

Chapter 7.1

Maryland Coastal Bays Fisheries Investigations

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Abstract

Since 1989, the Maryland Department of Natural Resources has conducted an annual finfish survey at 20 fixed sites in Maryland's Coastal Bays. The Coastal Bays are important finfish nursery grounds. Four species were identified to be representative of the fish assemblages in the Coastal Bays including bay anchovy, black sea bass, silver perch and summer flounder. Bay anchovy and silver perch can be classified as forage species while summer flounder and black sea bass have recreational and commercial importance. This data indicates a favorable habitat with stable population trends.

Introduction

The Maryland Coastal Bays finfish survey was developed to characterize fishes and their abundances in Maryland's Coastal Bays, facilitate management decisions, and protect finfish habitats. The Maryland Department of Natural Resources (DNR) has conducted the Coastal Bays Fisheries Investigations (CBFI) Trawl and Beach Seine Survey in Maryland's Coastal Bays since 1972, sampling with a standardized protocol since 1989. These gears target finfish although bycatch of crustaceans, mollusks, sponges, and macroalgae are common. This report includes data from 1989 – 2013.

Management Objective:

Characterize the stocks and estimate relative abundance of juvenile and adult marine and estuarine species in the Coastal Bays and near-shore Atlantic Ocean.

Methods

Study Area

Maryland's Coastal Bays are comprised of Assawoman Bay, Isle of Wight Bay, Sinepuxent Bay, Newport Bay and Chincoteague Bay. Also included are several important tidal tributaries: St. Martins River, Turville Creek, Herring Creek and Trappe Creek. Covering approximately 363 km² (140 mi²), these bays and associated tributaries average only 0.9 m (3 feet) in depth and are influenced by a watershed of only 453 km² (175 mi²; Maryland Department of Natural

Resources 2005). The bathymetry of the Coastal Bays is characterized by narrow channels, shallow sand bars and a few deep holes.

Trawl sampling was conducted at 20 fixed sites throughout Maryland's Coastal Bays on a monthly basis from April through October. With the exception of June and September, samples were taken beginning the third week of the month. Sampling began the second week in June and September in order to allow enough time to incorporate beach seine collections.

A standard 4.9 meter (16 ft) semi-balloon trawl net was used in areas with a depth of greater than 1.1 meter (3.5 ft). Each trawl was a standard 6-minute (0.1 hour) tow at a speed of approximately 2.5 knots. Speed was monitored during tows using a global positioning system (GPS). Waypoints marking the sample start (gear fully deployed) and stop (point of gear retrieval) locations were taken using the GPS to determine the area swept (hectares). Time was tracked using a stopwatch which was started at full gear deployment.

Seines were conducted in June and September at 19 fixed sites throughout the Maryland Coastal Bays. A 33 meter (100 ft) bag seine was used in areas with a depth less than 1.1m (3.5ft). The seine was pulled for approximately 33 meter (100 feet). Seine data are not presented in this document.

Data Analysis

Statistical analyses were conducted on species based on their recreational or commercial importance, or biological significance as forage for adult game fish. The Geometric Mean (GM) was calculated to develop species specific annual trawl and beach seine indices of relative abundance (1989-2013). The GM was calculated from the $\log_e(x+1)$ transformation of the catch data and presented with 95% Confidence Intervals (CIs; Ricker 1975). The GM and CIs were calculated as the antilog $[\log_e\text{-mean}(x+1)]$ and antilog $[\log_e\text{-mean}(x+1) \pm \text{standard error} * (t \text{ value: } \alpha=0.05, n-1)]$, respectively. A geometric grand mean was calculated for the time series (1989-2013) and used as a point estimate for comparison to the annual (2013) estimate of relative abundance

The four species presented here are representative of the fish assemblages of the Maryland Coastal Bays. They are bay anchovy (*Anchoa hepsetus*), black sea bass (*Centropristis striata*), silver perch (*Bairdiella chrysoura*) and summer flounder (*Paralichthys dentatus*). As with most finfish species found within Maryland's Coastal Bays, most of these species are coastal spawners, illustrating the importance of the Coastal Bays as finfish nursery grounds. Summer flounder and black sea bass are longer lived species of recreational and commercial importance while bay anchovy and silver perch have a shorter life span and serve as a forage base for larger fish.

