

Fish Health Fact Sheet - Disease in Striped Bass

WHAT IS MYCOBACTERIOSIS?

Mycobacteriosis is an infectious bacterial disease documented in more than 160 freshwater and marine fish species worldwide. Most fish species are susceptible, and this disease can occur in captive fish (hatcheries and aquariums) and wild populations. Like many other fish diseases, outbreaks of mycobacteriosis tend to occur when fish are stressed, and they are more susceptible to naturally occurring pathogenic organisms in the environment. Stress from low levels of oxygen, excess nutrients, elevated surface water temperatures or other factors can compromise the immune system and other defenses of fish. Elevated water temperatures combined with excess nutrients from run-off in spring and summer provide suitable conditions for blooms of bacteria and other pathogenic organisms in the Chesapeake Bay. Excess mycobacteria in the environment increase the likelihood of infection in newly hatched striped bass, which lack a mature immune system. Increased nutrient levels have been linked to a higher abundance of mycobacteria and increased disease prevalence in age-1 striped bass (*Morone saxatilis*). Once infected, this disease progresses with age in fish. Mycobacteriosis has persisted in the striped bass (*rockfish*) resident population since at least 1996, and mycobacterial infections have been documented in other fish species. In addition to fish, mycobacteria can also infect humans.

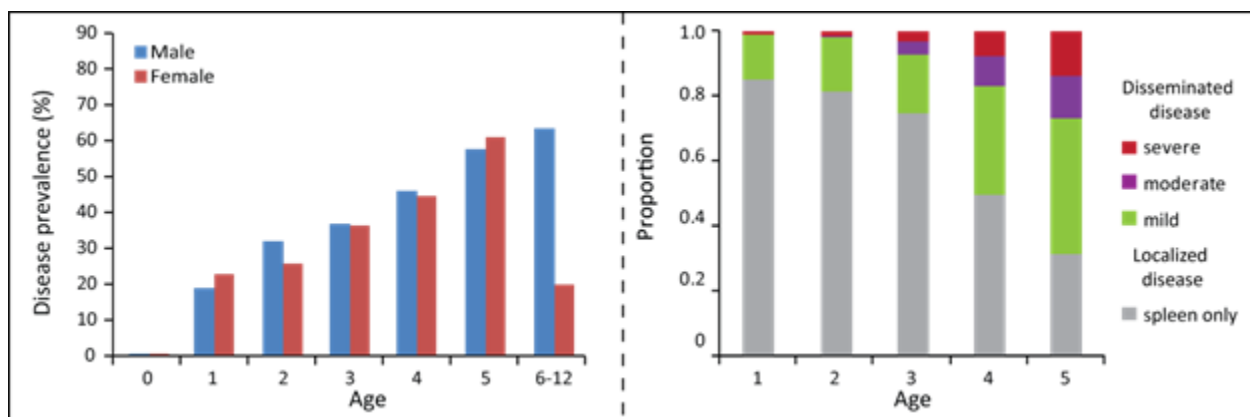
Several species of closely related bacteria, called mycobacteria, can cause this disease. *Mycobacterium marinum* is perhaps the most common species identified with this disease in fish, but several other species of mycobacteria can be pathogenic. In fish from the Chesapeake Bay, the most frequently encountered species of mycobacteria (*M. schottsii* and *M. pseudoschottsii*) are relatively new to science. At least 12 other species of mycobacteria have also been identified in striped bass from the Chesapeake Bay. Mycobacteria are commonly found in the environment (freshwater and marine), particularly in eutrophic water (high in nutrients such as nitrogen and phosphorus).



Striped bass with severe mycobacteriosis. This fish is emaciated (severe muscle loss) and has numerous skin ulcers.

WHAT ARE THE SIGNS OF DISEASE IN FISH?

