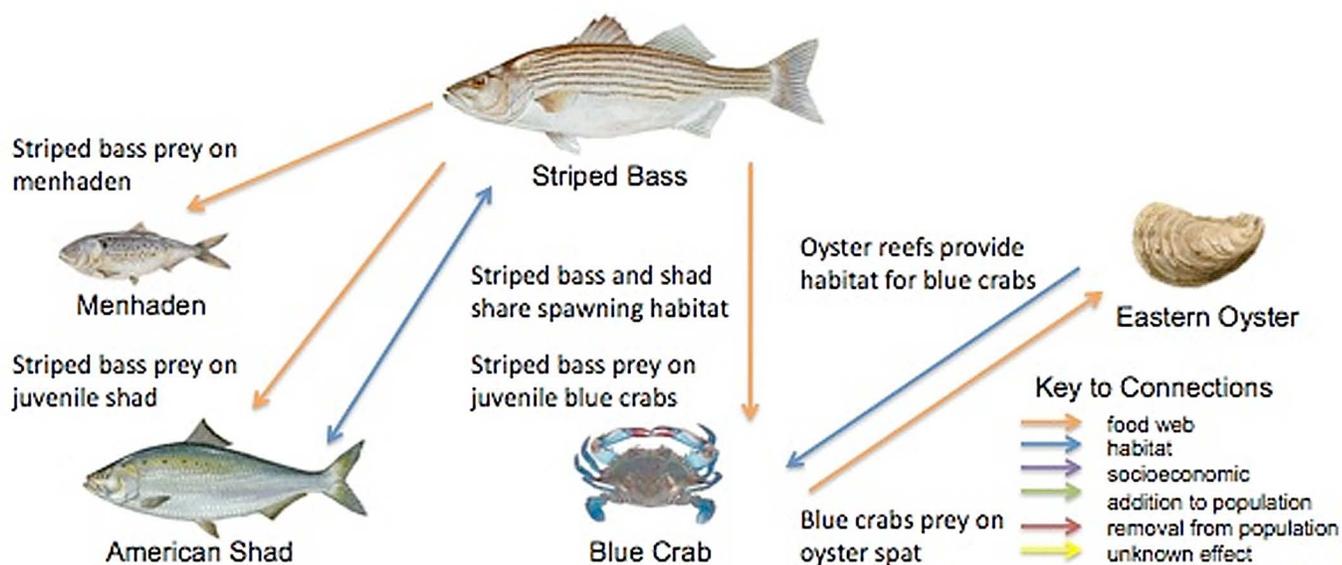


Ecosystem Connections between the Five Key Species

Ecological Connections



The ecological links between the five key species in the Chesapeake Bay earmarked for new ecosystem based fisheries management plans (EBFMPs) are illustrated in this diagram. These may not represent all of the ecosystem connections for all of the species, however, the diagram provides an idea of how these five species impact one another and some of the factors that need to be considered when formulating EBFMPs. Moving away from a single-species management approach towards ecosystem based management means that all of the interconnections illustrated in this slideshow must be considered in developing the new EBFMPs.

