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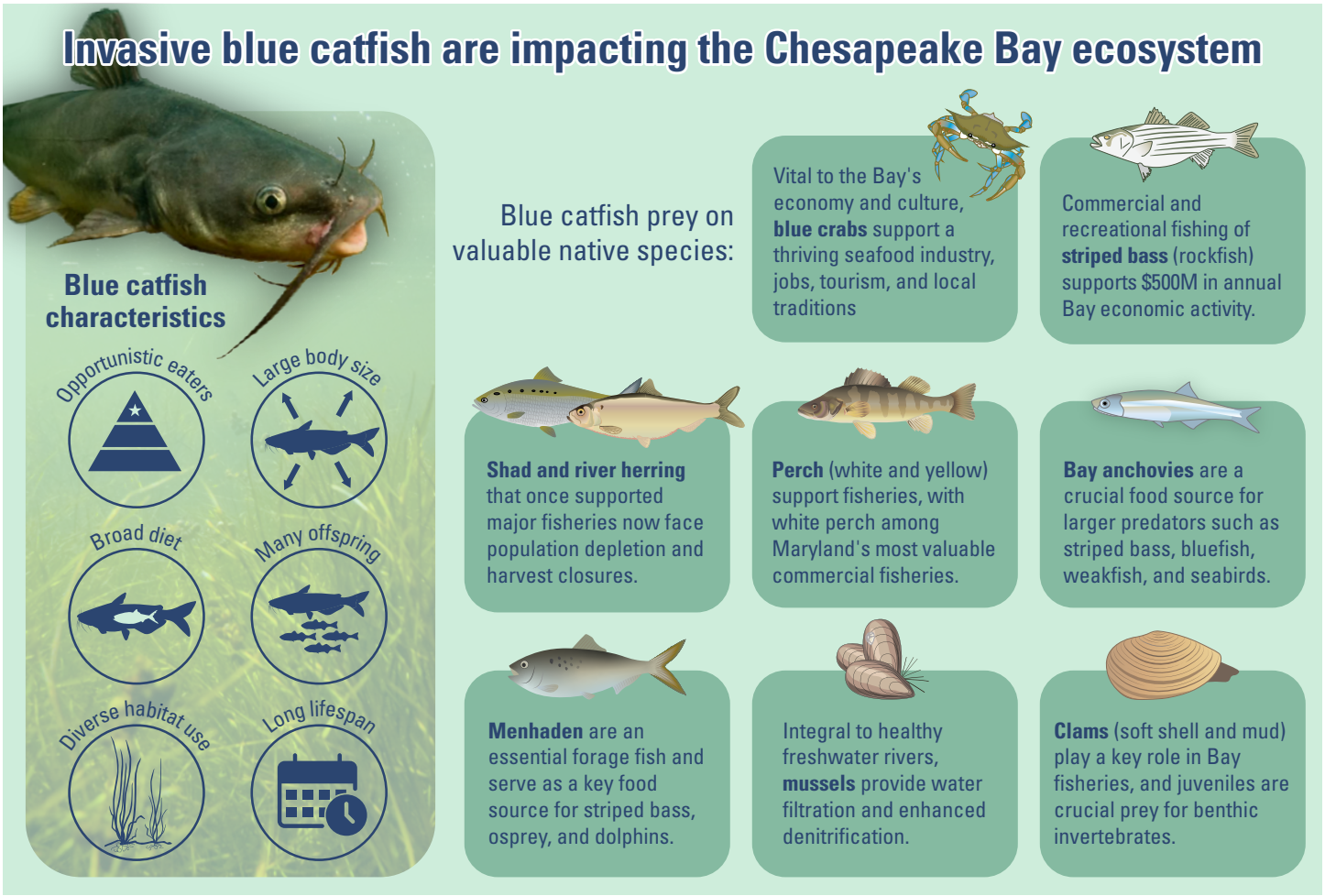
Invasive blue catfish in the Chesapeake Bay: A risk to realizing Bay restoration investments

The partners of the Chesapeake Bay are investing billions of dollars in the restoration of critical habitats to improve conditions for people and living resources throughout the Bay and its watershed (Phillips and others, 2017). However, the recent proliferation of invasive *Ictalurus furcatus* (blue catfish) in the Chesapeake Bay's major rivers has the potential to disrupt these restoration efforts and limit the full potential improvement of the ecosystem. The U.S. Geological Survey (USGS) can help respond to this management challenge in the Nation's largest estuary by leveraging its leadership and technical capabilities to work with resource managers, academics, and other stakeholders.

The contents of a blue catfish's stomach often include a variety of crabs, clams, mussels, and fish.



Blue catfish biology enables this invasive species to become established, spread rapidly, and put native species at risk. This figure highlights those characteristics and some of the valuable native species observed in high frequency in blue catfish stomachs.