Results

Bay Anchovy (*Anchoa hepsetus*)

Bay anchovy are often the most abundant species in overall finfish abundance captured by the survey in a year. Both juveniles and adults are captured in the trawl. They are a preferred forage species for larger game fish and have been found occurring with spot and summer flounder at multiple sites in the survey. They are equally abundant in all areas of the Coastal Bays. Being short-lived, they exhibit rather consistent recruitment and abundance. There has been more variance in the abundance in recent years compared to earlier years in the survey. However, the variance has been both above and below the long term mean and not indicative of a trend.

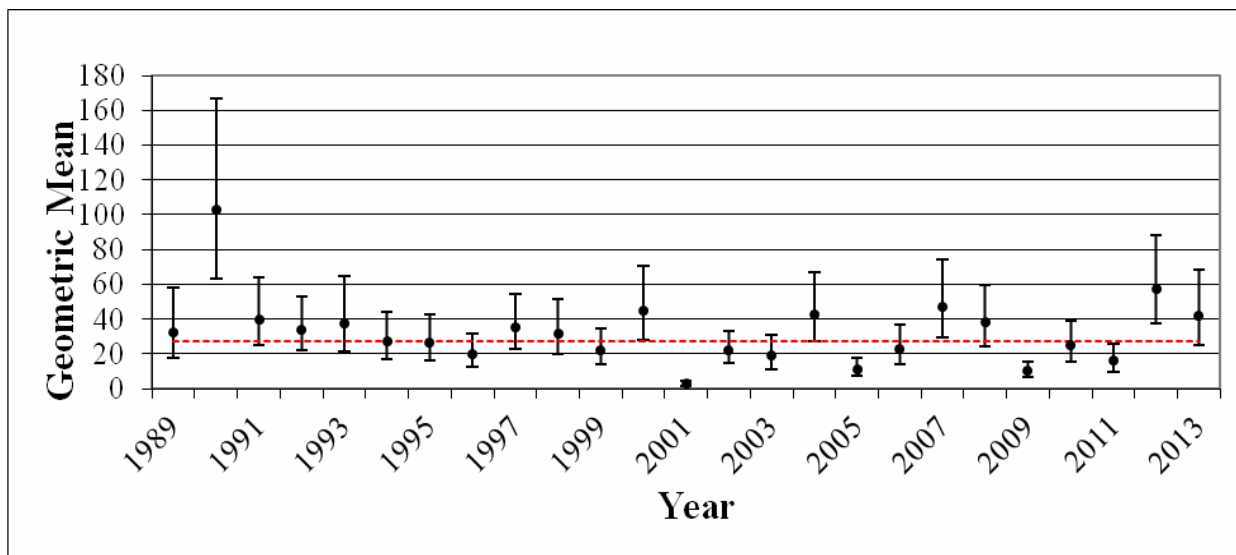


Figure 7.1.1 Bay Anchovy (*Anchoa hepsetus*) trawl index of relative abundance (geometric mean) with 95% confidence intervals (1989-2013). Dotted line represents the 1989-2013 time series grand mean. Protocols of the Coastal Bays Fisheries Investigation Trawl and Seine Survey were standardized in 1989 (n=140/year).

Black Sea Bass (*Centropristis striata*)

Black sea bass are a species that are important to both recreational and commercial anglers. The survey catches only juveniles so the results are an indication of recruitment variability between years. They are caught in all bays at selected sites by trawl with the most preferred sites in Sinepuxent Bay. Black sea bass prefer structured habitat and are therefore found most often near structure. Sinepuxent Bay offers a lot of structure in the form of rocks, shoreline, and seagrass beds so it is not surprising that they are abundant in this bay. They have a longer lifespan than the forage fish with an effective maximum age of eight years, so as expected, they exhibit more variability in reproductive success than the forage species. From the data, it appears they have three to five year cycles in recruitment.

