

## Fisheries and Aquatic Resources—Fish Health



Inoculating bacteriological plates

**F**ish health research scientists at the Leetown Science Center investigate persistent emergent health issues associated with genetics, pathogens and environmental stressors that undermine conservation and restoration of interjurisdictional populations including depleted, threatened, or endangered fishes and aquatic organisms.



Fish health research at Leetown had its origin in the 1930's when the Leetown Fish Hatchery and Experiment Station was constructed. In 1978, the National Fish Health Research Laboratory, now a component of the Leetown Science Center, was established to solve emerging and known disease problems affecting fish and other aquatic organisms critical to species restoration programs. Center scientists develop methods for the isolation, detection, and identification of fish pathogens and for prevention and control of fish diseases.



Collecting bacterial samples from Atlantic salmon

Today, those Center scientists specializing in fish health work across a number of important disciplines including pathology, microbiology, immunology, toxicology, and molecular biology.

Pioneering research in important aquatic animal health issues has been conducted at the National Fish Health Research Laboratory throughout its four decades of existence. Center scientists conduct research to improve our understanding of the magnitude of effects and applicable control measures for a variety of infectious disease agents affecting specific groups and populations of aquatic animals. In recent years, some such investigations have focused upon infectious salmon anemia virus of Atlantic salmon, infectious pancreatic necrosis virus of salmonid fish species, amphibian ranaviruses, furunculosis of Atlantic salmon, salmonid whirling disease, and

infectious diseases of corals.

Additional studies are using novel approaches to investigate the effects of antibiotics used to control bacterial pathogens; analysis of microbial flora and alterations in the microbial community associated with pathogens and disease status are being examined as tools to aid in the early diagnosis of infectious disease processes.

Over the past decade, numerous fish kills and the appearance of lesions on live fishes in the Chesapeake Bay and its tributaries raised public interest in fish health issues in this critical aquatic ecosystem. Working with collaborators, Center researchers discovered a pathogenic fungus, *Aphanomyces invadans*, to be the cause of chronic ulcerative lesions in menhaden, a primary forage fish for striped bass and other species of recreational and commercial interest.

## Research Application

- Leetown scientists utilize cutting-edge molecular biological techniques in a variety of ways to aid in environmental assessment and remediation efforts. Scientists are developing new molecular assessment methods to provide sensitive, early indications of water quality changes that affect the health of aquatic habitats. Likewise, molecular tools are being developed to determine the animal source(s) of biological contamination in natural waters.
- In collaboration with other USGS Science Centers and other partners, Leetown scientists are participating in a comprehensive study examining ecosystem health in the Klamath Basin in Oregon. Research priorities include the investigations of pathogens and diseases of resident fishes, including two endangered species of suckers from Upper Klamath Lake. To determine the significance of bacterial pathogens of these endangered fish, a suite of techniques utilizing microbiology, molecular biology, and pathology are being developed and applied.

Center scientists also have been investigating ulcerative lesions found to be associated with mycobacteria in Chesapeake Bay striped bass. Collaborative research with the Virginia Institute of Marine Science and other agencies has been directed towards ascertaining the extent of this problem throughout the Chesapeake watershed, molecular identification of mycobacterial species, infectivity studies, and evaluations of host immune responses.



Fish tumors on a brown bullhead

Ongoing Center research in Chesapeake Bay tributaries is also examining the potential impacts of anthropogenic activity and emerging contaminants on general and reproductive health of sentinel fish species. Studies include investigations of the incidence and potential causes of intersex among male bass within the Potomac River drainage and effects of environmental contaminants on the health of

sentinel fish species throughout Pennsylvania.

Center scientists conducted much of the original work establishing the connection between sediment contamination and cancer epizootics in fish populations in the Great Lakes tributaries. Over the last two decades many of these systems have seen point sources eliminated and sediments cleaned by dredging. Scientists are assessing the changes at the community level to see how these remediation efforts correlate with improvements in fish health.

Over 70% of the approximately 300 species of freshwater mussels native to the United States are endangered, threatened or otherwise at risk. Research conducted by Center scientists is evaluating the potential for pathogen transfer from mussels to fish when both are held in hatcheries, providing federal and state decision-makers with information on the use of fish hatcheries as management tools for mussel recovery. Other Center research is examining the cause of recurrent dieoffs among wild mussel populations in the Tennessee River below Wilson Dam.

Another major objective of Leetown's fish health scientists is to provide technical assistance to

federal and state collaborators and partners through technical and diagnostic support, training, and information exchange. The Eastern Fish Health Workshop provides a forum for collaboration and review of emerging fish health issues. Over 100 research scientists, fishery managers, fish health practitioners, and university students attend this annual Center sponsored workshop.



Pistolrip mussel from the Tennessee River

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