U.S. Department of the Interior
U.S. Geological Survey

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Since their introduction, blue catfish have expanded to most tributaries of the Chesapeake Bay

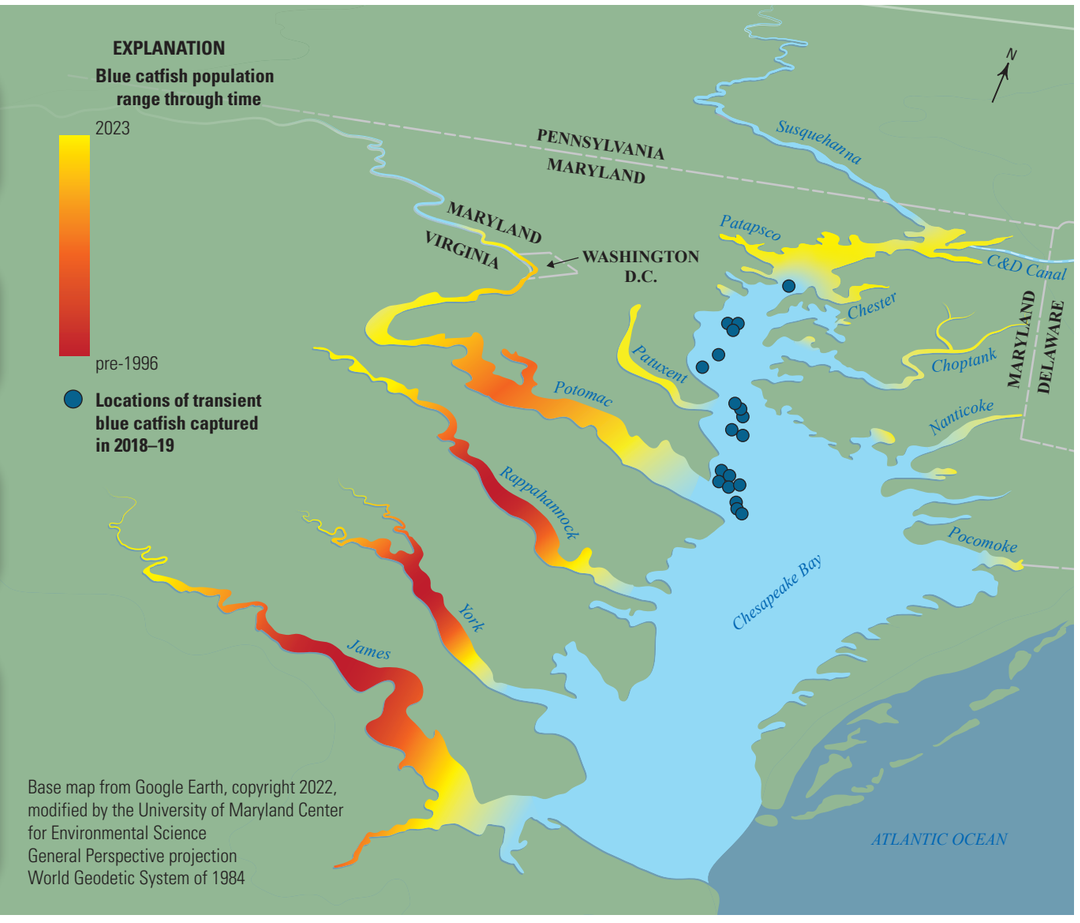
Native to the Mississippi, Ohio, Missouri, and Rio Grande Rivers, blue catfish were first introduced as a novel sportfish to the James River in the 1970s (Chesapeake Bay Program, 2020). The map below depicts observational records of the spatial and temporal invasion of blue catfish in the Chesapeake Bay. Individuals found in the main stem of the Bay are likely transient and their presence in these areas demonstrates the wide salinity tolerance (up to 15.7 practical salinity units) of the species. Today, blue catfish present opportunities for trophy and commercial fisheries but also challenges for minimizing effects on native species as they have rapidly spread and are now found in most Chesapeake Bay tributaries. Because of the need to balance these differing stakeholder interests, any bay-wide management response will likely require a tributary-by-tributary strategy.

Upper Bay: The leading edge of invasive blue catfish, experiencing rapid expansion and risk of spread to Delaware Bay through the Chesapeake-Delaware (C&D) Canal. This area serves as important habitat for blue crabs, white and yellow perch, Atlantic striped bass, and other ecologically and socio-economically important fish and aquatic resources.

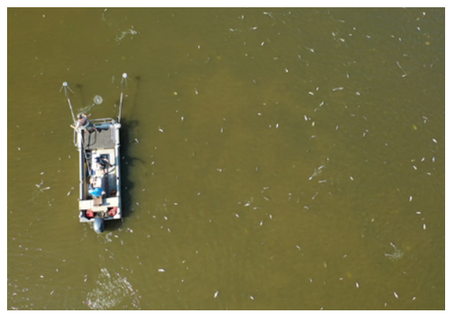
Mid-Bay (East): Recently invaded populations in this area are rapidly expanding and threatening major spawning areas for Atlantic striped bass and other important fish and aquatic resources, including the only known spawning population of the endangered Atlantic sturgeon in Maryland. This area hosts sport and commercial fisheries of blue catfish.