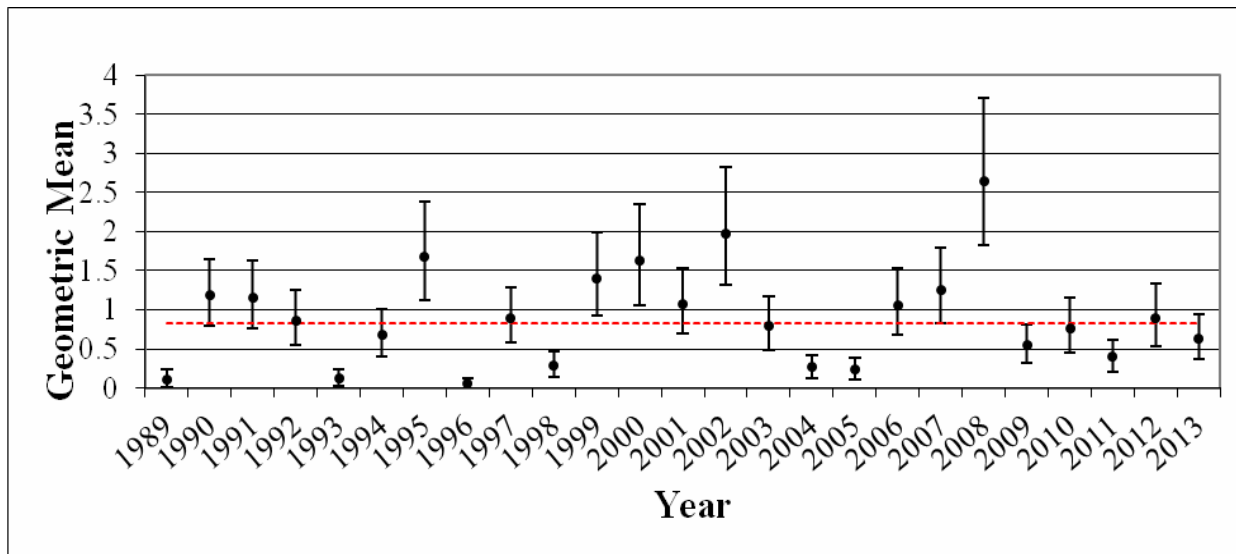


Figure 7.1.2 Black sea bass (*Centropristis striata*) trawl index of relative abundance (geometric mean) with 95% confidence intervals (1989-2013). Dotted line represents the 1989-2013 time series grand mean. Protocols of the Coastal Bays Fisheries Investigation Trawl and Seine Survey were standardized in 1989 (n=140/year).

Silver Perch (Bairdiella chrysoura)

Silver perch usually rank in the top five in abundance in a year. We catch only juveniles in the trawl survey so the index is an indication of yearly recruitment success. Silver perch are widely distributed in the Coastal Bays; however, they prefer sites in Assawoman Bay, St. Martins River, Isle of Wight Bay and Newport Bay, with the highest affinity for the St. Martins River. Silver perch have a maximum age of six years, making them less long lived than game species, but a long lived example of a forage species. Like the bay anchovy, they exhibit relatively stable recruitment from year to year. Recent indices show a little more variability in abundance with some particularly strong year classes.

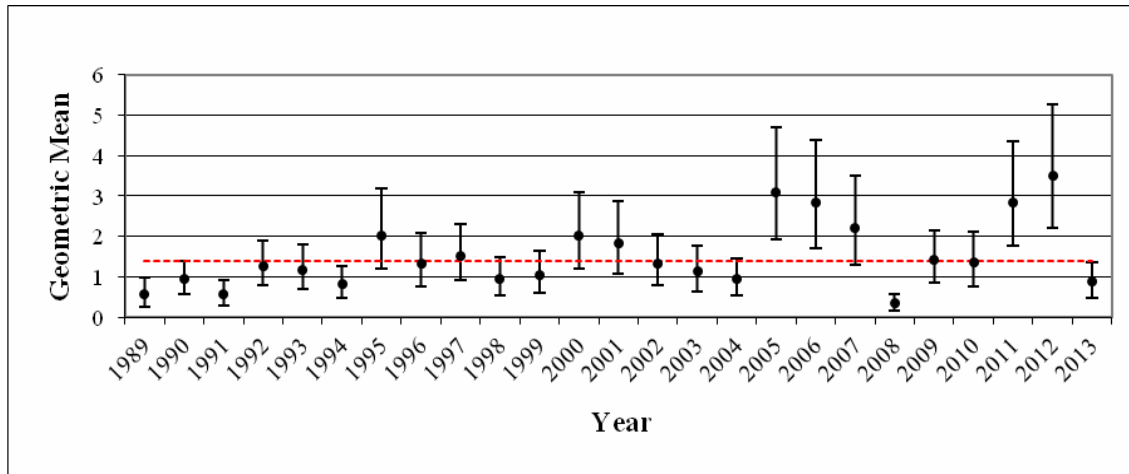


Figure 7.1.3 Silver Perch (*Bairdiella chrysoura*) trawl index of relative abundance (geometric mean) with 95% confidence intervals (1989-2013). Dotted line represents the 1989-2013 time series grand mean. Protocols of the Coastal Bays Fisheries Investigation Trawl and Seine Survey were standardized in 1989 (n=140/year).

