USGS National Wildlife Health Center

Strategic Science Plan

2020-2025

October 1, 2019

Introduction

This strategic science plan provides overarching direction for the USGS National Wildlife Health Center for the next five years. The mission, vision, and core values will guide our actions. The strategic science initiatives set the foundation for our goals and actions and guide our allocation of resources. The outcomes for each strategic initiative establish our targets and benchmarks for success.

While the strategic plan provides long-term direction, the planning process remains dynamic in order to respond to the needs of a changing environment. Thus, while our mission and core values remain constant, we are prepared to change our outcomes, goals, and priorities as the environment in which we operate changes. For that reason, we will use the strategic plan to guide our actions throughout the year and will formally review and update it as needed.

Planning context

Established in 1975, the USGS National Wildlife Health Center (NWHC or Center) is a U.S. Geological Survey (USGS) Science Center in the Midcontinent Region. The Center operates with a staff of 90 permanent employees, contractors, and volunteers, with a main campus in Madison, Wisconsin and a Field Station located in Honolulu, Hawaii.

The Center is a national and international focal point for information, research, and scholarly activities on scientific matters involving the study of wildlife health and disease, and the interrelationship between wildlife, human, and ecosystem health. Through strong partnerships with Federal and State natural resource management agencies, other Federal agencies, academia, private industry, and others, we study ecological factors leading to the occurrence of wildlife disease, conduct surveillance, and develop tools for disease prevention and control for use by natural resource managers.

The following strategic science plan describes the science priorities of the Center for the next 5 years, including goals and projected outcomes for each priority. In addition to addressing the varied needs of the wildlife health community and working to better integrate wildlife health into a broader health context, this strategic plan will serve to align the work of the Center with available resources by providing a scalable and flexible framework for our science direction. This plan provides the Center's strategy for prioritizing our work, establishing essential services and products, and fulfilling our role as a leading Federal science center in the global health community.

Our mission

Our **mission** is our fundamental reason for existence. It defines our identity and sets our agenda for the future years. We commit ourselves and our resources to moving toward this mission:

Advancing wildlife health science for the benefit of animals, humans, and the environment

Our 5-year vision

Our **vision** describes our aspirations and commitment and offers a clear and compelling description of our organization at the end of the next five years. Our five-year vision is:

Providing new solutions to promote wildlife health and ecosystem resilience

Our core values

In addition to the USGS Guiding Principles, our core values are the principles for which we stand. They guide our actions in achieving our mission. We expect all Center staff to apply these values in interactions with stakeholders and each other. The values are not subject to compromise or negotiation.

Core Value	Description	How Demonstrated
Service	Human, wildlife, domestic animal, and environmental health are interdependent. Informed by this, our collective work serves the common good.	- Conduct rigorous and actionable science that benefits our partners and the public. - Lead by example and consider the broad impact of our actions and decisions. - Demonstrate transparency, integrity, and honesty in all we do. - Respect the varied needs and viewpoints of our partners. - Serve one another, our partners, and the Center as a whole. - Demonstrate a commitment to scientific integrity and data quality.

Core Value	Description	How Demonstrated
Collaboration	By pursuing common goals and embracing the power of partnerships, we multiply our contributions.	- Seek opportunities to complement the skills, talents, and resources of others. - Actively listen and communicate frequently and clearly with colleagues and partners. - Value the diverse perspectives of team members and recognize that capitalizing on differences will make us more successful. - Acknowledge that our individual and collective success is intertwined by working as a team for the benefit of our mission, our partners, and our natural resources.
Innovation	We meet challenges with creativity and enthusiasm, offering novel solutions to complex problems.	- Challenge our own assumptions and opinions to break new ground. - Create an environment that cultivates inquiry, critical thinking, and a solution-oriented mindset. - Seek creative opportunities and embrace novel directions. - Commit to life-long learning.
Respect	Employee well-being is fundamental. We will provide a safe, supportive, and productive professional community.	- Foster and celebrate diversity in all forms. - Promote a culture of work-life balance.

Core Value	Description	How Demonstrated
		- Work through conflict by seeking common ground; use respectful disagreement as an opportunity for growth. - Assume the best intentions of others and approach colleagues with empathy, recognizing everyone has unique gifts and constraints. - Hold one another accountable for speech and behavior that is disrespectful, dishonest, negligent, or meant to intimidate.