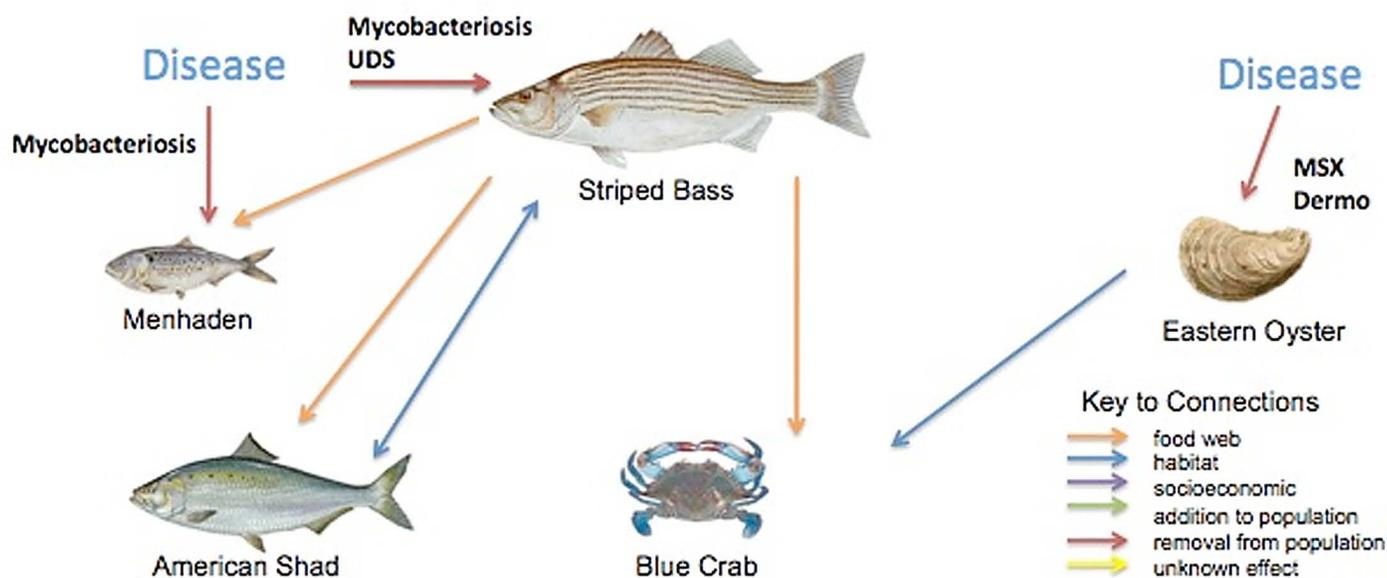
Disease



www.chesapeakebay.net



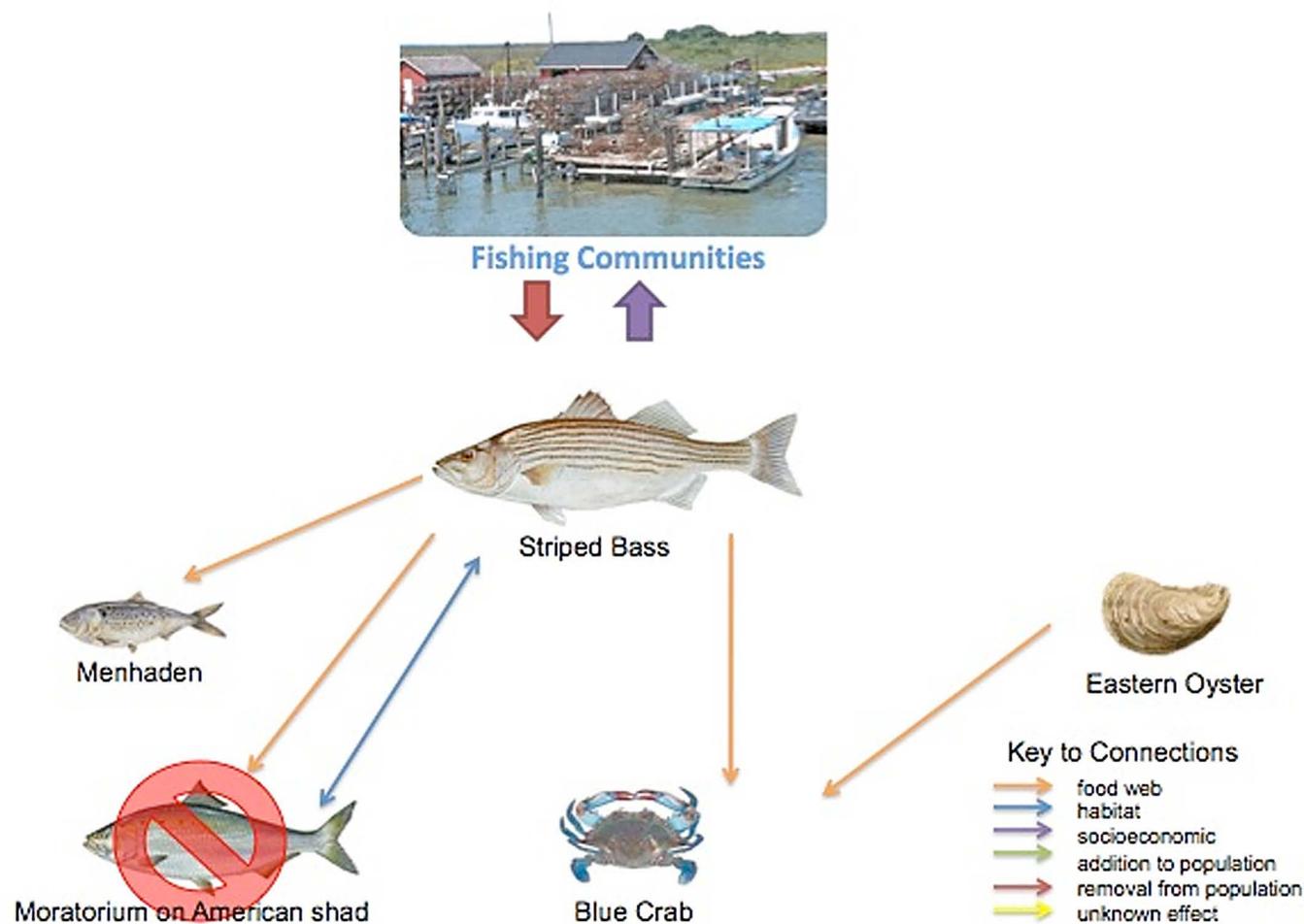
www.dnr.state.md.us



Disease impacts three of the five key species. Mycobacteriosis is an infectious disease that affects both menhaden and striped bass; approximately 60% of the striped bass population in the Chesapeake Bay (MDNR) carry the disease. Mycobacteriosis results in inflammation, tissue deterioration, and scar tissue initially manifesting as granulomas, bacteria filled nodules, in the spleen and kidneys which eventually spread to all internal systems. Evidence of the disease often appears as emaciation and external scar tissue in the form of lesions such as those pictured above. There are several strains of mycobacteriosis infecting fish in the Chesapeake Bay, including two strains that may be unique to bay species.

Ulcerative Dermatitis Syndrome (UDS) also impacts the striped bass population. UDS appears as shallow skin lesions on the fish body. The exact cause of these lesions is unknown and has been attributed to a variety of bacteria. Factors such as poor water quality, compromised