

Chapter 8.2

Status of finfish populations in the Maryland Coastal Bays

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Abstract

The Coastal Bays contain a diverse community of finfish populations. Many of the mid-Atlantic region's most valuable commercial finfish are composed of estuarine-dependent types like summer flounder (*Paralichthys dentatus*), bluefish (*Pomatomus saltatrix*), weakfish (*Cynoscion regalis*), spot (*Leiostomus xanthurus*), croaker (*Micropogonias undulatus*), striped bass (*Morone saxatilis*) and others. These species depend on the Coastal Bays as a place to find food, and several species use the bays as a nursery. A forage fish index has been developed and adopted as a measure of food availability in the Bays. This index is based on the abundance of four species - bay anchovy (*Anchoa mitchelli*), menhaden (*Brevoortia tyrannus*), spot, and Atlantic silverside (*Menidia menidia*). These species represent the most common finfish forage in Maryland's Coastal Bays. Since 1972, the Maryland Department of Natural Resources (DNR) has monitored this resource through annual trawl and seine surveys. Despite annual fluctuations, the forage index from both trawl and seine surveys trended downward slowly since the mid-1980's.

Introduction

Finfish stocks in the Atlantic Coastal Bays of Maryland continue to support a diverse finfish population. These shallow waters are ideal nursery and forage habitat for over 140 species of finfish. Additionally, well over 120 species of epibenthic and benthic fauna have been identified, many of which serve as prime forage for juvenile and adult finfish of commercial and recreational value.

Much of the region's most valuable commercial catch is composed of estuarine-dependent species like summer flounder (*Paralichthys dentatus*), bluefish (*Pomatomus saltatrix*), weakfish (*Cynoscion regalis*), spot (*Leiostomus xanthurus*), croaker (*Micropogonias undulatus*), striped bass (*Morone saxatilis*) and others. In 2002, commercial landings in Ocean City comprised 12.1 million pounds valued at 8.1 million dollars. Sportfishing is also an important economic component in Maryland. In 2003, over 700,000 people fished seven million days in Maryland waters with recreational saltwater fishing being one of the top outdoor activities. Recreational fishermen seek summer flounder, bluefish, weakfish, Atlantic croaker, and striped bass, and participate in as many as 13 annual tournaments open to Coastal Bays and near-shore Atlantic fishermen.

Many species in the Coastal Bays are dependent on coast-wide trends. Hence, fish populations in the Coastal Bays can be impacted by overfishing elsewhere as well as from degradation by eutrophication in other estuaries along the east coast. Recent management efforts lead to the development of fishery management plans for blue crabs and hard clams in the Coastal Bays.

Analyses

Forage fish index

Forage for both commercially and recreationally valuable finfish is considered a necessity for survival of juvenile finfish that use the Coastal Bays. Being sensitive to maintenance of a quality habitat, these species can be one of the first indicators of a stressed environment. A **forage fish index** was developed and adopted as a measure of food availability in the bays. This index, comprised of four species - bay anchovy, menhaden, spot, and Atlantic silverside - represents the most commonly sought finfish forage in Maryland's Coastal Bays. It is assembled from the results of an annual trawl and seine survey carried out by DNR Fisheries personnel at 20 monthly trawl sites (April through October) and at 19 seine sites each in the months of June and September (Figure 8.2.1). This survey has been maintained continuously for 31 years.

Summer flounder

The Maryland Coastal Bays are important habitat for summer flounder as they use the area to feed and grow. Newly hatched summer flounder enter the estuary in April at a very small size after being transported to the Ocean City inlet from the continental shelf where they were spawned in the winter. As they settle out in the Coastal Bays they begin to feed first on microscopic organisms, progressing to small shrimps, crabs, and fish as they increase in size. Larger summer flounder also return to the Coastal Bays each summer to take advantage of the rich food available in the estuary.

Summer flounder are a very popular target for recreational fishermen in the Coastal Bays. They are present and targeted by fishermen from April through October. Recent recreational harvests in Maryland fluctuated between 40,000 to 135,000 animals with a total weight of 100,000 to 250,000 pounds. The recreational fishery is important to the local economy benefiting bait stores, boat liveries, restaurants, and hotels. An annual hard quota has controlled commercial landings for summer flounder since 1993 (226,570 pounds in Maryland) that the industry cannot exceed.