Our strategic initiatives and related goals

Strategic Initiative 1: Take a comprehensive approach to wildlife health to optimize outcomes for animals, humans, and the environment

Wildlife, human, and domestic animal health are closely interrelated within the context of the health of the environment, and an approach to wildlife health that acknowledges and incorporates these broader components can provide wide-ranging benefits. The health of wildlife has direct impacts on humans, domestic animals, the environment, and local and global economies. As vulnerable populations that depend on functioning ecosystems, wildlife populations are in turn highly impacted by alterations in land use, introduction of invasive species and pathogens, and other anthropogenic pressures. Due to their close link with humans, domestic animals, and the environment, wildlife can serve as an indicator of the health of the broader community. These interrelationships, as embodied by the One Health concept, must play a central role in the consideration of wildlife health to maximize the practical value of wildlife health science to society.

Even as we acknowledge the complex interdependence of the health of wildlife, people, and the environment, we recognize that health is a dynamic and fluid construct, influenced by a range of interacting biological, socio-economic, and environmental factors. A comprehensive definition of wildlife health must extend beyond absence of disease to include resilience, or the ability to respond and adapt in the face of health threats. To safeguard wildlife health, we need a holistic perspective that incorporates multiple factors, including pathogens, habitat, the abiotic environment, and societal values.

With this initiative, we will begin to orient towards a broader paradigm of wildlife health inclusive of multiple determinants within the larger context of functioning ecosystems and global health. We will do this through collaborative projects with partners in the natural resources, agriculture, public health, social, and environmental sectors and by collectively sharing information with stakeholders and the public regarding both the components of, and the importance of, wildlife health and resilience. Together, we will encourage a shift in the view of wildlife as a threat (e.g. to agricultural or public health), to one where wildlife is a positive and important component of properly functioning ecosystems of which humans are an integral part. In this way, we will leverage our collective scientific capabilities for the service of all partners and stakeholders in multiple disciplines and help find real-world solutions that advance health for all.

This Initiative will support U.S. Department of the Interior (DOI) and U.S. Geological Survey (USGS) priorities of understanding and managing the health of wildlife and natural ecosystems and will assist DOI natural resource management agencies in the creation of a conservation stewardship legacy.

Goal 1.1: Expand options for managing wildlife by better defining what comprises healthy wildlife and ecosystems. We will carry out proof-of-concept studies defining determinants of wildlife health and proposing, applying, and validating metrics to measure wildlife health. We will apply this approach to a wildlife health problem with One Health implications to generate cross-disciplinary actionable solutions.

Proposed 5-year outcomes
Published at least one study or review article contributing to an understanding of the determinants of wildlife health to more fully elucidate factors affecting wildlife health and to create the basis for the development of health metrics. This will allow for more strategic application of management actions to improve wildlife health, improved assessment of the impacts of management actions, and support for integration of wildlife health metrics into existing management processes (e.g. species status assessments, recovery planning, and habitat conservation planning) to optimize management outcomes.
In collaboration with partners in wildlife management and other wildlife health professionals, developed a process to define and study wildlife health and its determinants from a management perspective. For instance, this could include a health map template that can be applied to specific contexts to understand wildlife health and identify management actions that can promote health.
Worked with partners to publish at least one study developing and applying metrics to measure wildlife health in order to monitor health trends over time and to assess the impacts of management actions.
In collaboration with partners in multiple disciplines, published study employing cross-disciplinary solutions-based approaches to a wildlife health problem with One Health implications based on available management actions.

Goal 1.2: Collaborate with our partners in obtaining, analyzing, and acting on information needed to make wildlife health decisions in a holistic context.

Proposed 5-year outcomes
Developed and implemented a wildlife health toolkit with resources or curricula for wildlife health professionals.
Established a collaborative community of partners, including public health and agricultural agencies, committed to addressing the health of the entire ecosystem to help mobilize knowledge to action.
Held a series of targeted workshops for wildlife professionals that facilitates integration of determinants of wildlife health into management options for enhancing wildlife and ecosystem health.
Released Center products (e.g. newsletters, status and trends reports, wildlife health bulletins, or annual reports) with a health-centric focus.