immune system, and insufficient nutrition may exacerbate the condition or inhibit the fish's ability to ward off the bacteria. It is estimated that 8-13% of striped bass in the Chesapeake Bay have these lesions.

Human Connections to the Ecosystem



The Chesapeake Bay has a rich history of diverse fishing communities influenced by target species, fishing methods, and commercial and recreational interests. Four of the five key species of the Chesapeake Bay provide resources for consumers as food, fertilizer, bait, and feed crops for agriculture. Currently there is a moratorium on fishing for American shad. Sound fishery management is integral for sustaining fishery resources and supporting traditional fishing communities. One of the goals of EBFM is to balance the needs of fishing communities with species sustainability.

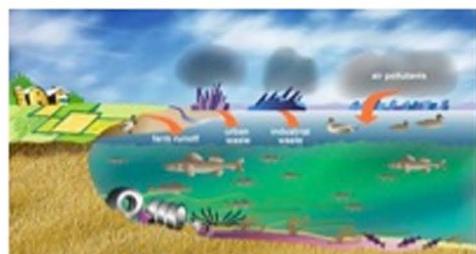
For more information on historical fishing communities of the Chesapeake Bay:

<http://www.mdsg.umd.edu/issues/communities/history/>

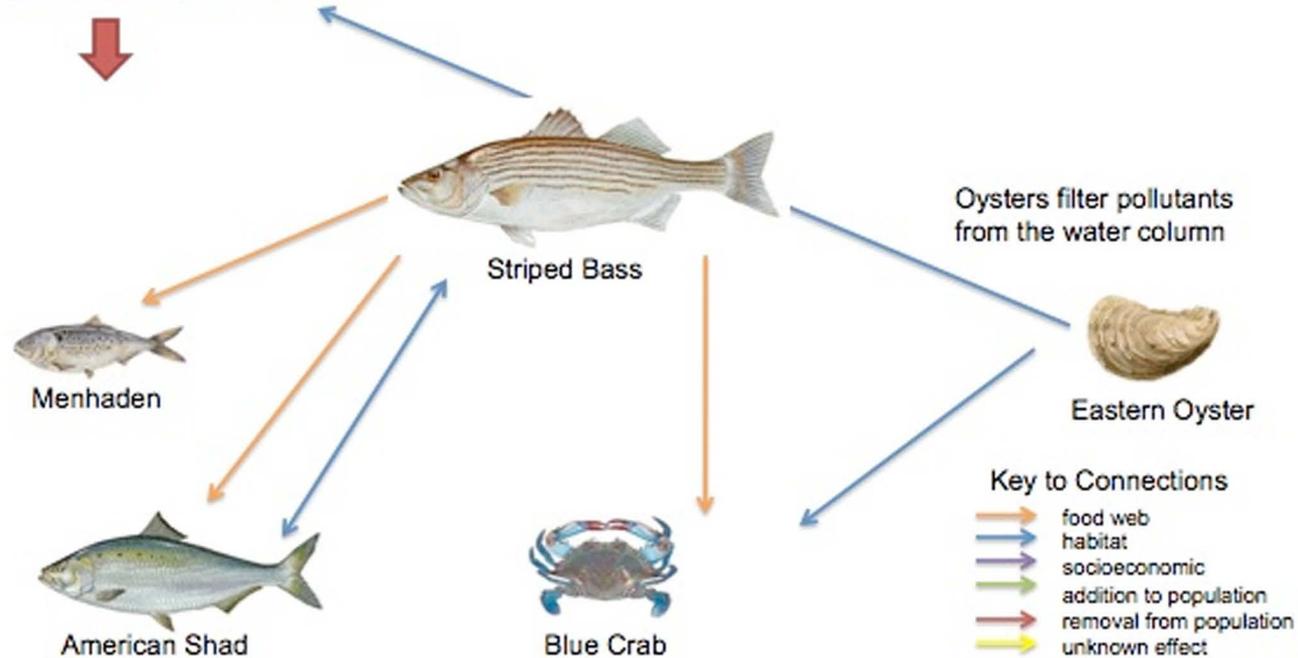
For more information on commercial and recreational fishing in the Chesapeake Bay:

<http://www.mdsg.umd.edu/issues/communities/fisheries/>

Human Connections to the Ecosystem



Nonpoint Source Pollution

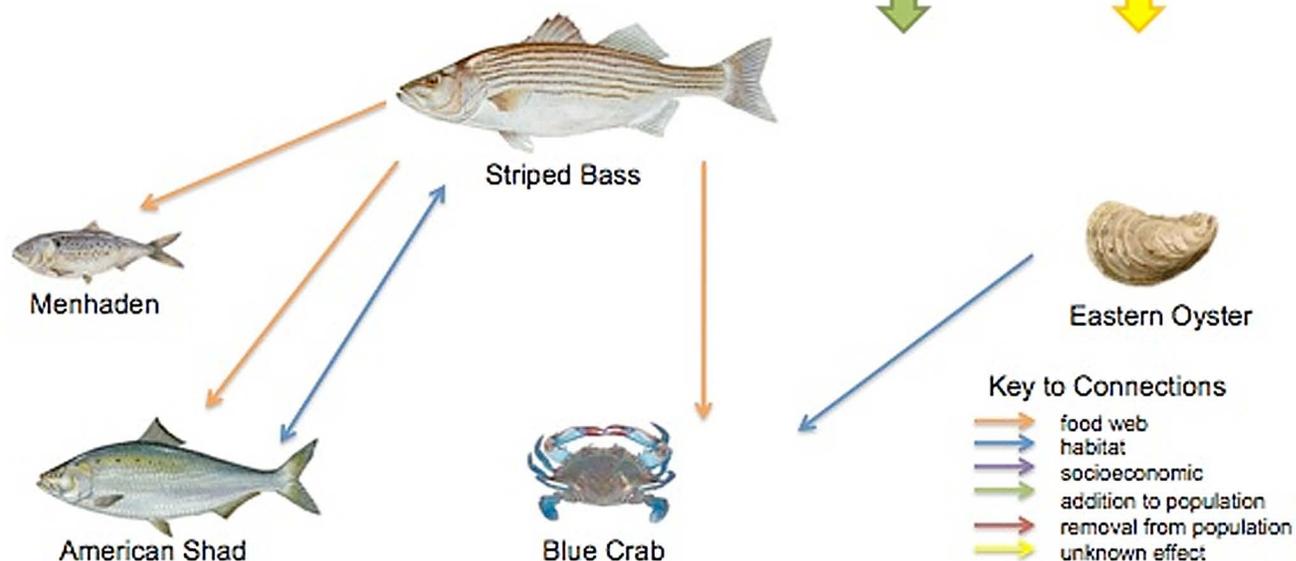


Nonpoint-source (NPS) pollution cannot be attributed to a single source (like a drainage pipe), making mitigation challenging. In the Chesapeake Bay NPS pollution may occur in the form of excess nutrients, sediment, toxins, and pathogens that are introduced into the ecosystem via stormwater runoff or air pollution. Beneficial human activities such as agriculture and development often have NPS pollution as an unintended consequence, resulting in algal blooms, anoxia, and habitat degradation in the Chesapeake Bay. Balancing human activities which may contribute to NPS pollution with habitat quality and ecosystem health is another essential component of EBFM.