Fish Indicator: Trend in forage fish index

DRAFT indicator: Flounder trends

Results

Status and trends of forage fish index

Since the mid-1980's, forage indices for both the trawl and seine surveys continued a slow downward trend (Figure 8.2.2 and 8.2.3). Current status is gradually declining. This trend is based on a bay-wide data compilation, so regionalizing effects to the various segments of the Coastal Bays could cause a loss of accuracy.

The top ten species, including invertebrates, collected in 2003 from both the trawl and seine surveys are shown in Table 8.2.1. This demonstrates the diversity of species found in the Coastal Bays. A full list of species found in the Coastal Bays since study inception is found in Appendix A of this chapter.

Detailed analysis of forage fish index trends and species observed during annual surveys are found in Casey et al. 2002.

Status and trends in summer flounder abundance

The Maryland Coastal Bays is used as summer habitat for both juvenile and adult summer flounder. The Atlantic States Marine Fisheries Commission has managed summer flounder since the Atlantic Coastal Population collapse of the species from overfishing in 1989. Maryland, along with other Atlantic States, cooperates in the management of the species through commercial quotas and recreational harvest limits. Since interstate management of the species began, the stock recovered to a level no longer considered to be overfished. However, target levels of abundance have not been reached. Figure 8.2.4 shows the trend in summer flounder in the Coastal Bays. A detailed analysis of summer flounder trends, as well as trends for other commercial species, is found in Casey et al. 2002.

Summary

These shallow bays provide habitat for over 140 tidal finfish species and over 120 species of epibenthic and benthic invertebrates (Casey et al. 2002). Overall, the top ten most abundant species have not changed substantially from 1972 to present (Casey et al. 2002).

Despite annual fluctuations, the forage fish index from both trawl and seine surveys shows a slow downward trend since the mid-1980's. This decline is dominated by the decreased abundance of spot since then, following a coast-wide decline. However, the other species in the index have also been slowly declining. The stock of summer flounder

has recently recovered and is no longer considered overfished, although target levels of abundance have not been reached.

Additional measures of fish community health are in the process of being developed by the Maryland Coastal Bays Program (Index of Biotic Integrity, principle components analysis, and indicator species).

References

Casey, J.F., S.B. Doctor, and A.E. Wesche. 2002. Investigation of Maryland's Atlantic Ocean and Coastal Bay Finfish Stocks. Report for Federal Aid Project No. F-50-R. Maryland Department of Natural Resources, Stevensville, MD.

Table 8.2.1: Most abundant species found during 2003 seine and trawl surveys conducted by the Maryland DNR Fisheries Service. OC – Ocean City. * - Invertebrate.

Rank abundance	Trawl sites above OC inlet	Trawl sites below OC inlet	Seine sites above OC inlet	Seine sites below OC inlet
1	Silver perch, <i>Bairdiella chrysoura</i>	Lady crab*, <i>Ovalipes ocellatus</i>	Atlantic needlefish, <i>Strongylura marina</i>	Blue crab*, <i>Callinectes sapidus</i>
2	Mottled dog whelk*, <i>Nassarius vibex</i>	Silver perch, <i>Bairdiella chrysoura</i>	Summer flounder, <i>Paralichthys dentatus</i>	White mullet, <i>Mugil curema</i>
3	Summer flounder, <i>Paralichthys dentatus</i>	Spot, <i>Leiostomus xanthurus</i>	Silver perch, <i>Bairdiella chrysoura</i>	Winter flounder, <i>Pleuronectes americanus</i>
4	Grass shrimp*, <i>Palaemonetes</i> spp.	Northern sea robin, <i>Prionotus carolinus</i>	Spot, <i>Leiostomus xanthurus</i>	Bay anchovy, <i>Anchoa mitchelli</i>
5	Atlantic croaker, <i>Micropogonias undulatus</i>	Grass shrimp*, <i>Palaemonetes</i> spp.	Winter flounder, <i>Pleuronectes americanus</i>	Sand shrimp*, <i>Crangon septemspinosa</i>
6	Sea grape (tunicate)*, <i>Mogula manhattanensis</i>	Summer flounder, <i>Paralichthys dentatus</i>	Grass shrimp*, <i>Palaemonetes</i> spp.	Atlantic menhaden, <i>Brevoortia tyrannus</i>
7	Blue crab*, <i>Callinectes sapidus</i>	Weakfish, <i>Cynoscion regalis</i>	Bay anchovy, <i>Anchoa mitchelli</i>	Silver perch, <i>Bairdiella chrysoura</i>
8	Weakfish, <i>Cynoscion regalis</i>	Bay anchovy, <i>Anchoa mitchelli</i>	Blue crab*, <i>Callinectes sapidus</i>	Blue mussel, <i>Mytilus edulis</i>
9	Sand shrimp*, <i>Crangon septemspinosa</i>	Blue crab*, <i>Callinectes sapidus</i>	Atlantic silverside, <i>Menidia menidia</i>	Atlantic silverside, <i>Menidia menidia</i>
10	Bay anchovy, <i>Anchoa mitchelli</i>	Sand shrimp*, <i>Crangon septemspinosa</i>	Atlantic menhaden, <i>Brevoortia tyrannus</i>	Grass shrimp*, <i>Palaemonetes</i> spp.