Strategic Initiative 2: Provide wildlife health intelligence for action

Wildlife disease remains a central component of wildlife health. An understanding of wildlife diseases, the factors that contribute to disease occurrence, and the impacts of disease on populations and ecosystems is crucial to assessing and promoting wildlife health. Wildlife diseases can also negatively impact public health, domestic animal health, and the agricultural economy. Managers and decision-makers must have current information about diseases on the landscape, disease trends, and potential impacts of diseases to wildlife, humans, domestic animals, and the environment to make scientifically-informed decisions. In collaboration with a consortium of partners, the National Wildlife Health Center will design and implement a scalable, national wildlife disease surveillance program to detect priority pathogens, toxins, and toxicants (as defined by the process outlined below), facilitate early detection of novel pathogens, determine risk factors, and understand disease drivers and potential impacts of disease to wildlife health and resilience. This program will serve a national need for this information and will allow natural resource managers and policy-makers to make evidence-driven decisions supported by the most current scientific understanding of wildlife diseases and their impacts.

This Initiative supports DOI and USGS priorities of detecting and investigating wildlife diseases, providing science to inform natural resource management, and protecting our nation's people, resources, and borders from wildlife disease threats.

Goal 2.1: Design and implement a scalable, national wildlife disease surveillance program to detect novel and priority pathogens, toxins, and toxicants, to determine the significance of novel or emerging diseases, and to understand disease drivers.

Proposed 5-year outcomes
Conducted risk assessments tied to determinants of health to identify priority pathogens, toxins, toxicants, and hosts that will serve as the focus for targeted surveillance efforts.
In collaboration with Federal, State, and academic partners, established a designed surveillance program to detect and monitor priority pathogens based on clear objectives that are spatially focused, active, and that identify both presence and absence of pathogens.
Identified focus areas such as geographic nodes, high-risk locations, or species that can be targeted for designed and opportunistic surveillance for detecting novel or emerging diseases.
Conducted outreach with partners to communicate changes to Center strategies for conducting designed and opportunistic surveillance.
Formed an internal working group to assess the significance of wildlife disease events and conducted a pilot project to declare unusual wildlife mortality events for rapid response and enhanced investigation. Classifying wildlife disease events in this manner will help determine, in part, which diseases are a priority for NWHC and warrant further investigation.

Proposed 5-year outcomes
Integrated wildlife health data from surveillance program with other data streams (e.g. environmental data) to determine disease or health drivers
Developed a pipeline for rapid application of next-generation sequencing and bioinformatics expertise to discover novel pathogens associated with important wildlife mortality events.
Conducted laboratory and field studies to determine the significance (e.g., confirming etiology and determining population-level impacts) of novel or emerging diseases.
Maintained readiness for emergency response capabilities including Emergency Support Function-11.

Goal 2.2: Collate and share intelligence to provide situational awareness for wildlife diseases, including endemic, high priority, and emerging diseases.

Proposed 5-year outcomes
Applied FAIR (findable, accessible, interoperable, and reusable) standards to diagnostic and surveillance data and transferred to new Laboratory Information Management System (LIMS).
Continued development of WHISPers to include the ability of partners to submit samples to NWHC and reduce redundancy in data entry and integration with other data systems at NWHC (e.g., LIMS).
Created designed surveillance data structure in WHISPers for improved access to data on location and spread of priority pathogens.
Identified additional stakeholder groups (e.g., Department of Homeland Security's National Biosurveillance Integration Center) to engage with WHISPers or other forms of data sharing.
Disseminated situational reports based on analysis of WHISPers data to State and Federal partners. Developed anomaly detection in WHISPers to alert managers regarding potentially important disease events.
Collectively developed network of national and international partners to facilitate sharing of wildlife health intelligence for improved situational awareness of priority pathogens. WHISPers will be used as a national dissemination point for information on priority wildlife pathogens and mortality events occurring in the US through solicitation of information from partners on occurrence of wildlife diseases or mortality events diagnosed at other laboratories and the sharing of wildlife diseases of interest with the World Organisation for Animal Health (OIE).