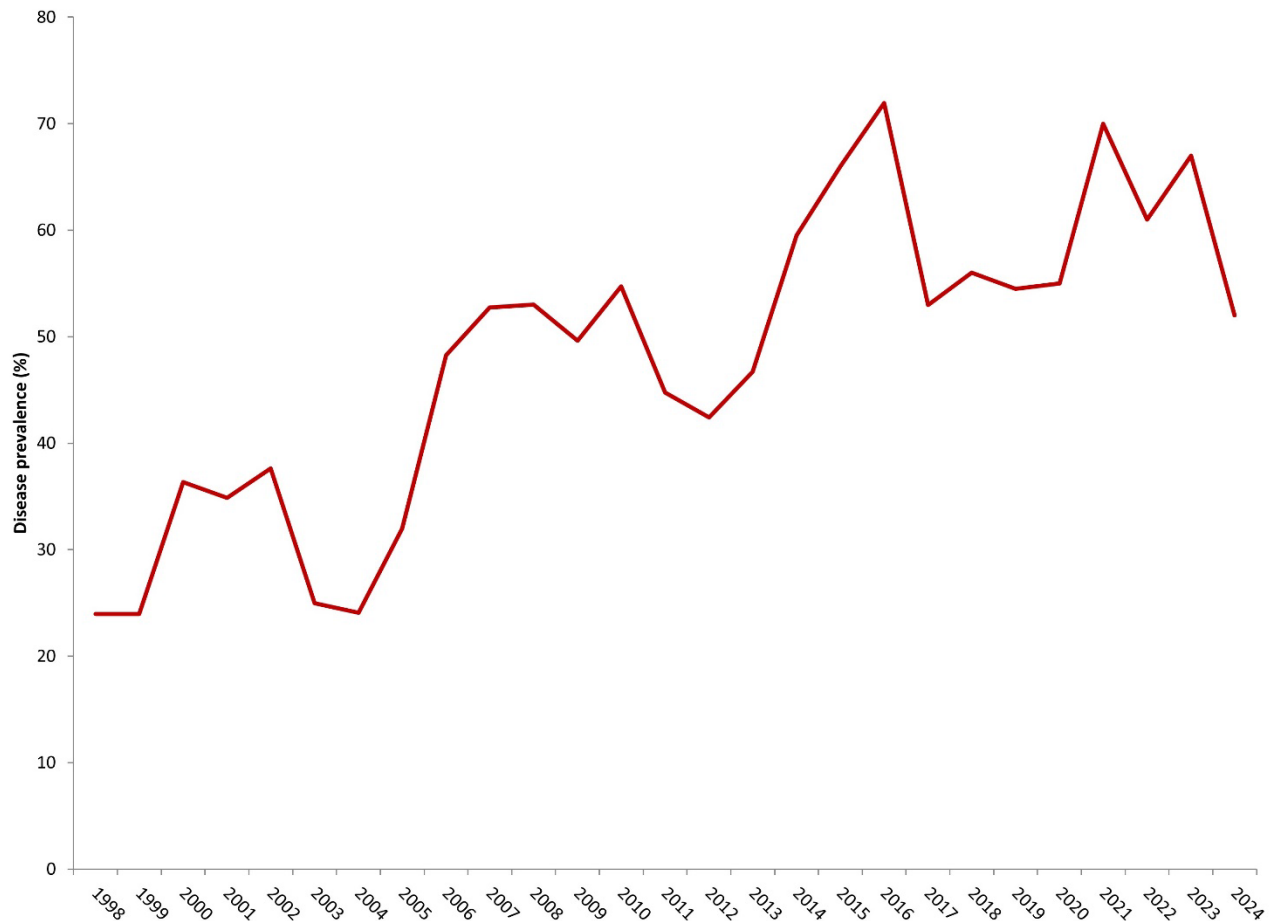
Striped bass often acquire mycobacterial infections within the first year of life. However, mycobacteria grow very slowly, so signs of disease are usually only evident in the summer following infection. The formation of nodule-like lesions in the spleen and other internal organs characterizes this disease. Tissue damage can result from the combined effects of the bacteria and subsequent inflammation, which is the host's immune response to the infection. Lesions are primarily noted in the spleen, but the infection often spreads to other organs in fish, such as the heart, liver, kidney, and eyes. Signs of disease commonly progress to the skin of affected fish. Fish with mild forms of mycobacteriosis generally appear normal, while fish with severe forms may appear unusually skinny (emaciated) and have numerous skin lesions covering the body. Mycobacteriosis is a very slow-acting disease. The development of severe skin lesions and emaciation (see image on page 1) may occur within months in some fish but more commonly takes more than three years to develop in the majority of fish. The slow but steady nature of this disease increases prevalence and severity with age (see charts below). Striped bass do not recover from mycobacteriosis. Once the disease process begins, clinical signs almost invariably and progressively worsen. While some lesions may show minor signs of healing, ulceration and pigment changes typically result in permanent scar tissue and underlying damage to the muscle.