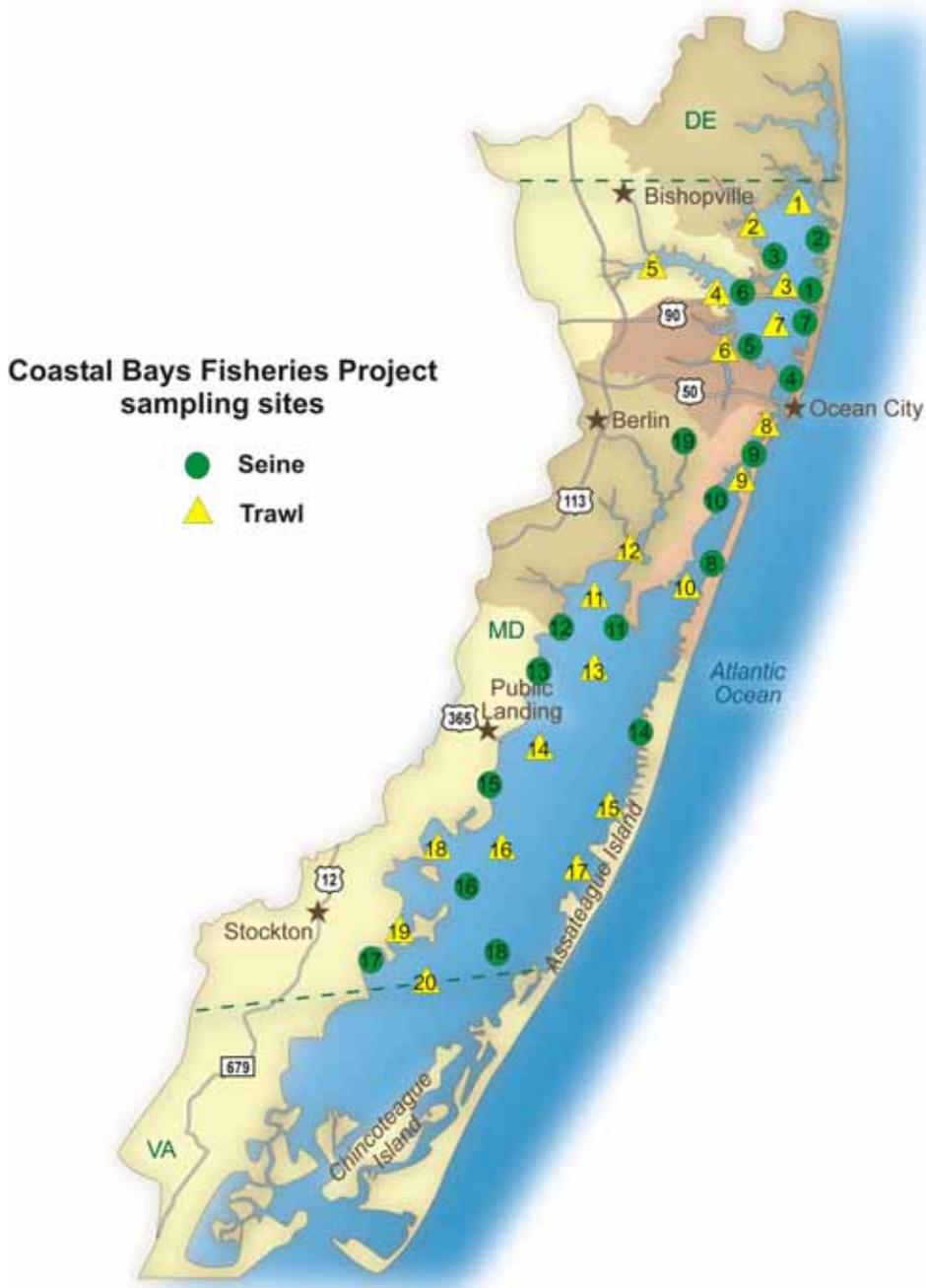


Figure 8.2.1: Map showing locations of Coastal Bays Fisheries Project trawl and seine sampling sites.

