A Preliminary Analysis of Commercial Fishery Records in the Patuxent River Estuary with Emphasis on the Jug Bay area, Chesapeake Bay National Estuarine Reserve

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Introduction

The Maryland Department of Natural Resources (MDNR) has kept records of commercial fish catch in the Chesapeake Bay since 1929. These records are used for stock assessment and to monitor fishery compliance with state regulations.

In an effort to better characterize commercial fish harvesting within Jug Bay, a component of the Maryland National Estuarine Research Reserve, DNR records for the upper, lower, and entire Patuxent River from 1929-2004 were analyzed to examine temporal trends of total fish catch, changes in main targeted species, species relative importance of total harvest, and comparisons between the upper and lower sections of the Patuxent River. This is a first and important step to understand the role and potential impact of commercial fishing on the fish population dynamics of the Patuxent River.

Analysis of Fishing Records

Fishermen have been required by DNR to report information about their catch for each fishing trip, including:

- Fishing location
- Species of fish being caught
- Gear type used
- Fish harvest (measured in pounds)
- Amount of time fishing

MDNR fishing report to be filled out by each fisherman for each gear type used on each fishing trip

Simple descriptive analyses (total sums, means, relative proportions) were used to process the fish catch data for the Patuxent River estuary from 1929 to 2004, and to characterize:

- Trends of total fish harvested for the upper, lower, and entire Patuxent.
- Changes in the composition of species harvested for the upper, lower, and entire Patuxent.

Data limitations:

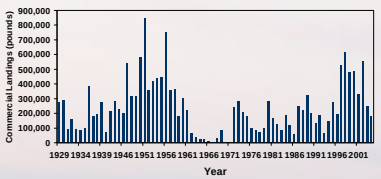
The nature of commercial fish catch data and the way the data are collected creates limitations on the interpretation and extrapolations that can be derived from this information. Commercial fishing data by itself cannot be used to estimate fish population trends, but it provides an estimate of human fish removal, a component of the overall population mortality.

Acknowledgements:

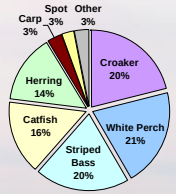
We would like to thank MDNR fisheries data manager Connie Lewis for providing the fisheries records needed for this study and for her assistance in understanding the data. We would also like to thank Harry Hornick, MDNR fisheries biologist, for sharing his knowledge of Maryland fishery history.

Trends in Patuxent River Commercial Fish Landings

Total Commercial Harvest in Patuxent River 1929 - 2004

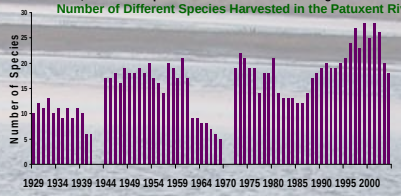


Species Composition of Harvested Fish 1929-2004

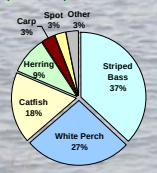


- During the 75 year record, commercial catch in the Patuxent River showed two peak periods: the decade after World War II and again in the mid nineties.
- The croaker was a major contributor to the Patuxent River fishery from 1929 until the late 1950s. After that time, it was not reported in substantial numbers again until the late 1990s.

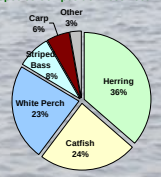
Number of Different Species Harvested in the Patuxent River



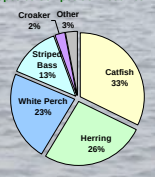
Species Composition 1970-1979



Species Composition 1980-1989

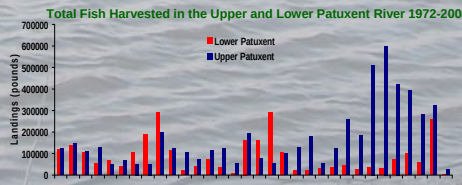


Species Composition 1990-2004

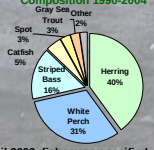


- In the mid 1940's the number of species harvested doubled from about 10 to 20. Market demand and catch regulations for certain species might have contributed to this sudden increase. Also, species that earlier were considered bycatch had now become commercially important.
- The contribution of striped bass catch to the commercial fishery declined markedly from 1970 to 2004; the catfish contribution increased steadily; and the white perch contribution remained relatively constant.
- By the 90s and early 2000s, the contribution of herring to the commercial fishery increased three-fold from its contribution in the 1970s.