Proposed 5-year outcomes
In collaboration with partners in wildlife health, developed and shared case definitions to standardize wildlife disease terminology in North America and to improve the ability to share and access data across databases and agencies.

Strategic Initiative 3: Provide wildlife health tools and technology for action

The promotion of wildlife health is an aspect of natural resource management that is biologically, ecologically, and socio-politically complex. Historically, tools for the management of wildlife health have been primarily pathogen-focused and often used only after disease has manifested in a population. The National Wildlife Health Center will continue to play an important role in pathogen discovery, characterization, development of diagnostic tests and vaccines, and other applied management research to facilitate effective response to disease outbreaks. Additionally, NWHC will explore, develop, and implement new metrics and solutions to assist managers in addressing the wide range of factors (genetic, demographic, environmental, socio-political, etc.) impacting the health of free-ranging wildlife and ecosystems. This will involve collaboration with DOI partners with complementary capabilities, such as the USGS Water Mission Area. The Center will also develop predictive modeling and forecasting tools to allow natural resource managers to make better decisions in the face of uncertainty. The goal is to provide enhanced tools for managers to assist in sound decision-making that optimizes health outcomes.

This Initiative will support DOI and USGS priorities of controlling wildlife disease outbreaks and bridging the gap between science and management for federal trust species by providing science and tools for decision-making and management. Furthermore, this innovative approach will help ensure that USGS retains its position at the forefront of wildlife health science.

Goal 3.1: Create capacity for decision analysis and human dimensions research at NWHC. We will conduct or incorporate research on decision-making impediments and human behavior to improve implementation of wildlife health management.

Proposed 5-year outcomes
Explored need for social science capability at NWHC. By the end of 5 years, decide whether to pursue strategic hire of scientist to build a program focused on integrating human dimensions into wildlife health.
In collaboration with partners, identified 2-3 key wildlife health problems or repeated themes, such as the introduction of exotic pathogens or interagency coordination at the wildlife/livestock/human interface, that would benefit from social science research.
In collaboration with partners in the social sciences, completed a study using a cross-disciplinary, solutions-based approach that included conducting social science research to address a wildlife health problem.

Proposed 5-year outcomes
Increased capacity and enhanced partnerships for use of decision support tools (structured decision making, adaptive management, etc.) to assist partners in wildlife health management decisions.

Goal 3.2: Deploy predictive modeling and forecasting tools for use by wildlife managers to identify factors that affect wildlife health and occurrence of wildlife disease outbreaks impacting wildlife populations, domestic animals, or humans.

Proposed 5-year outcomes
In collaboration with partners, developed practical and user-friendly web applications or tools to increase understanding of processes driving wildlife health, to assess factors impacting occurrence of disease, and for designing model-driven surveillance in preparation for or following a wildlife disease outbreak of high consequence.
Completed risk assessment and development of forecasting tools for partner-identified priority diseases and species where early warning is needed to apply management actions to reduce potential impacts.
Established a quantitative program with expertise in conducting risk assessments, development and application of statistical models and artificial intelligence approaches, and the creation of quantitative tools that are accessible to appropriate users.
In collaboration with partners, provided how-to guides and training materials, as well as in-person training or webinars, educating users on how best to use web applications and tools that have been created.

Goal 3.3: Develop and apply novel laboratory tools for prevention, detection, and management of significant wildlife diseases.

Proposed 5-year outcomes
Worked with USGS Water Mission Area on large-scale health issues associated with water quality that could be predicted or managed to improve wildlife health.
Completed at least one field-deployable assay for a wildlife disease of importance to the wildlife health community for active use in the field.
Continued development of field-deployable wildlife vaccines for important wildlife diseases.
Continued development of diagnostic assays for wildlife diseases of significant management concern.

Planning team members

- James Gray (facilitator)
- Katrina Alger
- David Blehert
- Julia Lankton (chair)
- Jeff Lorch
- Katie Richgels
- Jonathan Sleeman
- Dan Walsh
- C. LeAnn White

Focus group team members

- Darren Berger
- Brenda Berlowski-Zier
- Barb Bodenstein
- Mike Bonds
- Tom Hankins
- Melissa Lund
- Robin Russell
- Valerie Shearn-Boschler