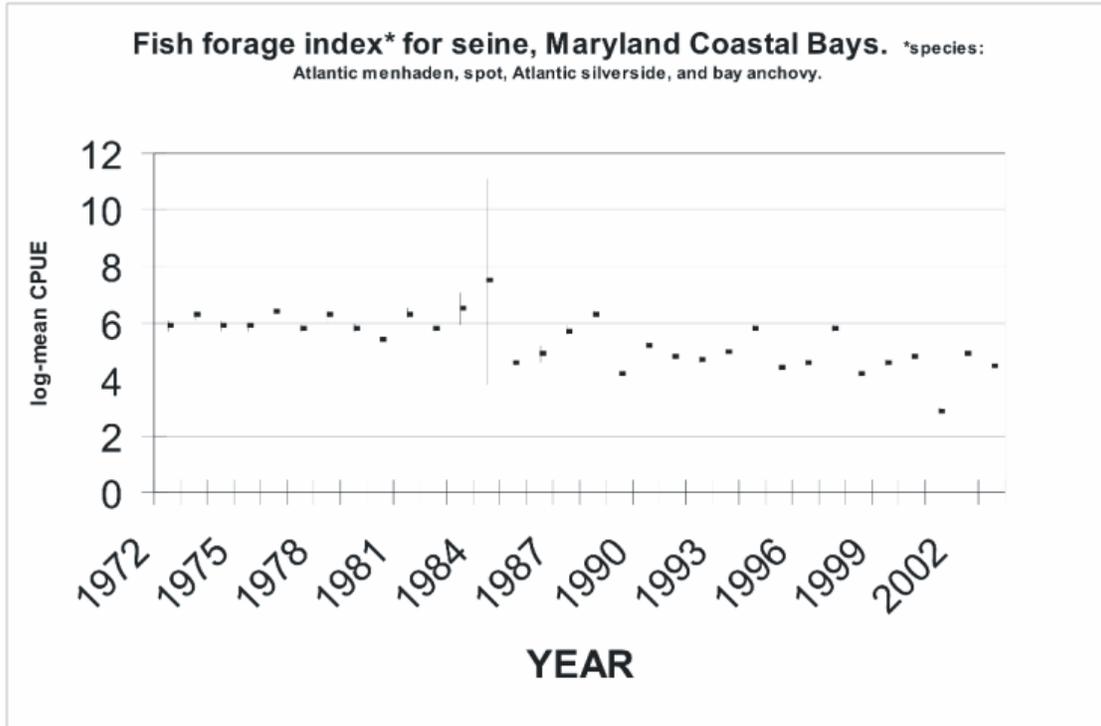


Figure 8.2.2: Forage fish index for trawl samples since 1973. All values are in mean catch per unit effort based on the number of trawls completed each year in the Coastal Bays. Error bars represent the standard error of the log-transformed means.

