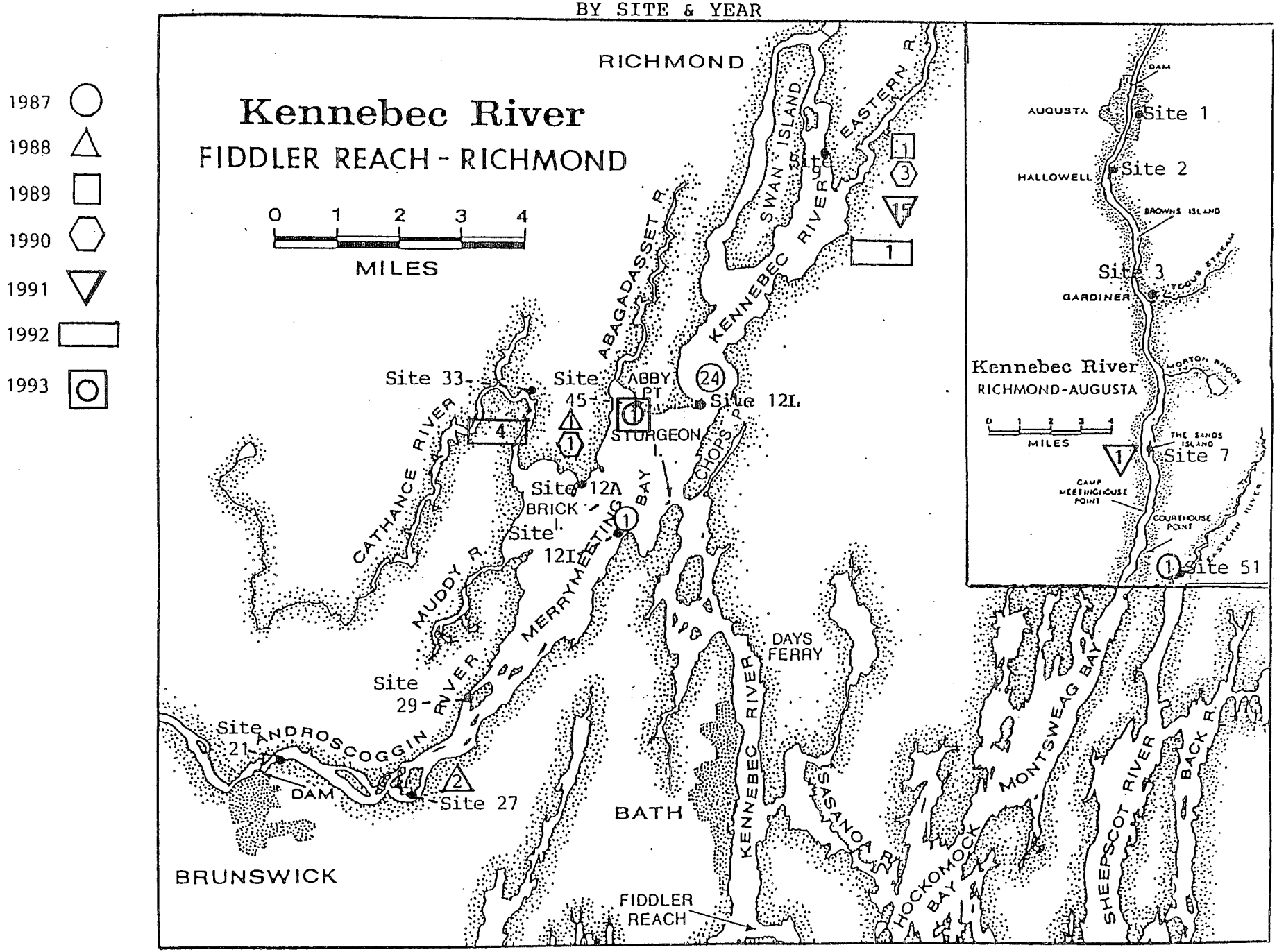
| Year | # Stocked | Size(TL) | Origin | Location |
|---|---|---|---|---|
| 1982 | 319 | 2-4" | Hudson River(W) | Androscoggin |
| 1983 | 572 | 2-4" | Hudson River(W) | Kennebec |
| 1984 | 2,306 | 4-5" | Unknown(H)* | Kennebec |
| | 200 | 2-4" | Hudson River(H) | Kennebec |
| 1985 | 46,759 | 3-4" | Hudson River(H) | Kennebec |
| 1986 | 30,246 | 3-5" | Hudson River(H) | Kennebec & Androscoggin |
| 1987 | NONE | NA | NA | NA |
| 1988 | 66,623 | 2-5" | Hudson River(H) | Kennebec & Androscoggin |
| 1989 | 40,535 | 3-5" | Hudson River(H) | Kennebec & Androscoggin |
| 1990 | 65,233 | 3-5" | Hudson River(H) | Kennebec & Androscoggin |
| 1991 | 10,942 | 4-5" | Hudson River(H) | Kennebec & Androscoggin |

(W) = Wild
(H) = Hatchery

*Fish obtained from Multi-Aquaculture Systems, Inc., Amagansett, Long Island. Brood stock captured in Long Island coastal waters could have been Hudson or Chesapeake origin.

FIGURE 1

LOCATION OF SAMPLING SITES
AND NUMBERS OF WILD YOUNG-OF-THE-YEAR STRIPED BASS
BY SITE & YEAR



# BIBLIOGRAPHY

Atkins, C.G. 1887. The River Fisheries of Maine. In: Goode, G.B. 1887. The Fisheries and Fishery Industries of the United States, Section V, Volume 1.

Flagg, L.N. 1974. Striped Bass and Smelt Survey, Completion Report, AFS-4.

Otto, R.S. 1971. Design of a Creel Survey for the Striped Bass Sport Fishery Along the Central Maine Coast. Masters Thesis, University of Maine, Orono.