

Eastern Ecological Science Center— Fish and Aquatic Animal Health

Science provided by the U.S. Geological Survey (USGS) Eastern Ecological Science Center (EESC) helps to protect fish and aquatic animal health and support disease management of our Nation’s fisheries and aquatic animal populations. Our capabilities and expertise span diverse, yet highly integrated disciplines related to all aspects of biology, ecology, and animal health. Our scientists work to identify novel and emerging pathogens and diseases to assess fish and aquatic animal responses to parasites, pathogens, adverse environmental conditions, and chemical exposures. Eastern Ecological Science Center research is conducted both in laboratories and in the field in various aquatic environments ranging from headwater streams to the ocean. The EESC team provides science leadership and support for fisheries and aquatic species specialists nationwide.

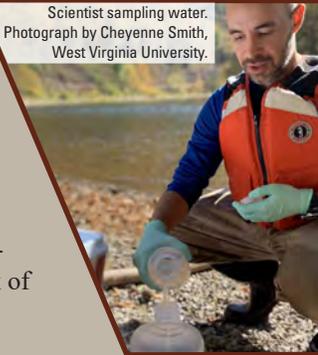
Blue catfish
Photograph by Christine Densmore, U.S. Geological Survey.



What We Do

Our scientists are working in fish and aquatic animal health to produce field and laboratory-based science products to improve our understanding of the disease and health risks, the challenges facing fish and aquatic animals, and assist managers in making hard decisions that affect aquatic species and their habitats. We provide scientific information for our management partners on native species, sportfish, invasive species, and imperiled species from aquatic habitats undergoing active restoration or conservation efforts. Our science knowledge, research experience, and modern research facilities allow us to conduct focused animal-health investigations, perform targeted disease biosurveillance, and create decision-support tools and research methods that reduce the risk of diseases and enhance certainty in managing fish and aquatic animal health.

Scientist sampling water.
Photograph by Cheyenne Smith,
West Virginia University.



Focused Research

Biological threats on fish and aquatic animal health including:

- Significant pathogens and diseases
- Invasive species effects

Chemical contaminant interactions and effects on fish and aquatic animal health and diseases including:

- Identification of adverse effects on endocrine, reproductive, and immune responses
- Effects of long-lasting toxic chemicals, including per- and polyfluoroalkyl substances (PFAS)

Physical barriers to fish migration and the effects of natural and anthropogenic environmental change on growth, reproduction, and development of anadromous fish species.

Health and disease of imperiled species relates to climate change or land use, including coral disease research, such as Stony Coral Tissue Loss Disease.

Biosurveillance and Monitoring

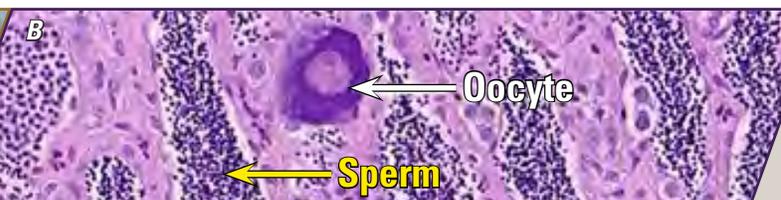
- Ongoing health-related threats to the United States’ important fish and aquatic animal resources
- Emerging threats, including new pathogens and diseases of fish and aquatic animals
- Disease ecology, including the effects of physical, chemical, and biological alterations to aquatic habitats

Disease Decision Science and Research

- Field and laboratory-based investigations
- Epidemiological modeling and advanced statistical analysis
- Decision analysis for effective management of natural resources

Banner photograph: Atlantic Menhaden feeding in the Chesapeake Bay. Photograph by Mikey Lutmering, U.S. Geological Survey.
Photograph A: Clinical presentation of blotchy bass syndrome in a smallmouth bass. Photograph by Megan Schall, Penn State University.

Photograph B: Microscopic image of smallmouth bass gonads showing an abnormality involving development of both eggs and sperm. Photograph by Vicki Blazer, U.S. Geological Survey.



Our Research Campuses, Capabilities and Facilities

Leetown Research Laboratory (Kearneysville, West Virginia)

- Laboratories with dedicated focus on aquatic animal pathology, immunology and immunodiagnostic testing, and microscopy and imaging
- Mass spectroscopy laboratory with the capability to analyze contaminants, such as PFAS, in animal tissues
- Molecular and genetic-based technology, such as environmental DNA (eDNA) detection methods, next-generation sequencing (NGS); technology and functional genomics, to identify emerging threats to fish and aquatic animals
- Multiple aquatic labs are designed to test and observe the fish and aquatic animal response and adaptation to environmental stressors and migration-related challenges, including the capability for holding and working with freshwater species at varying water temperatures
- Outdoor adjustable flow research ponds for holding of aquatic species
- Biosafety Level 3 (BSL-3) biocontainment laboratory is specifically designed for fish and aquatic animal holding and research



Two scientists extract plasma from a smallmouth bass. Photograph by Michael Eckles, U.S. Geological Survey.



A scientist uses a swim tunnel respirometer. Photograph by Andrea Miehls, U.S. Geological Survey.

S.O. Conte Research Laboratory (Turners Falls, Massachusetts)

- Outdoor rearing facility and indoor aquatic laboratory with the capability to control temperature, salinity, and photoperiod for rearing a wide range of aquatic species
- Endocrinology and protein chemistry lab with the capability of measuring hormones and their receptors and proteins involved in acclimation to salinity and temperature
- Graphite furnace atomic absorption spectrophotometer for use in measuring ions and heavy metals
- Large-scale facility for testing complex hydraulic structures and devices and housing three major hydraulic flumes capable of flow as much as 350 cubic feet per second (ft³/s)

Patuxent Research Refuge (Laurel, Maryland)

- Physiology and ecotoxicology laboratories with multiple analytical capabilities, including blood chemistry measurements
- Molecular and biochemical analytical laboratories with capabilities and instrumentation for genomics, transcriptomics, microbiome, immune system, endocrine, and organismal stress biomarker analysis
- Bioinformatics capability
- Environmental chambers for amphibian or invertebrate physiology and toxicology studies



Researcher using an imaging flow cytometer to capture smallmouth bass immune function data. Photograph by Christine Densmore, U.S. Geological Survey.

A brain coral infected with Stony Coral Tissue Loss Disease in The Florida Keys National Sanctuary. Photograph by Ilsa Kuffner, U.S. Geological Survey.