Mid-Bay (West): The origin of the blue catfish invasion into Maryland with high abundances observed beginning in the 1990s. A hotspot for sport and commercial fishing, holding Maryland's blue catfish sportfishing record of 84 pounds and an increasing commercial fishery for blue catfish with 3.1 million pounds harvested in 2023, valuing $1.5 million.

Lower Bay: Oldest population of blue catfish in the Bay with estimated densities of over 1,300 blue catfish per acre. The blue catfish in this region are valued by trophy sport fisherman. The sport fishing record for Virginia is 143 pounds. The economic value of the blue catfish in this region is estimated at $2.5 million dollars (Chesapeake Bay Program, 2020). This population is of concern to fishery managers and stakeholders, given that estimates of blue catfish in a 199-km river section preyed annually on 401 tons of blue crab, 98 tons of Atlantic menhaden, and 62 tons of American eel, all of which are vital species to this region (Hilling and others, 2023).



Map showing the spatial and temporal invasion of blue catfish in the Chesapeake Bay, 1970–2023. (Population range data are from Branson D. Williams [Maryland Department of Natural Resources, unpub. data, 2024], Christopher M. Jones [Maryland Department of Natural Resources, unpub. data, 2024], and Ronald W. Owens [Potomac River Fisheries Commission, unpub. data, 2024]. Location data of transient blue catfish are from Fabrizio and others [2020].)



Diverse stakeholder groups are affected by the blue catfish invasion including (from left to right): sportfishing (holding a trophy-sized blue catfish), commercial fishing (unloading a blue catfish harvest), conservation organizations (surveying by electrofishing), and the seafood market (fine dining on blue catfish).

Leveraging USGS scientific expertise and experience

Addressing the challenge of blue catfish will require focus on three key aspects of invasive species management: control of the established population's size, early detection of and response to the species' establishment in new areas, and prevention of further range expansion. The USGS has a demonstrated track record of working alongside State and Federal partners to respond to inter-state and inter-regional invasive species challenges across the United States. This experience and the unique nonregulatory science mission of the USGS presents an opportunity to leverage the USGS's scientific expertise to inform management decisions that are complex and encompass differing stakeholder perspectives.

Biological sampling of blue catfish by U.S. Geological Survey and Maryland Department of Natural Resources personnel.

Collaborating with partners and stakeholders

Blue catfish are a great concern to many of the 13 agencies and organizations interested in the management of aquatic invasive species occurring within the Chesapeake Bay watershed according to a survey administered by the USGS in 2019 (Desmore, 2020). Data obtained from this survey were used to identify priority science needs. Working closely with the Chesapeake Bay Program's Invasive Catfish Workgroup, the USGS's scientific capacities are being leveraged by USGS partners to expand research capacity and address research gaps. A collaborative approach among State and Federal resource managers, academic institutions, and other stakeholders will need to be continued, and coordinated, to maximize resources and capabilities to address this significant Bay restoration challenge.

The USGS's role in informing invasive blue catfish response: Safeguarding Bay restoration investments

Scientific Leadership and Coordination.—The USGS can provide leadership and science coordination to establish and implement a comprehensive research framework for understanding and informing management of invasive blue catfish.

Research Prioritization and Implementation.—As a leader in scientific research, the USGS can provide additional capabilities and address critical knowledge gaps related to invasive blue catfish. This includes assessing population dynamics, ecosystem impacts, socioeconomic implications, feasible management strategies, and fish and public health assessments.

Development and Application of Scientific Tools.—The USGS can develop and apply scientific tools and methodologies to support research and management activities related to blue catfish. This includes the development of monitoring techniques such as environmental DNA assessment, population modeling, spatial analysis, and decision-making frameworks.

Collaborative Partnerships.—The USGS is a nonregulatory science organization, which is of value to its collaborators, including Federal, State, and local partners, academic institutions, nonprofit organizations, and other stakeholders engaged in blue catfish management.

Public Outreach and Engagement.—The USGS can provide resource managers with scientific information for use in public outreach and education efforts intended to raise awareness about the effects of invasive blue catfish and the importance of population control. Such efforts can also be used to enlist the public's support and assistance in addressing this expanding management challenge.

Adaptive Management and Decision Support.—The USGS is known for its expertise in adaptive management principles and decision support tools to evaluate the effectiveness of management strategies and to inform future actions.

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For more information regarding U.S. Geological Survey Chesapeake Bay studies and the U.S. Geological Survey Eastern Ecological Science Center visit:

- https://www.usgs.gov/centers/cba
- https://www.usgs.gov/centers/eesc

Science communication, layout, and design by Lili Badri, Veronica Malabanan Lucchese, Vanessa Vargas-Nguyen, and Bill Dennison of the University of Maryland Center for Environmental Science.

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