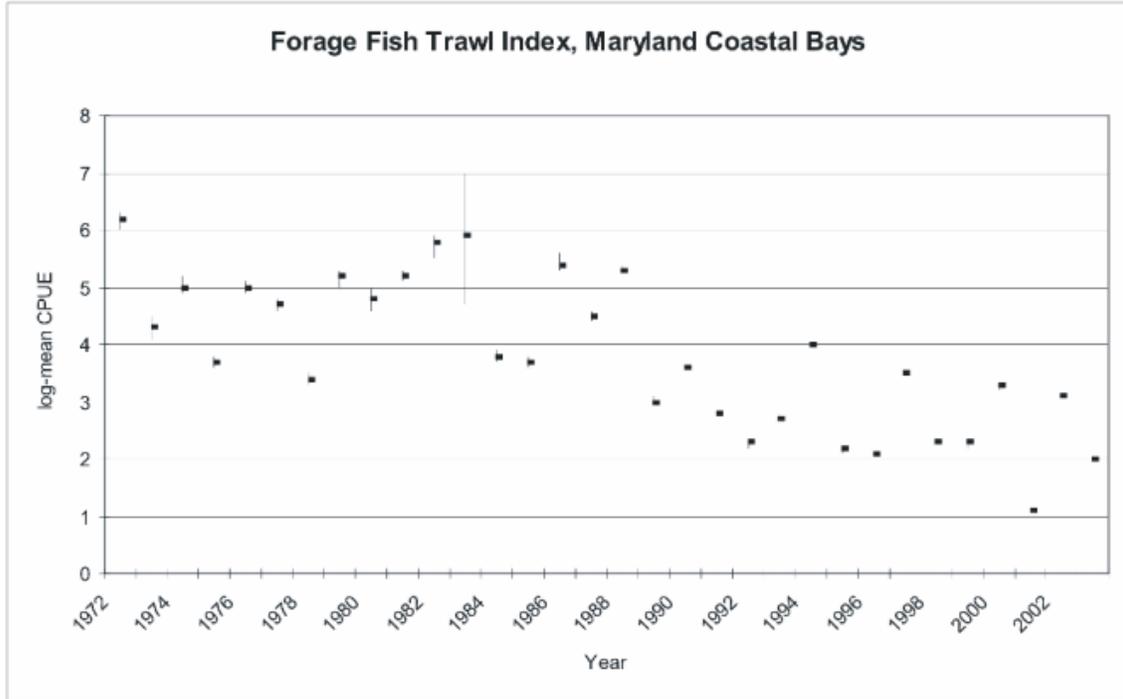


Figure 8.2.3: Forage fish index for seine samples since 1973. All values are in mean catch per unit effort based on the number of seine pulls completed each year in the Coastal Bays. Error bars represent the standard error of the log-transformed means.

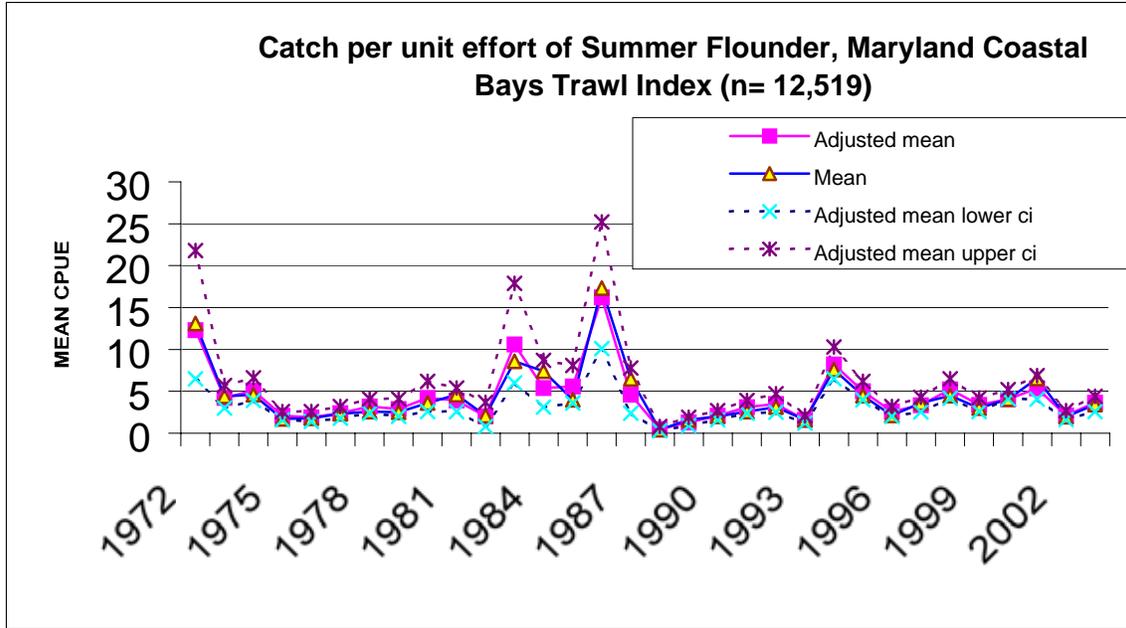


Figure 8.2.4: Annual mean summer flounder catch per unit effort during the DNR Coastal Bays trawl survey. Dashed lines indicate 95% confidence limits. The adjusted mean was calculated by multiplying the geometric mean by the sum of the time series arithmetic mean divided by the sum of the geometric means (Casey et al. 2002).