

# U.S. Geological Survey Chesapeake Science Strategy, 2015–2025—Informing Ecosystem Management of America’s Largest Estuary

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## Executive Summary

The U.S. Geological Survey (USGS) has the critical role of providing scientific information to improve the understanding and management of the Chesapeake Bay ecosystem. The USGS works with Federal, State, and academic science partners to provide research and monitoring, and communicate results of these activities to enhance ecosystem management for both the Chesapeake and other National ecosystems. The USGS Chesapeake Science Strategy was prepared to guide science activities to address the Chesapeake Bay Watershed Agreement (2014–2025), to support the Department of the Interior (DOI) involvement in the Bay restoration efforts, and align with the USGS Mission Area (MA) Science Strategies.

The Chesapeake Bay is our Nation’s largest estuary, and provides critical goods and services to the people, fish, and wildlife that use the 64,000-square-mile watershed. The Chesapeake Bay watershed contains over 3,600 species of fish, wildlife, and plants and provides spawning grounds for many ecologically and economically important species including striped bass and blue crabs. The Bay watershed lies in the heart of the Atlantic Flyway and has 29 species of waterfowl, about 1 million of which winter in the region. The size of the Chesapeake seafood harvest is third in the Nation, only behind the Atlantic and Pacific Oceans. Along with agricultural production, tourism, and recreation, the estimated economic value of the services from the Chesapeake Bay watershed is about \$100 billion annually. However, the health of the Bay ecosystem began to decline at the beginning of the 20th century due to overfishing and increasing human population and associated land change.

The Chesapeake Bay Program (CBP) is the Federal-State cooperative effort that started in 1983 to restore the Bay and watershed. Given the ecological and economic importance of the Chesapeake ecosystem, President Obama issued an Executive Order (EO) in 2009 for increased Federal leadership in the CBP to enhance the pace of restoration, and the supporting strategy was released in 2010. The EO directed the Federal Government, including the U.S. Department of the Interior (DOI), represented by the National Park Service (NPS), the U.S. Fish & Wildlife Service (FWS), and the USGS, to expand its efforts and increase leadership to restore the Bay and its watershed. The USGS and other Federal agencies expanded their activities in 2011 to meet the President’s Chesapeake EO. Since the EO was released, there have been several important changes in the USGS, DOI, and the CBP including: (1) the Chesapeake Bay Watershed Agreement, (2) increased DOI leadership in the CBP, and (3) the release of the USGS MA science strategies. The EO strategy served as a foundation for the Chesapeake Bay Watershed Agreement that was signed in 2014 by the CBP Partners, and has goals and outcomes to be met by 2025 (table 1).

The USGS developed the Chesapeake Science Strategy to guide our activities to address the Chesapeake Bay Watershed Agreement, DOI leadership in the CBP, and USGS MA strategies. Improving the understanding of fish and wildlife population and health, and the factors affecting their condition is the emphasis of the Strategy. The science focuses on documenting the critical ecosystem connections in the Chesapeake, and providing implications to enhance decision making for restoration and conservation activities.

**Table 1.** Relation between Chesapeake Bay Executive Order Strategy, Chesapeake Bay Watershed Agreement Goals, and U.S. Geological Survey (USGS) Chesapeake Science Themes.

[**Bold**, focus of USGS efforts for Goals in Agreement]

2010 Executive Order Strategy Topics	Chesapeake Bay Watershed Agreement Goals and Principles, 2014–2025	U.S. Geological Survey Chesapeake Science Themes, 2015–2025
Sustain Fish And Wildlife	Sustaining Fisheries	Provide Science to Support Restoration and Conservation of Fish, Wildlife, and Habitat
Recover Habitats	<b>Vital Habitats</b>	
Restore Clean Water	<b>Toxic Contaminants</b>	Characterize and Explain Water-Quality Conditions and Change
	<b>Water Quality</b>	
Conserve Land and Increase Public Access	<b>Healthy Watersheds</b>	Assess and Forecast Effects of Climate and Land Change
	<b>Land Conservation</b>	
	Public Access	
Expand Citizen Stewardship	Stewardship	
	Environmental Literacy	
Respond to Climate Change	<b>Climate Resiliency</b>	Assess and Forecast Effects of Climate and Land Change
Develop Environmental Markets		
Strengthen Science	<b>Use Science-Based Decision Making</b>	Synthesize and Provide Information to Support Ecosystem Management

The revised Strategy has four themes that address 7 of the 10 goals in the Chesapeake Bay Watershed Agreement (table 1):

- Enhance science to support restoration, and conservation of fish, wildlife, and critical habitats.
- Characterize and explain changes in water quality, and its effect on freshwater and estuarine ecosystems.
- Assess and forecast effects of climate and land change on ecosystem conditions.
- Synthesize and provide information to support ecosystem management.

The structure and function of biological communities of the Bay and its watershed are extremely complex and are affected by a variety of stressors and conditions. To better define the issues being addressed, the USGS has developed cross-cutting questions that define some of the most important

scientific challenges where multiple disciplines and collaborators are needed to address an issue. The initial questions include:

- How do land and climate changes affect freshwater fish communities, health, and habitats?
- What are the relations among land use, water quality, contaminants, and the health of fish and wildlife?
- How are coastal wetlands and their carrying capacity for waterbirds affected by changing climate and land use?
- How is the water quality of rivers and estuaries responding to restoration actions, and changing land use?
- What are some of the best opportunities for management actions to benefit multiple restoration outcomes?