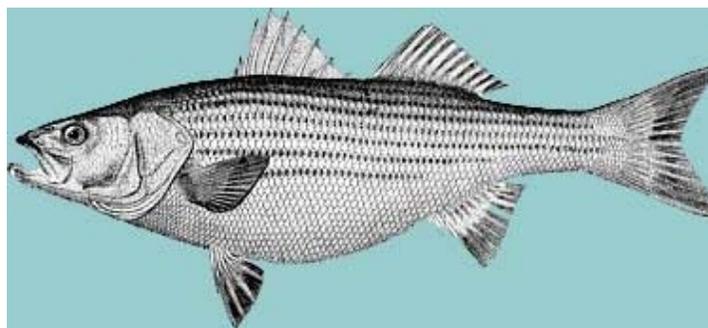


Striped Bass Health



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As the State fish, and a symbol of the vitality of the Chesapeake Bay, the striped bass (*Morone saxatilis*), or rockfish, is a central part of our work, play, and heritage in Maryland. Severe declines in the number of rockfish in the late 70s - mid 80s have become a fading memory as we now enjoy historically high levels of abundance. To ensure continued success of the population, the Maryland Department of Natural Resources is working to monitor not only indicators of the overall abundance, but the physical and nutritional health of striped bass.

Since 1998, the Sarbanes Cooperative Oxford Laboratory (MD DNR) in cooperation with the University of Maryland, Horn Point Laboratory, the MD-VA Regional College of Veterinary Medicine, the Maryland Department of Agriculture, and the U.S. Food and Drug Administration has conducted a striped bass health survey to examine the prevalence of disease in striped bass, and the general nutritional status of the species. The survey takes place each fall and enlists the aid of local watermen and charter boat captains to collect a representative number of fish from all areas of Maryland's Chesapeake Bay. Each fish collected is weighed and measured, with samples taken to look for any microscopic signs of disease, to identify bacteria that may be present, and to assess the nutritional health of the fish. This effort, in combination with ongoing research and monitoring of fish health incidents, as reported by diligent citizens through DNR's fish health hotline (**410-226-5193**), has provided a picture of the overall health of striped bass and specific issues facing the population.



Ulcerative Dermatitis Syndrome (UDS)

In 1994, watermen fishing the Potomac River first reported a high percentage of fish with external lesions which is a condition termed Ulcerative Dermatitis Syndrome(UDS). These shallow lesions range in size from multiple small areas of reddening, to large patches covering most of the body of the fish. Fall Bay-wide survey results from the last 3 years suggest that between 8 and 13% of the fish have these lesions, with the majority being the 3-5 year old fish (18"-26"). These symptoms are not apparent in the migratory spawning stock. The

spawning stock differs from these younger fish in that they reside in the Atlantic Ocean throughout most of the year but swim into tributaries of the Chesapeake Bay each spring to spawn. While many types of bacteria have been isolated from affected individuals, none have consistently been proven to cause the lesions.



Lesions on fish are extremely common and can be caused by a variety of factors related to both physical damage, and organisms in the water. Just as scrapes and cuts in humans can easily become infected, anything that penetrates the fish's slime layer and/or damages the underlying skin can create an opening for micro-organisms to take hold. However, some of these organisms can infect a fish without external damage. Under most circumstances, the fish's immune system is capable of warding off infection, but stressors such as poor water quality, excessive handling, or poor nutritional health can reduce the fish's ability to counteract invading pathogens.

Nutritional Health

Coupled with reports of external lesions on striped bass, have been concerns over the number of thin fish captured by recreational anglers and watermen in past years. Experiments at the Horn Point Laboratory, combined with examinations of fish in the field from surveys, suggest that in late summer and fall 1998-1999, striped bass were in poor nutritional health. During the fall season, striped bass begin to school and feed heavily in preparation for the winter and spawning in the spring. Excess food is stored predominantly as fat in the body cavity and as this is used, it is replaced with water. Typically, tissue from a healthy striped bass will be about 70-74% water, 20-24% protein, and 2-5% fat. Fish collected in the fall of 1998 and 1999 averaged 80% moisture, 19% protein, 0.5% fat. This information, coupled with observations of no body fat, and in comparison with wild fish starved for lengths of time at HPL, strongly suggests poor nutritional health. Samples collected in 2001 are currently being examined.

Mycobacteriosis

Perhaps the most serious concern with striped bass health is the high prevalence of a potentially deadly disease, mycobacteriosis. Mycobacteriosis is caused by a large group of bacteria, *Mycobacterium spp.* Clinical signs vary greatly, but can include external lesions, swelling of the eyes, emaciation, skin color changes, stunted growth, or no signs at all. While mycobacteria have been isolated from some fish with UDS, the relationship between mycobacteriosis and UDS in striped bass has not been clearly established. Internally, the disease is characterized by the formation of marble sized nodules called granulomas, which are found primarily in the spleen and head kidney, but can form throughout the body. A granuloma is essentially the body's way of containing a pathogen that it can not otherwise eradicate, by encapsulating the invading bacteria (see figures). Mycobacteria are hardy, slow growing organisms. Disease may take months to years to progress, and there is currently no known cure for this disease in fish.



The fall survey found mycobacteria in 25% of fish sampled in 1998 and 40% in 1999, with 2001 results pending. This disease has been found in fish as young as 1 year old, but predominantly in the 3-5 year olds. Complicating matters further, a new species of mycobacterium was isolated from these fish, tentatively named *Mycobacterium chesapeaki*. Studies at cooperating laboratories have shown this new bacteria to be capable of causing the same disease noted in the wild. Little is known about this species' requirements for growth or potential impact on wild populations of fish.

As with many bacteria that cause disease in fish, some species of mycobacteria can affect humans. Typically, infection occurs at the extremities (hands, feet) or knees resulting in local swelling and raised, red areas at sites of infection. High human body temperature is believed to preclude the spread of disease, but treatment with antibiotics can be lengthy. Those who regularly handle fish or work on the water can take measures to protect themselves such as wearing gloves and sturdy boots, avoiding exposing cuts or scrapes to the water, and washing with a disinfectant.

Current Understanding and Future Direction

Most of the theories proposed to explain the current health status of striped bass relate to their increased abundance. The complex interaction of organisms in the environment is a delicate balance. Every system has a limit to the number and type of organisms it can support to maintain this balance. When that limit is approached, the balance between predator and prey is tested, often resulting in increased stress in the population. Currently, striped bass are quite high in abundance in the Chesapeake Bay, while their main forage species, Atlantic menhaden, is low in abundance. Competition is increased among striped bass for the available food. It is possible that increased forage time and reduced feeding success are causing physiological stress among striped bass leading to increased susceptibility to infection. Outbreaks of disease are one of nature's ways of restoring balance in an ecosystem. Little is known about the ability of this new species of mycobacterium to infect fish and cause the symptoms noted regardless of how many fish there are. The 2001 striped bass year class is the highest recorded by the State of Maryland. Following the health of this year class through time will lend insight into this most basic of questions.

A thorough understanding of the current health status of striped bass and the role of mycobacteria in the fish population is needed. Efforts will continue to develop a test that will allow for a rapid, non-invasive identification of mycobacteria. With more efficient methods of identifying these bacteria, MD DNR can then expand the scope of our studies to include a full epidemiological approach to the striped bass population. Expanded sampling efforts will offer a better picture of how widespread mycobacteria are within the striped bass population, to what degree they are causing disease, which segments of the population are susceptible to disease and when, and how the disease is spread. This knowledge can then be incorporated into an overall fisheries management plan for more effective decision making for Maryland fish stocks.