Prevalence (left chart) and severity (right chart) of mycobacteriosis in striped bass.

HOW MANY FISH ARE AFFECTED BY THIS DISEASE?

Initial surveys in 1998 indicated that about 25% of the resident striped bass had mycobacteriosis. Prevalence has gradually increased to about 60% in 2022 (see chart below). Survey data are based primarily on fish < age 6 (generally <25" in length) and considered residents of the Chesapeake Bay. Fish aged six and older show a large difference in disease prevalence by sex. Disease prevalence remains elevated in older males but decreases markedly in older females. Determining the impact of disease on striped bass is complicated because females and males begin migrations at different ages; females may begin migrating at age 5, while males may delay migrations until age 10. Declines in disease prevalence in older fish likely indicate mortality, but more data are needed from larger and older fish to confirm.



Prevalence of mycobacteriosis in age 1-5 striped bass since 1998.

WHAT IS THE MARYLAND DEPARTMENT OF NATURAL RESOURCES DOING ABOUT THIS DISEASE?

The Maryland Department of Natural Resources (DNR) has monitored mycobacteriosis in the striped bass population since 1998. Each year, fish are collected from numerous locations around the Chesapeake Bay and examined for disease. In recent years, the prevalence of this disease appears to be increasing in the population. Information gathered in this survey is being used in epidemiology and environmental studies. Epidemiology is the study of the health of animal populations. Scientists from the Maryland Department of Natural Resources, the University of Maryland, and the National Oceanic and Atmospheric Administration (NOAA) are using data gathered from the striped bass disease survey to determine how many fish are dying from this disease. Disease data and various available water quality data are also assessed to determine the links between environmental impacts on the Chesapeake Bay and fish disease. This research will provide helpful information on why this disease has persisted in the population for over two decades and the impact the disease may have on the coastal population.

WHAT CAN YOU DO?

Anglers occasionally catch striped bass with signs of disease, such as ulcers and reddened areas in the skin (see picture above). The department recommends that anglers release diseased fish. There is no data to indicate that removing diseased individuals will reduce disease impact on the

striped bass population. Current data suggests that fish infections are associated with increased abundance of mycobacteria in the water column. Regardless of whether a fish has the disease, all anglers and commercial watermen must follow current daily size and creel limits laws. We also encourage anglers and watermen to take basic precautions to prevent infections from handling diseased fish (see the following section on Human Health Risks).

WHAT ARE THE HUMAN HEALTH RISKS OF MYCOBACTERIOSIS?

Mycobacteria can cause rare infections in people through breaks in the skin:

- The disease in humans is characterized by the appearance of small nodules (reddish bumps) or ulcerations.
- Infections in humans are generally limited to extremities such as the hands.
- Individuals with cuts, scrapes, or compromised immune systems are at a higher risk of infection.
- Human infections are rarely serious if diagnosed and treated promptly.

Striped bass, when cooked properly, are safe to eat:

- A review of published medical studies indicates no association between the consumption of cooked fish and human mycobacterial disease.
- Maryland Department of Health recommends not consuming raw fish or fish with lesions.

Simple precautions can help protect individuals when handling striped bass or other fish:

- Wear heavy gloves and boots to avoid puncture wounds from fish spines.
- Wash hands thoroughly after handling striped bass.
- Cleanse and bandage any open cuts or scrapes on hands or arms.
- Contact a healthcare provider with any questions or concerns.

When handling any type of fish, use a few practical and straightforward precautions:

- Wear waterproof gloves if cuts or scrapes are present on the skin.
- Dispose of any leftover fish parts after preparing raw fish.
- Wash off cutting boards, surfaces, knives, and other utensils with warm soapy water.
- Stop infections early. Contact a health provider if red or ulcerated bumps appear on the skin.

For more information, contact your healthcare provider or local health department. If you have any questions or concerns about fish health, contact the Maryland Department of Natural Resources at mark.matsche@maryland.gov.