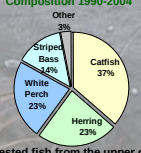
Total Fish Harvested in the Upper and Lower Patuxent River 1972-2004



Lower Patuxent Species Composition 1990-2004



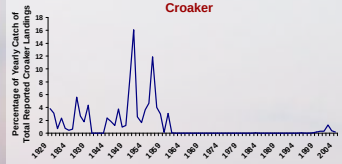
Upper Patuxent Species Composition 1990-2004



- From 1972 until 2003, fishermen specified whether they harvested fish from the upper or the lower part of the Patuxent River, separated by the Benedict Bridge (see map). In comparing the two sections of the river, we found that:
  - Total fish harvest between the upper and lower Patuxent did not vary dramatically between 1972 and 1990. However from 1990 to 2004, the upper Patuxent was much more heavily fished than the lower section of the river.
  - Catfish species (mostly channel catfish) were the main targeted species in the upper Patuxent, but not in the lower section.
  - White perch and herring are important commercial species in both sections of the River, but contribute to the lower Patuxent fishery in a greater percentage.
  - The percentage of striped bass harvested was similar between the two sections of the Patuxent.

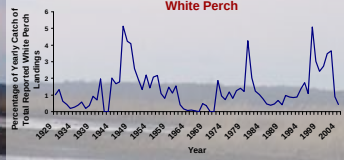
Trends in Main-Targeted Commercial Species

Croaker



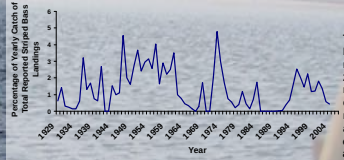
The croaker (*Micropogonias undulates*) provided an important fishery in the Patuxent from 1929 until 1961. Between 1944 and 2004 (the time period in the record when gear was specified), it was caught in greatest numbers by haul seine (96% of croaker landings).

White Perch



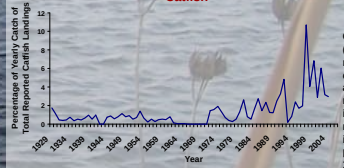
The white perch (*Morone americana*) has provided a major fishery throughout the entire 1929-2004 record. It shows three peaks of harvesting, in the early 50s, 80s, and late 90s. Between 1944 and 2004, it was caught in greatest numbers with haul seine, anchored gill net, and fyke net (35%, 18%,and 17% of white perch landings, respectively).

Striped Bass



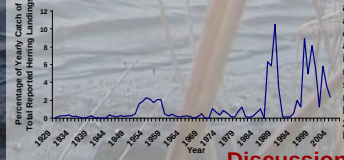
The striped bass (*Morone saxatilis*), Maryland's state fish, has also provided a major fishery throughout the entire1929-2004 record. There was a striped bass moratorium from 1985-1989 when it became endangered, but after careful regulation it returned to the commercial fishing record as a strong component. From 1944-2004 it was caught in greatest numbers by haul seine and anchored gill net (45% , 20% of striped bass landings, respectively).

Catfish



Catfish, predominantly channel catfish (*Ictalurus punctatus*), has recently become a more important fish to the Patuxent commercial fishery. Catfish species have always been present in the commercial record. The channel catfish was probably introduced into Maryland waters and is not a native fish (Lee et al., 1976). From 1944-2004, it was caught in greatest numbers by fish pots, pound nets, and haul seine (50%, 15%, 15% of catfish landings, respectively).

Herring



Herring (predominantly *Brevoortia tyrannus* and *Dorosoma cepedianum)* numbers have also grown considerably in the reported commercial harvest. These species were always present in the records, but their increase in popularity in recent years reflects a growing market for the gizzard shad (*D. cepedianum),* as fertilizer and menhaden (*B. tyrannus)* for fish oil, livestock feed and bait. Between 1944 and 2004, they were caught in greatest numbers by pound net (65% of herring landings).

Discussion

The Jug Bay component of the Chesapeake Bay National Estuarine Research Reserve has traditionally been an important spawning area for a variety of anadromous and estuarine fish species, including striped bass and yellow perch. It has also been a historically important site for commercial fishing. In addition to commercial fishing, several ecological factors impact these fish species (the loss of submerged aquatic vegetation, chronic low levels of dissolved oxygen, and high concentrations of suspended solids, which currently degrade spawning grounds). It is not known whether commercial fishing alone has a significant effect on these fish populations and the freshwater tidal ecosystem in general.

MDNR commercial fishing records reflect a market-driven and regulated fishery, and therefore do not reflect the population status of any harvested species. Examining them may, however, help us begin to understand the extent of the mortality pressure exerted by commercial fishing on the fish populations of the Patuxent River.

Reference

Lee, D.S., A. Norden, and C.R. Gilbert. 1976. A List of the Freshwater Fishes of Maryland and Delaware. Chesapeake Science, 17 (3): 205-211.