Other Factors Affecting Populations

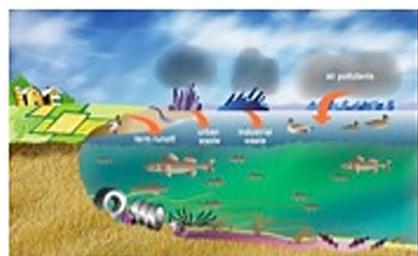


Recruitment and Introductions



Natural recruitment is the influx of new individuals into a population due to reproduction or immigration. High recruitment often yields larger populations, but this is dependent upon the reproductive success of individual adults, and survival of new recruits, both of which may be influenced by habitat quality and availability and size of the existing population. In some cases, where populations appear to be suffering from poor recruitment, as in the case of oysters, artificial recruitment in the form of introducing farmed or non-native species may be attempted to supplement the population. The success and impacts of these techniques are often unknown and may have significant risks associated with them. Weighing the costs and benefits of artificial recruitment and shaping the environment to foster successful natural recruitment play into EBFM.

EBFM for the Chesapeake Bay: The Big Picture



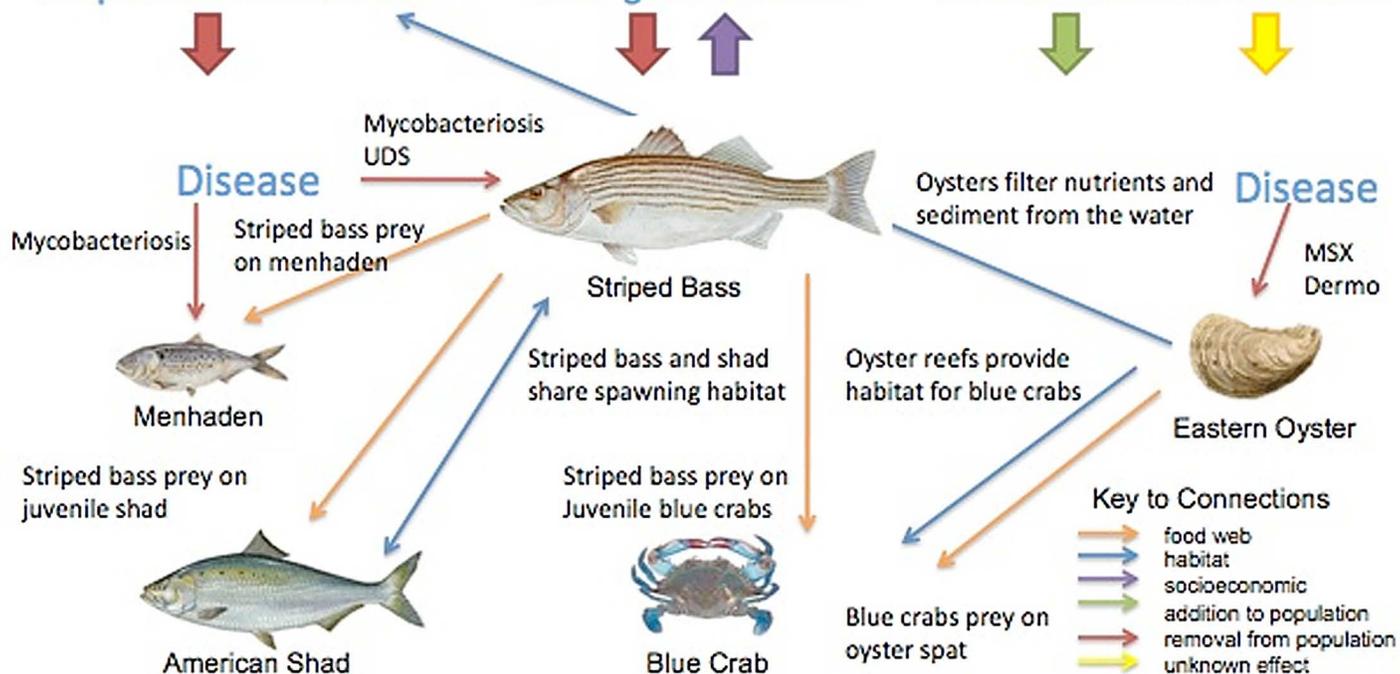
Nonpoint Source Pollution



Fishing Communities



Recruitment and Introductions



Successful Ecosystem Based Fisheries Management for the Chesapeake Bay requires detailed and thoughtful consideration of the interconnections between species, their environments, and human impacts on the populations. Maryland Sea Grant has been tasked with coordinating stakeholders and management entities in the Chesapeake Bay region to reflect upon these issues and develop new EBFMPs which balance sustainability of living and non-living marine resources and human communities while spanning multiple jurisdictions. Maryland Sea Grant will approach this coordination effort by implementing the new structure for EBFM described below.