Summer Flounder (*Paralichthys dentatus*)

Summer Flounder are probably the most sought after recreational game fish in the Coastal Bays. Almost all the individuals captured by the trawl survey are juveniles, so the index is a reflection of annual recruitment. Summer flounder have preferred sites of abundance in all the Coastal Bays except for Sinepuxent Bay. The more extreme currents found in Sinepuxent Bay may inhibit the preference of juvenile summer flounder for that bay.

Summer flounder have a maximum age of 20 years, so like the black sea bass; they exhibit slightly more variability in recruitment from year to year. However, when compared to other game fish, summer flounder actually have relatively constant recruitment.

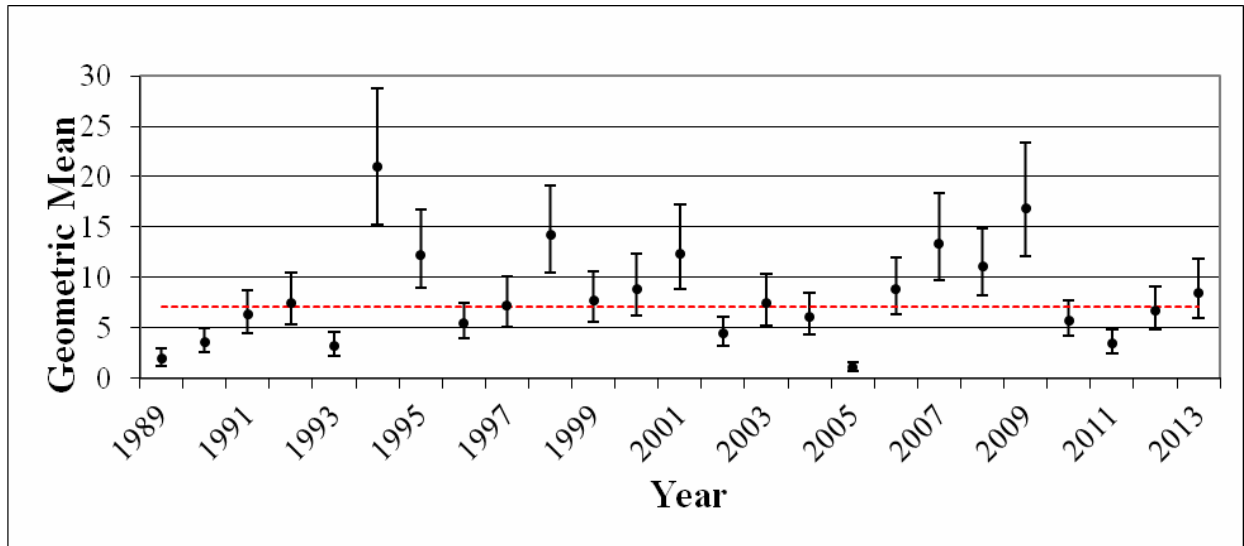


Figure 7.1.4 Summer Flounder (*Paralichthys dentatus*) trawl index of relative abundance (geometric mean) with 95% confidence intervals (1989-2013). Dotted line represents the 1989-2013 time series grand mean. Protocols of the Coastal Bays Fisheries Investigation Trawl and Seine Survey were standardized in 1989 (n=140/year).

Discussion

The four species presented here show different life strategies in annual recruitment dependent on how long they live. The forage species that have shorter life spans have more stable annual abundance while the longer lived game species have more variability in abundance from year to year. Overall the four species presented indicate favorable habitat exists in the Maryland Coastal Bays with stable population trends.

References

Maryland Department of Natural Resources. 2005. Maryland's Coastal bays ecosystem health assessment 2004.DNR-12-1202-0009.